COURSE
GUIDE

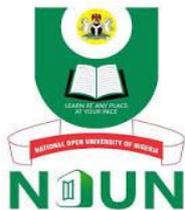**LIS 218**
INTRODUCTION TO TELECOMMUNICATIONS

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NATIONAL OPEN UNIVERSITY OF NIGERIA

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INTRODUCTION

Welcome to LIS 218: Introduction to Telecommunications. This Course Guide is a brief description of what the course is all about and the course material will give you the contents of what you are expected to learn in this course. It also contains some general guidelines on the amount of time you are expected to spend on each unit of this course in order to successfully complete the course. There is a separate Assignment File which contains detailed information on tutor-marked assignments that you are expected to answer at the completion of each unit.

WHAT YOU WILL LEARN FROM THIS COURSE

The course consists of 15 units of reading materials which should engage you for about 15 weeks. Each unit is designed to provide reading materials for two to three hours of study. This course does not require prior skills in any area of knowledge other than the general admission requirements. The approach at this level is to help the students to understand the basic concepts of telecommunications, the history of telecommunication by tracing the timeline from the traditional era to modern days of communication and to appreciate the impact of telecommunications (both negative and positive) in our society.

The rest of this guide will tell you what you are expected to learn in this course, how to work through the course, the content of the course, and useful information on exercises and assignments, and how to get the most out of the course.

COURSE AIMS

The aim of this course is to introduce the students to the course introduction to Telecommunication in library and information science. This will be achieved by
Introducing the students to the introduction to telecommunications.
Helping students to know the basic concepts in telecommunications.
Exposing students to the history of telecommunications from the traditional era to modern days of communication.

Discuss the impacts of telecommunications (both negative and positive in our society).

COURSE OBJECTIVES

To achieve the above aims, some general objectives were set for the course. The course is divided into units and each unit has specific objective at the beginning. You may want to refer to them during and

after you might have completed a unit to check the pace of your progress. The general objectives set below cover the whole course. By meeting these objectives, you should have achieved the aims of the course.

On successful completion of the course, you should be able to:

- Define the basic concepts of telecommunications and its importance
- Understand different ways telecommunication messages are being sent
- Know how telecommunications work
- Trace the timeline of telecommunications from earlier time to modern era
- Identify the different types of telecommunication systems, their components and functions
- Identify telecommunication by their geographical scopes and topology
- Understand the impact of telecommunication on various sectors of the society

WORKING THROUGH THIS COURSE

To go through this course you are required to read the study units, answer the self-assessment exercises and do the assignment in each unit. The self-assignment exercises are meant to help you to reinforce what you have learnt. It will be very helpful to you to try and answer the questions first before looking at the answers. At the end of the unit, you will find an assignment, which will be marked by your tutor. Work diligently on it and submit your work to your tutor for grading. Individual assignments/test, Group assignments, Discussions/Quizzes/Out of class engagements etc will constitute 40% of the total marks of the examination in this course.

You will need to have access to a computer and be familiar with the basic elements of a computer system. In due course, you will have practical exercises in the library and on the Internet, and so, you need to have access to these facilities. It is expected that you will spend on the average two to three hours to study one unit and about 15 weeks to complete the whole course. However, you should realize that you are actually to work at your own pace.

COURSE MATERIALS

Major components of the course are:

i.   The Course Guide
ii.   Study Units
iii.   Assignments
iv.   References /Further Reading
v.   Presentation Schedule

STUDY UNITS

There are 15 units which you will work through in this course. They are:

Module 1   Definitions and Concepts

Unit 1   Tele, Communication, Telecommunications
Unit 2   Methods of sending Telecommunication messages
Unit 3   General importance of Telecommunications

Module 2   History of Telecommunications

Unit 1   Timeline of Telecommunications
Unit 2   Traditional Telecommunications
Unit 3   Modern Telecommunications

Module 3   Telecommunications systems

Unit 1   Telecommunications systems – meaning and examples
Unit 2   Components of Telecommunications systems
Unit 3   Telecommunications networks

Module 4   Telecommunications Networks

Unit 1   Telecommunications networks: an overview
Unit 2   Geographical networks
Unit 3   Network topology

Module 5   Impact of Telecommunications in the society

Unit1   Impact of Telecommunications on the Social sector
Unit 2   Impact of Telecommunications on the Education sector
Unit 3   Impact of Telecommunications on the Economic sector

Each unit consists of table of contents, introduction, statement of objectives, main content, conclusion, summary, tutor marked assignment

and references. There are activities at every point that will assist you in achieving the stated objectives of individual units of this course.

PRESENTATION SCHEDULE

Your course materials will spell out the important dates for early and timely completion and submission of your Tutor-Marked Assignments and for attending tutorials. You should bear it in mind that assignments should be submitted at the stipulated time and date. Make sure you do not lag behind in your work.

ASSIGNMENT FILE

There are at least thirty assignments in this course, that is, at least one assignment per unit. The assignment file contains all the works you are to submit to your tutor/facilitator for marking. Your assignments are as important as your examinations and they carry 30% of the scores are marked for the course.

ASSESSMENT

Assessment method will be of two-folds. These are assignments and written examination. The course materials are prepared to assist you to do the assignments. You are expected to utilize the information and knowledge from the recommended texts at the end of each unit. The assignments will carry 30% of the total marks while the final examination of about three hours duration will be written at the end of the course and this will carry 70%.

TUTOR-MARKED ASSIGNMENT (TMA)

The Tutor-Marked Assignment is a continuous assessment component of your course and it accounts for 30% of the total score. You are required to submit at least three (3 TMAs before you are allowed to sit for the end of course examination. Your facilitator will give you the TMAs and you are expected to return same to him/her as and when due.
Your assignment file contains the assignment questions for the units in this course. The information and materials contained in your reading, study units and references will assist you in completing your assignments. You should demonstrate that you have adequate knowledge of the materials read and that you have equally made further research into other references, which will give you a wider viewpoint as well as provide you a deeper understanding of the course.

Ensure that each tutor-marked assignment reaches your facilitator on or before the deadline stated in the presentation schedule and assignment file. In case of any unforeseen circumstances that may hinder you from submitting your assignment before the due date, contact your facilitator before the assignment is due to discuss the possibility of an extension. Extension will not be granted after the due date.

FINAL EXAMINATION AND GRADING

The final examination for LIS 218 is about three hour's duration and it has a value of 70% of the total marks. The examination questions will reflect the type of self -testing, practice activities and tutor-marked assignments/problems that have previously been encountered in the course. All areas of the course will be assessed.

You could form a discussion group with a considerable number of your colleagues and practice or discuss the activities and assignment written in each unit before the examination period.

COURSE MARKING SCHEME

Assessment	Marks
Assignment 1-30 (best 3 out of all will be submitted)	Three assignment marked, each 10% totaling 30%
Final Examination	70% of Overall Course Score
Total	100% of course Score

SUMMARY

This course LIS218 – Introduction to Telecommunications, intends to expose the students to the fundamentals and processes of telecommunications and its impact in the society. Upon the completion of this course, the students will be equipped with the necessary knowledge concerning the concepts of telecommunications in the society.

I wish you success in this course.

**MAIN
COURSE**

CONTENTS

MODULE 1   DEFINITIONS AND CONCEPTS OF TELECOMMUNICATIONS

Unit 1   Tele, Communication, Telecommunications
Unit 2   Ways Telecommunications messages are sent
Unit 3   General Importance of Telecommunications

UNIT 1   TELE, COMMUNICATION, AND TELECOMMUNICATIONS

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1.0   INTRODUCTION

Literarily, most people understand the meaning of communication to be strictly the exchange of ideas, messages or information between and among two or more people. In the field of Information and Communication Technology, the meaning of communication is much more about the exchange of data and information between and among technologies where feedback is a necessary component. In this module, you will be exposed to what tele, communication, and telecommunications as concepts are all about. The ways Telecommunication messages are sent and how Telecommunication works generally will also be discussed in this module.

This unit will help you to understand the basic concept of Telecommunication as it will clearly explain the two words that make up the word "Telecommunication". It will also explain the importance of Telecommunication.

2.0   INTENDED LEARNING OUTCOMES

- At the end of this unit, you should be able to:
- Define Tele, Communication and Telecommunications
- Identify the components and various levels of communication
- Identify the importance of Telecommunications generally

3.0   MAIN CONTENT

3.1   Definition of Tele

The word "Tele" comes from [Ancient Greek](#) , meaning "at a distance, far off, far away, far from". This is often used especially in transmission over a distance. Example where Tele is mostly used in the formation of compound words such as telegraph, telephone, television, telescope e.t.c

3.2   Communication as a Concept

The term "communication" has been derived from the Latin word "communis," that means "common". Thus "to communicate" means "to make common" or "to make known", "to share" and includes verbal, non-verbal and electronic means of human interaction. Communication is the process of sharing data, information, thoughts and feelings between the transmitter and the recipient through signals, speaking, writing or body language. The transmitters and the recipients can be human or computer depending on the context in which it is being used. Scholars who study communication analyse the development of communication skills in humans and theorise about how communication can be made more effective. It is the meaningful exchange of information between two or a group of people. Communicative competence designates the capability to install intersubjective interactions, which means that communication is an inherent social interaction (Hartley, 2009)

Communication may be intentional or unintentional, may involve conventional or unconventional signals, may take linguistic or non-linguistic forms, and may occur through spoken or other modes" (Mehrabian, 2005). This act of making common and known is carried out through exchange of thoughts, ideas or the like. The exchange of thoughts and ideas can be had by gestures, signs, signals, speech or writing. People are said to be in communication when they discuss some matter, or when they talk on telephone, or when they exchange information through letters. Basically, communication is sharing information, whether in writing or orally. Humans convey information through a variety of methods: speaking, telephones, email, blogs, TV,

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art, hand gestures, facial expressions, body language and even social contexts (Velentzas, Mamalis, Broni, 2010)

Communication plays very important role in the human life. Since the moments of our existence we communicate our wants and needs. In the earlier days communication was very difficult due to lack of proper means of communication. If anybody wanted to convey a message to a person who is living far away, that message used to be sent with the help of human beings only. For a longer distance and more detailed message pigeon post was used. These means were very costly, uncertain and time consuming also. Because of all these reasons there was a great need of efficient means of communication to save time and money and hard work (Cheney, 2011).

3.2.1. Types of Communication

Communication may be divided into two areas – verbal and non-verbal communication. Verbal communication, or communication through words, provides the opportunity for personal contact and two-way flow of information among humans. A large part of our communication as human is verbal in nature. Verbal communication may be divided into two areas – oral and written communication. Oral communication may be defined as a process whereby a speaker interacts verbally with one or more listeners, in order to influence the latter's behavior in some way or the other. Oral communication in a business context can takes the form of meetings, presentations, one-to-one meetings, performance reviews and so on. Written communication is a process whereby a writer interacts verbally with a receiver, in order to influence the latter's behavior. Written communication at the workplace can take several forms such as letters, memos, circulars, notices, reports and email.

Non-verbal communication, on the other hand may be defined as communication without words. This could happen among humans and also computers. It refers to any way of conveying meanings without the use of verbal language. Non-verbal communication is generally unintentional, unlike verbal communication in humans. Humans tend to communicate silently unknowingly to send signals and messages using non-verbal expressions such as gestures, facial expressions, posture and the way we dress. Whereas computers communicate knowingly with one another by sending signals and messages.

Fig.1.1: Pictures showing Verbal Communication among humans
Source: Communications Images. Google.com

Non Verbal Communication

Non verbal (Personal) communication may be defined as the communication between the Sender and the Receiver when both physically present at a place use the means other than language or spoken word to convey their feelings and thoughts.

articles junction.blogspot.com

Fig.1.2: Pictures showing Non-Verbal communication in human
Source: Communications Images. Google.com

3.2.2 Communication Process

Communication is a continuous process which mainly involves the following:

1. Sender

The sender or the communicator generates the message and conveys it to the receiver. He is the source and the one who starts the communication

2. Message

It is the idea, information, view, fact, feeling, etc. that is generated by the sender and is then intended to be communicated further.

3. Encoding

The message generated by the sender is encoded symbolically such as in the form of words, pictures, gestures, etc. before it is being conveyed.

4. Media

It is the manner in which the encoded message is transmitted. The message may be transmitted orally or in writing. The medium of communication includes telephone, internet, post, fax, e-mail, etc. The choice of medium is decided by the sender.

5. Decoding

It is the process of converting the symbols encoded by the sender. After decoding the message is received by the receiver.

6. Receiver

He is the person who is last in the chain and for whom the message was sent by the sender. Once the receiver receives the message and understands it in proper perspective and acts according to the message, only then the purpose of communication is successful.

7. Feedback

Once the receiver confirms to the sender that he has received the message and understood it, the process of communication is complete.

8.   Noise

It refers to any obstruction that is caused by the sender, message or receiver during the process of communication. For example, bad telephone connection, faulty encoding, faulty decoding, inattentive receiver, poor understanding of message due to prejudice or inappropriate gestures, etc.

Fig.1.3:Diagram of Communication Process
Source: Communications Processes. Google.com

3.2.3   Levels of communication

There are basically five levels of communication
Intra Personal Communication: level one is the simplest level of communication which takes place within one self. Most of the intra personal communication is in form of thinking. This forms the basis for all other levels of communication. Example is thinking and speaking to one self (aloud)

Inter Personal Communication: This is the second level of communication which refers to sharing ideas between two or more people. It can be formal or informal. This level is more complex than the level one because it involves senders and receivers, so there are possibilities of interference.

Small Group Communication: This is the third level of communication. It involves interaction among four to twelve individuals. Small group communication is often used for problem solving session or meetings where everyone is given the chance to make his/her own contribution.
Public Speaking Communication: This is a situation whereby one person communicates with many people. It involves presentation by one

individual in a face-to-face situation with an audience. Public speaking differs from small group communication because the size of the audience is too large to allow each and everyone in the audience interacts with the speaker unlike the second and third level where there is constant give and take between senders and receivers. In public speaking, most of the feedback from the audience is non-verbal. Examples are delivering lecture to a large number of students, conferences, seminars, workshops etc.

Mass Communication: This is using electronic and print technologies for sending messages to large number of people at once and received at the same time. Television, radio, newspapers, magazines, compact discs and the Internets are all forms of mass communication

3.3   Telecommunication as a concept

The word telecommunication was adapted from the French word télécommunication. It is a compound of the Greek prefix tele- (τηλε-), meaning 'far off', and communication, meaning 'to transfer information'. Telecommunications, also known as telecom, is the exchange of information over significant distances by electronic means and refers to all types of voice, data and video transmission. This is a broad term that includes a wide range of information transmitting technologies such as telephones (wired and wireless), microwave communications, fiber optics, satellites, radio and television broadcasting, the internet and telegraphs. In essence, Telecommunications is the suite of technologies, devices, equipment, facilities, networks, and applications that support communication at a distance. Electronic equipment such as radio and television help us transfer information to one another over long distances. This has played a significant role in people's lives since the 19th century (Freeman, 2005)

In modern times, the process of telecommunication involves the sending of electromagnetic waves by electronic transmitters but in earlier years it involved the use of smoke signals, drums or semaphore (as discussed in module 1). Today, telecommunication systems or devices such as television, radio and telephone are widespread and are common in many parts of the world. There is also a vast array of networks that connect these devices, including computer networks, public telephone networks, radio networks and television networks. Computer communication across the Internet, such as e-mail and instant messaging, is just one of many examples of telecommunication. This is transmitted through a transmission media, such as over physical media, for example, over electrical cable, or via electromagnetic radiation through space such as radio or light. Such transmission paths are often divided into

communication channels which afford the advantages of multiplexing (Freeman, 2005).

The range of telecommunications applications is broad and includes telephony and video conferencing, facsimile, broadcast and interactive television, instant messaging, e-mail, distributed collaboration, a host of Web- and Internet-based communication, and data transmission.

Fig.1.4:   Diagrams   showing   Telecommunications
Source: Telecommunications Images. Google.com

SELF-ASSESSMENT EXERCISE

List the eight communication processes.

4.0   CONCLUSION

Telecommunication has now become an integrated part of the society. With better use of telecommunication equipment, effective communication can be possible. This unit has highlighted and discussed in details what you need to know about the concepts of telecommunication by introducing to you the concepts of Tele, communication and Telecommunication. By now you should be able to differentiate the literal meaning of communication and the technological meaning. Also, by using the definition of the two terms "Tele" and "communication", you should be able to define telecommunication

without any stress. You can now identify the importance of telecommunication generally.

5.0   SUMMARY

The unit has exposed you to the concept of "tele" and "communication" as separate concepts and telecommunication as a compound concept. The origin in the case of "tele" was highlighted. Communication, the processes and the levels of communication were discussed with examples. Finally, the unit dwelled on the telecommunication and its concepts. The next unit will explain the way Telecommunication messages are being sent.

6.0   TUTOR-MARKED ASSIGNMENT

Discuss the concept of Telecommunication and its significance in the society.

7.0   REFERENCES/FURTHER READING

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UNIT 2   METHODS   OF   SENDING TELECOMMUNICATIONS MESSAGES

CONTENTS

1.0   INTRODUCTION

From the preceding unit, it is evident that telecommunications messages can be sent in a variety of ways and by a wide range of devices. This unit will help you to understand the various ways Telecommunications messages are sent from source to destination. This includes point-to-point, point-to-multipoint and multiplex system.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

* discribe the point-to-point means of sending Telecommunications messages and their examples
* explain the point-to-multipoint means of sending Telecommunications messages and their examples
* discuss the multiplex way of sending Telecommunications messages and their examples.

3.0   MAIN CONTENT

3.1   Point –to – Point

Point-to-point transmission: The messages can be sent from one sender to a single receiver such as personal communication through telephone conversation between two people or facsimile (fax) messages.

Telegraph

Telegraph services use both wireline and wireless media for transmissions. Soon after the introduction of the telegraph in 1844, telegraph wires spanned the country. Telegraph companies maintained a system of wires and offices located in numerous cities. A message sent by telegraph was called a telegram. Telegrams were printed on paper and delivered to the receiving party by the telegraph company. With the invention of the radio in the early 1900s, telegraph signals could also be sent by radio waves. Wireless telegraphy made it practical for oceangoing ships as well as aircraft to stay in constant contact with land-based stations.

Telephone

The telephone network also uses both wireline and wireless methods to deliver voice communications between people, and data communications between computers and people or other computers. The part of the telephone network that currently serves individual residences and many businesses operates in an analog mode and relays electronic signals that are continuous, such as the human voice. Digital transmission is now used in some sections of the telephone network that send large amounts of calls over long distances. However, since the rest of the telephone system is still analog, these digital signals must be converted back to analog before they reach users. The telephone network is stable and reliable, because it uses its own wire system that is powered by low-voltage direct current from the telephone company. Telephone networks modulate voice communications over these wires. A complex system of network switches maintains the telephone links between callers. Telephone networks also use microwave relay stations to send calls from place to place on the ground. Satellites are used by telephone networks to transmit telephone calls across countries and oceans.

Telex

Telex is primarily a point-to-point system that uses a keyboard to transmit typed text over telephone lines to similar terminals situated at individual company locations.

Facsimile

Facsimile transmission now provides a cheaper and easier way to transmit text and graphics over distances. Fax machines contain an optical scanner that converts text and graphics into digital, or machine-readable, codes. This coded information is sent over ordinary analog

telephone lines through the use of a modem included in the fax machine. The receiving fax machine's modem demodulates the signal and sends it to a printer also contained in the fax machine.

3.2   Point – to – Multipoint

Point-to-multipoint transmission: This type of transmission occurs when one sender transmits information to many receivers. This often involves broadcasting which provide the basis for commercial radio and television programming.

Teletype

The teletype, essentially a printing telegraph, is primarily a point-to-multipoint system for sending text. The teletype converts the same pulses used by telegraphs into letters and numbers, and then prints out readable text. It was often used by news media organisations to provide newspaper stories and stock market data to subscribers.

Radio

Radios transmit and receive communications at various preset frequencies. Radio waves carry the signals heard on AM and FM radio, as well as the signals seen on a television set receiving broadcasts from an antenna. Radio is used mostly as a point-to-multipoint medium for commercial broadcasts, but it can also be used for personal point-to-point transmissions. Two-way radios, cordless telephones, and cellular radio telephones are common examples of transceivers, which are devices that can both transmit and receive messages from point to point. Personal radio communication is generally limited to short distances (usually a few kilometers), but powerful transmitters can send radio signals hundreds of kilometers. Shortwave radio, popular with amateur, or ham, radio enthusiasts, uses a range of radio frequencies that are able to bounce off the ionosphere. This electrically charged layer of the atmosphere reflects certain frequencies of radio waves, such as shortwave frequencies, while allowing higher-frequency waves, such as microwaves, to pass through it. Shortwave radio operators use the ionosphere to bounce their radio signals to other radio operators thousands of kilometers away.

Television

Television is primarily a point-to-multipoint technology that is broadcast to any user within range of the transmitter. Televisions transmit news and information, as well as entertainment. Commercial television is broadcast over high-frequency radio waves and can be received by any

television set within range of the transmitter. Televisions have also been used for point-to-point, two-way telecommunications.

Cable television is a commercial service that links televisions to a source of many different types of video programming using coaxial cable. The cable provider obtains coded, or scrambled, programming from a communications satellite, as well as from terrestrial links, including broadcast television stations. The signal is scrambled to prevent unpaid access to the programming. The cable provider electronically unscrambles the signal and supplies the decoded signals by cable to subscribers. Television users with personal satellite dishes can access satellite programming directly without a cable installation. Personal satellite dishes are also a subscriber service. Fees are paid to the network operator in return for access to the satellite channels.

3.3   Multiplex System

Multiplex System: This is a way of transmitting information which involves multiple transmitters and multiple receivers. This is designed to cooperate and to share the same physical channels in transmission process. Examples are video conferencing and telephony conferencing. Teleconferencing and Video conferencing

This is a type of multiplex system in which a television picture or telephony links two or more physically Separated parties using only one physical channel. It is a convenient way for people to meet and communicate without the expense or inconvenience of travel. Video cameras on computers now allow personal computer users to teleconference over the Internet.

4.0   CONCLUSION

This unit has discussed the various ways of sending and receiving telecommunication messages. They are point-to-point, point-to-multipoint and multiplex systems. Examples were given in each case and how they work was demonstrated to you.

5.0   SUMMARY

In this unit, you have been explicitly taught the different ways through which telecommunication messages can be sent and received. The next unit will explain the general importance of telecommunications.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Explain how point-to-point works.
2.   What is the difference between point-to-point and point-to-multiple in   telecommunication sending messages?

7.0   REFERENCES/FURTHER READINGS

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UNIT 3   IMPORTANCE OF TELECOMMUNICATION

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1.0   INTRODUCTION

Telecommunications has become part and parcel of the society which every individual cannot do without ranging from radio to television to telephone to computers and the Internet; therefore it is imperative that importance of telecommunications be highlighted. This unit will expose you to the general importance of telecommunications from local to global perspectives.

2.0   INTENDED LEARNING OUTCOME

By the end of this unit, you will be able to:

explain the importance of Telecommunication in general.

3.0   MAIN CONTENT

3.1   General Importance of Telecommunications

The following are some of the importance of Telecommunication:

1.   Enhanced Efficiency in Communication

The geographical distance that used to exist long ago in the past has been bridged as telecommunication becomes an integral part of the society. Telecommunications enable people around the world to communicate and to have contact with one another. It allows people to have immediate access to information and to communicate even from remote areas. Long lost friends and relations have been able to re-unite due to the existence of telecommunication. Also, when there are good and smooth means of passing information from the top management to the middle management down to the lower management and vice versa

then business activities are certain to run properly. Customers and other partners can exchange information accurately in any organisation that exploits the use of telecommunications systems. Telecommunication tools such Cloud Meeting help you to communicate with any member of the organisation effortlessly. This is the kind of efficiency that telecommunication tools have brought. Your employees won't necessarily need to be on their PC to receive information. They can just easily do so using their mobile gadgets.

2.   Increase flexibility in Working Place

In the past, working has not been as flexible as we have now. This is possible because of many telecommunication tools available. Employers and employees don't have to be physically present for every meeting. They do not have to travel to attend meetings as conference meeting can always be scheduled. They can take part by connecting to video conferencing software such as Skype, ezTalks, etc.

The number of people working from home has been rising continuously for the past few years. This can be attributed to the improved performance of telecommunication tools. It allows workers to attend meetings, workshops and complete their tasks online right from the comfort of their homes.

3.   Improves Team Work

Team work is a critical aspect in any organisation. Every team member needs to have access to the rest of their colleagues to be able to perform their duties effectively and efficiently. With a very good telecommunication connection, all team members become connected virtually. They can exchange information more easily using video call. Asking questions or clarifying issues, progress and updates also becomes easy. This is not limited to teams only but the entire company as they all can be linked together where they could communicate to each other regardless of their location in the organisation. People in different departments can call each other with the use of telecommunications. When employees are closer, consultations becomes easier, therefore, improved performance can be guaranteed.

4.   Boosts Customer Relations and Services

Organisation has to make sure that its clients are well treated and handled because customers are important to the company. Customers should feel cherished, and one way to accomplish this is to ensure that they have complete access to excellent customer care. Telecommunication tools have changed how organisations interact with

their clients. Customers now have the opportunity to contact companies and have face-to-face interactions where they get to share their concerns from wherever they are located. With such a platform an organisation will not only benefit by having loyal customers but will also have good public relations as the customers are likely to speak remarkable things about the company. An excellent telecommunication connection can make this to be achieved therefore; leading to a more satisfied customer and this can attract more prospective clients.

5.   Saves Time, Costs and Office Space

As noted earlier, telecommunication enables employees to virtually attend meeting. They no longer have to travel long hours on the road, air or train just to attend in a meeting. Through their mobile gadgets and PC, they can use ezTalks software or skype, for example, to take part in the meeting. These softwares provide the participants with an interactive platform where they can not only listen but also contribute and view presentations using the provided whiteboards. They can also save these presentations to review later. This saves them a lot of time and cost of travelling.

People and organisations now utilise the work-at-home options as telecommunication devices become more convenient and easy to use. Individuals can execute all their office operations from the comfort of their homes. As this brings convenience to the employees, it also reduces cost on the employer's side such as the amount spent on purchasing desks, computers, paying electricity and rent. Such savings can help to reduce businesses' running costs thereby increasing profit.

4.0   CONCLUSION

The importance of telecommunication has been experienced by every individual in this modern world, some of which we have learnt in this unit. Efficient telecommunication has significantly helped individuals and companies to use their time more appropriately because time has always been an essential element in day to day activities of human beings. You should by now appreciate Telecommunications better!

5.0   SUMMARY

In this unit, you have been exposed to the importance of telecommunications in general. The next module takes on the history of Telecommunications

6.0 TUTOR-MARKED ASSIGNMENT

List and explain five importance of telecommunication in our society. Explain why Telecommunications is important.

7.0 REFERENCES/FURTHER READINGS

http://www.irfanerdogan.com/intro2com/communicationas.pdf

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MODULE 2   HISTORY OF TELECOMMUNICATIONS

Unit 1   Timeline of Telecommunications
Unit 2   Traditional Telecommunications Systems
Unit 3   Modern Telecommunications Systems

UNIT 1   TIMELINE OF TELECOMMUNICATIONS

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
        3.1   Tracing the timeline of Telecommunications from
                traditional to modern era
4.0   Conclusion
5.0   Summary
6.0   Tutor Marked Assignment
7.0   References/Further Reading

1.0   INTRODUCTION

The history of telecommunication has been seen to be progressing steadily matching human growth. This module will guide you through the historical development of Telecommunication. You will also be exposed to the different types of traditional and modern telecommunications systems.

This unit will help you to trace the timeline of Telecommunication from thetraditional to modern era. Specifically, from prehistoric era when fires, beacons, smoke signals, communication drums, horns were used as mode of communication over distance to the modern era when Internet telephony is the order of the day.

2.0   INTENDED LEARNING OUTCOME

By the end of this unit, you will be able to:

•   trace the timeline of telecommunications from the traditional to modern era.
•   Discuss the different developmental stages of telecommunication.

3.0   MAIN CONTENT

3.1   Tracing the timeline of Telecommunications from Traditional to Modern Era

The timeline of telecommunications is dated from the ancient era to our present day society. One remarkable thing across the momentous development of telecommunication is that man tries to looks for ways to solve his problem of exchanging of ideas over a distance via a variety of methods. The history of telecommunications however began with the use of smoke signals were the sight of smoke from afar signifies a kind of message. Also, different sounds of drums and lung blown horns relay different messages which can be heard from afar e.g sound for celebration is different from mourning and so on. This is mostly seen in Africa, the Americas and parts of Asia. Then in the 1790s, the first fixed semaphore systems emerged in Europe; however it was not until the 1830s that electrical telecommunications systems started to appear. The growth of Telecommunications is becoming more widespread and efficient as the development of modern civilization unfurl. This unit details the history of telecommunications and the individuals who helped make telecommunications systems what they are today.

Prehistoric Era: Fires, beacons, smoke signals, communication drums, horns: Man's first attempts at distance communication were extremely limited. This was the era when prehistoric man relied on fire and smoke signals as well as drum messages to encode information over a limited geographic area as they attempted to contact neighboring clans. These signals also needed to have very simple, pre-decided meanings like "safe" or "danger" or "victory" or could be used as a form of alarm system in order to alert prehistoric clans to predators or invading clans.

6th Century BCE: Mail: Cyrus the Great was a Persian emperor at the height of Persia's power in the 6th century BCE. The empire was so vast that Cyrus couldn't easily communicate from one end to the other: He is credited as having established the first postal system in the history of the world. Other ancient powers like Egypt, Rome, and China eventually built their own postal systems later on. http://www.cyrusthegreat.net/

5th Century BCE: Pigeon post: Persia and Syria are credited with establishing the first pigeon messaging system around the 5th century BCE due to the discovery that pigeons have an uncanny ability to find their way back to their nests regardless of the distance. Travelers would bring doves and pigeons along with them, attach messages to them and release them to fly back home. Later on, pigeons would be used by

Romans to report the outcomes of sporting events and by Egyptians for military communications. http://www.deadmedia.org/notes/4/041.html

4th Century BCE: Hydraulic Semaphore: In the 4th century BCE, the hydraulic semaphore was designed in ancient Greece as a method of communication, and it was vital during the first Punic War. Very much like early smoke signals or beacons, it involved a network of identical containers on separate hills, each with a vertical rod floated in it. These rods would have predetermined codes inscribed at various intervals. Someone who wished to communicate would signal another with a torch; they would synchronize and then simultaneously open their spigots and drain the water until it was at the desired code. This system also had the same limitations as smoke signals - the messages had to be pre-determined prior to sending them. http://kotsanas.com/gb/exh.php?exhibit=1201002

Circa 490 BCE: Heliographs (shield signals): The heliograph or shield signal was first documented during the famous Greek battle of Marathon that took place in 490 BCE. A heliograph involves the shining of the sun on a polished object like a shield or mirror. Interestingly enough, in this instance, the signal given was not really understood, since its meaning had not been clearly agreed upon prior to it being used. http://kotsanas.com/gb/exh.php?exhibit=1201002

15th Century CE: Maritime flag semaphore: The ability to communicate between ships was very difficult before the 15th century. At that time, flag semaphore, a special code involving the positions of two hand-held flags, was introduced. Each position and motion represented a letter or number. This made it very easy for fleets to communicate. http://www.anbg.gov.au/flags/semaphore.html

1672: First experimental acoustic (mechanical) telephone: Robert Hooke is first credited with creating an acoustic telephone in 1672. Hooke discovered that sound could be transmitted over wire or string into an attached earpiece or mouthpiece. At the time, it's not clear that he was aware of the implications of this discovery, as his notes point toward his desire to use this device to make music. http://oceanofk.org/telephone/html/part1.html

1790: Semaphore lines (optical telegraphs): Using the maritime flag semaphore as a starting point, the Chappe brothers, two French inventors, created the first optical telegraph system in 1790. The optical telegraph was a system of pendulums set up somewhere high like on a tower or the top of a town clock. The telegraph would swing its mechanical arms around and sign messages from one tower to the next. It was the first telecommunications system in Europe.

http://people.seas.harvard.edu/~jones/cscie129/images/history/chappe.html

1838-1922: Electrical telegraph: Samuel B. Morse had been working on the idea of a recording telegraph with friends Alfred Vail and Leonard Gale. They discovered that when connecting two model telegraphs together and running electricity through a wire, you could send messages by holding or releasing the buttons in a series of intervals. This became known as Morse code and laid the foundation for modern land-line phones.https://earlyradiohistory.us/sec002.htm

1858: First trans-Atlantic telegraph cable: At this point, most of Britain and the United States had telegraph stations and were able to regularly communicate within their own countries, but a man named Cyrus Field from New York wanted to lay the first transatlantic telephone cable to connect England and the United States by telegraph. This project, though it was met with many setbacks, was finally completed in August of 1858. https://nationalmaglab.org/education/magnet-academy/history-of-electricity-magnetism/museum/transatlantic-telegraph-cable

1867: Signal lamps: In 1867, the first dots and dashes were flashed by signal lamps at sea. The idea was that of British Admiral Phillip Colomb, who took the design of signal lamp inventor Arthur C.W. Aldis and implemented this method of communication as well as his own code in order for the ships in his fleet to easily communicate. This code was similar to Morse code, but eventually, Morse code became more widely used. https://en.wikipedia.org/wiki/Signal_lamp

1876: Telephones: The year 1876 was a big one for Alexander Graham Bell. Having come to the U.S. as a teacher for the deaf, he had been trying to figure out a way to transmit speech electronically. Despite little support from his friends, he successfully invented the telephone in March   of   1876. http://www.pbs.org/transistor/album1/addlbios/bellag.html

1877: Acoustic phonograph: Inventor Thomas Alva Edison made incredible strides in sound recording and transmission when he completed the first acoustic phonograph in August of 1877. He had been trying to improve and finalise the model for the telephone when he realized that by attaching a needle to the phonograph diaphragm and a tin-foil cylinder on which the needle could record spoken words, he could   record   and   play   back   sounds. http://memory.loc.gov/ammem/today/aug12.html?loclr=blogtea

1880: Telephony via light-beam photophones: In 1880, Alexander Graham Bell took the money he'd received for successfully creating the

telephone, set up a lab and got to work improving his invention. The fruit of his labor was the photophone, a device capable of transmitting sound in a beam of light. In essence, Bell had made the first wireless call in
history!http://www.americaslibrary.gov/jb/gilded/jb_gilded_bell_1.html

1893: Wireless telegraphy: Nikolai Tesla was the first to successfully transmit radio waves wirelessly through a transmitter in 1893. He patented his work, which was lucky because shortly after that, Guglielmo Marconi, another inventor, alleged that Tesla had copied his work. During the legal battle that ensued, this was found to be untrue. Tesla continued to experiment with wireless transmission and attempted to create a more efficient light bulb. https://www.internetsociety.org/internet/what-internet/history-internet

1896: Radio: Undaunted by his defeat in the U.S. courts, Marconi kept working on his own versions of wireless transmission of sound. In 1896, he sent his first long-distance wireless transmission. The signal was sent over a distance of 2 kilometers. The recipient of this signal waved a white kerchief to show that it had been received. This earned Marconi a place in the history books as the man who gave us the first radio. http://www.seas.columbia.edu/marconi/history.html

1915: First North American transcontinental telephone calling: Alexander Graham Bell is back in the history books again after he made the first coast-to-coast call by phone in January of 1915 to his assistant. It was the first long-distance call made in history from a land-line. It has significance because it made long-distance communication all over the country a reality. http://www.telcomhistory.org/vm/scienceLongDistance.shtml

1927: Television: Phillip T. Farnsworth made media history on September 7, 1927, when he demonstrated the first working television set. He had been working on a method to transmit images: What he discovered was that you could encode radio waves with an image and then project them back onto the screen. This gave us the first television prototype.
http://www.nyu.edu/classes/stephens/History%20of%20Television%20page.htm

1927: First U.K.-U.S. radio-telephone service: The first radio-telephone service from the U.K. to the U.S. was established in January of 1927. The phones were initially radio phones, so there were some issues with fading and interference. Initially, it was only one circuit and received about 2,000 calls a year, and the cost for three minutes of conversation

time   was   nearly $10.   http://strowger-net.telefoonmuseum.com/tel_hist_tat1.html

1930: First experimental videophones: In 1930, AT&T had decided to create a two-way experimental videophone they called the Iconophone. This allowed people to see, hear, and respond to those they were speaking to in real time. The idea, although different, did not meet with much   commercial   success.   http://archiv.ub.uni-heidelberg.de/artdok/2016/1/Mills_The_audiovisual_telephone_2012.pdf

1934: First commercial radio-telephone service, U.S.-Japan: The first radio telephone calls from the U.S. to Japan were first made in 1934. This enabled people to speak across the Pacific Ocean for the first time. Unfortunately, due to the distance, the quality of the calls was not great. There   tended   to   be   a   lot   of   fading   and interference. http://history.journalism.ku.edu/1930/1930.shtml

1936: World's first public videophone network: The world, now in the throes of World War II, sees the first public videophone network installed in Nazi Germany in March of 1936 during a trade fair. It was for use by "Aryans only" for a limited time each day from 8 a.m. until 8 p.m. It was left installed there even after the trade show was over. http://www.terramedia.co.uk/Chronomedia/years/1936.htm

1946: Limited-capacity mobile telephone service for automobiles: In June of 1946, the first telephone call was made from an automobile phone. The design had been put together by Southwestern Bell. Due to the cost of installation and the small volume of calls, it wasn't a very extensive   mobile   network. https://ethw.org/The_Foundations_of_Mobile_and_Cellular_Telephony

1956: Transatlantic telephone cable: The first 36-circuit transatlantic telephone cable was installed in 1956. The cable stretched from Newfoundland to Scotland. This now made phone calls much less expensive than the older radio telephone system. http://atlantic-cable.com/Cables/1956TAT-1/

1962: Commercial telecommunications satellite: The Communications Satellite Act was officially passed in 1962, allowing telecommunications to finally go into space. AT&T was in the process of constructing their satellites, and two short years later, they would have put six telecommunications   satellites   into   orbit. https://link.springer.com/chapter/10.1057/9781137396938_2

1964: Fiber-optic telecommunications: In 1964, Charles Kao and George Hockham published a paper that proved that fiber-optic communication could be possible as long as the fibers used to transmit the information were free of impurities. This discovery reopened the door Alexander Graham Bell had first created with his photophone, allowing sound to be transmitted over beams of light. http://www.timbercon.com/history-of-fiber-optics/

1965: First North American public videophone network: In 1965, the first picture phone service began in trials. These phones were called "Mod I" picture phone sets, and in July of that year, Union Carbide Corporation began trials for the first picture phone network. In December of the same year, AT&T also began similar trials in some of their networks. http://long-lines.net/tech equip/Picturephone/BLR0569/picturephone.pdf

1969: Computer networking: In October of 1969, the first data traveled between nodes of the ARPANET, a predecessor of the Internet. This was the first computer network and was invented by Charley Kline and Bill Duvall. http://www.computerhistory.org/atchm/october-29-1969-happy-40th-birthday-to-a-radical-idea/

1973: First modern-era mobile phone: Inventor Martin Cooper placed the first cellular mobile call in 1973 to his rival at Bell Labs, Joel Engel. The first mobile phone had a maximum talk time of 30 minutes, and it took a year for the battery to recharge. The phone would eventually be a prototype for Motorola's first mobile phones. http://www.pewinternet.org/2013/04/03/the-first-cell-phone-call-excerpt-from-networked-the-new-social-operating-system/

1979: INMARSAT ship-to-shore satellite communications: The year 1979 was a big leap forward for maritime communications. The International Maritime Satellite Organization (INMARSAT) was established to provide marine vessels with reliable communication for increased safety and communication for sailors and passengers who needed to speak to someone on shore. http://www.marsat.ru/en/technologies/history-of-inmarsat/

1981: First mobile phone network: The first commercially automated cellular network was launched in Japan in 1981. The network was originally launched only in Tokyo in 1979 and then was expanded. Simultaneously, the Nordic Mobile Telephone system was also established in Denmark, Finland, Norway, and Sweden. http://www.winlab.rutgers.edu/~narayan/Course/Wireless_Revolution/vts%20article.pdf

1982: SMTP email: Prior to 1982, the Internet was highly secure and comprised of limited network clusters between military, corporate, and some university research facilities. In 1982, Jonathan Postel wrote the Simple Mail Transfer Protocol and shifted the focus of the Internet from security to reliability using the networks as relay stations to send electronic mail to the recipient through cooperative hosts. http://infrastructure.tamu.edu/message/email/relayhistory.html

1983: Internet: On January 1, 1983, the Internet was officially born. ARPANET officially switched its old network control protocols (NCP) and Transmission Control Protocol/Internet Protocol (TCP/IP) became standard. https://en.wikipedia.org/wiki/History_of_the_Internet

1998: Mobile satellite hand-held phones: The first canopy of 64 satellites was put into place by a company called Iridium in 1998. They also produced the first hand-held satellite phones, which were smaller and less cumbersome than the earlier "bag" phones. This revolutionized mobile telecommunications and would lead to the modern smartphone. http://iml.jou.ufl.edu/projects/fall99/coffey/history.htm

2003: VoIP Internet telephony: In 2003, phone calls were now capable of being transmitted over a computer through Internet protocols. This meant that long-distance charges were not applicable, as callers would use already-established computer networks .https://bebusinessed.com/history/voip-history/

4.0   CONCLUSION

This unit has traced the timeline of Telecommunication from the traditional to modern era. The historical developments of telecommunications were extensively discussed.

5.0   SUMMARY

In this unit, you have been learnt about the historical development of telecommunication from the earlier times of fires, beacons, smoke signals, communication drums, and lung blown horns to the times of Internet telephony. The next unit will take on different examples and description of traditional telecommunications systems.

6.0   TUTOR -MARKED ASSIGNMENT

1.   Trace the timeline from first telephone era to the internet.
2.   Discuss the prehistoric era of telecommunication.
3.   What significant development happened in telecommunication in the 5th century B.C.?

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UNIT 2   TRADITIONAL TELECOMMUNICATIONS

CONTENTS

1.0   INTRODUCTION

This unit will put you through the various traditional Telecommunications systems by describing each of them and how they work. This unit will also show you the diagrammatic representation of each of the traditional telecommunications system identified

2.0   LEARNING OUTCOME

By the end of this unit, you will be able to:

- state different examples of traditional telecommunications systems.
- describe each traditional telecommunications systems and how they work.
- sketch any traditional telecommunications systems.

3.0   MAIN CONTENT

3.1   Examples, Descriptions and Illustrations of Traditional Telecommunications Systems

Traditional systems of telecommunication refer to the conventional means through which man attempts to reach out and communicate over a distance with one another. From the timeline of telecommunication, a historical overview of the systems was given, in this unit, a careful look at the various systems will be considered to give you an in-depth understanding of the concept.

Telegraph

Samuel Morse invented the telegraph. The idea behind the telegraph - sending electric signals across wires - originated in the early 1700s, and by 1798 a rough system was used in France. New York University he began working on his version of the telegraph in 1832; he developed Morse Code (a set of sounds that corresponded to particular letters of the alphabet), in 1835; and by 1838 he had presented his concept to the U.S. Congress. He was not the first to think of the idea - 62 people had claimed to invent the first electrical telegraph by 1838 - but Morse beat everyone else to by being the first to get political backing for his telegraph and a business model for making it work. In 1843, Morse built a telegraph system from Washington, D.C., to Baltimore with the financial support of Congress. On May 24, 1844, the first message "What hath God wrought?" was sent. At first, telegraph messages were transmitted by trained code users, but in 1914 a form of automatic transmission was developed. This made the message transmission much faster and by the turn of the 20th century, all long-distance communication depended heavily on the telegraph.

Fig.2.1:Telegraph ticker machine
Source: images for telegraph ticker machine. Google.com

Visual Signals

There are many forms of visual telecommunication systems. They transcend from the prehistoric times to the end of 19th century. They are: Semaphore Signals: were the early tools used in communication. Objects; usually flags were held and used to describe or give out information to the receiver over a visible horizon. The flags could be any color usually black and white, or red and yellow held separately in different hands.

Fig.2.2   Source: images of Semaphore line. Google.com

Fire and Smoke: In the middle Ages, smoke and fire signals were employed between Crusader-built towns and forts in Palestine and Syria as systems of communication. The Greeks, Persians, and Romans used smoke and fire signals for transmission of predefined information about singular occurrences. The indigenous peoples of North America communicated using smoke signals. Each tribe had its own smoke-signal language. They used damp grass, which would cause a column of dense smoke to rise. The use of smoke was also a signal that danger is approaching. Different thickness had particular connotation

Fig.2.3   Source: images of fire and smoke Google.com

Pigeons Post: during the early civilizations, many empires send messages and information using birds. The information are inscribed on parchments, leaves etc. and tag around the neck or legs of the birds and then released to fly to the determined destination of the recipients. Homing pigeons have been used throughout history globally. Roman and Persian Empire were among the first users of this system of telecommunication and was extensively used by the military in Ancient Rome.

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Fig.2.4   Source: images of Pigeon Post. Google.com

Beacons- Beacons were used in a relay system and were proficient in transmitting data over significant distances. The Brecon Beacons in Wales were used to notify forthcoming approach of English raiders. Beacons were used along the Elizabethan English coast to warn of the approaching Spanish Armada. Flag signals were used, before the invention of the radio by ships to communicate. They are still used if radio communications break down

Fig.2.5   *Source: images of Beacons. Google.com*

Audio/Sound Signals

Sound and audio signals are part of traditional system of telecommunication. It allows for clarity of sounds to the recipients. The sound or message emanates from the materials from which the instruments are made, and they could be shaken, scratched, struck, pricked (pulled) or pressed with the feet. The loud-sounding gong, the wooden drum are used to announce the promulgation of laws and regulations, meetings, arrangements for communal works and generally spread "official" information to the community (Wilson, 1981). Examples are given below:

Horns: Animal horns have been used as traditional system of telecommunication. Once information is needed to be sent across; the horn will be blown. Several types of sounds signify the information or messages sent and to whom it concerns. They produce sound as a result of the vibration of a column of air. Common in traditional societies in Nigeria are the gourd horn, and ivory horn. Apart from being used as musical instrument, they are also used to announce the arrival and departure of icons at gatherings.

Fig.2.6   Source: images of Horns.
Google.com

Drums: many cultures especially across Africa are known for their popular use of the drums as system of telecommunication. Apart from using them to produce musical sound for dancing, the drums are also used to summon special meetings, proclaim the arrival and departure of important visitors to palace, announce serious acts of sacrilege and disasters, alert the community against invasion and in war advertise the presence of war chief. The most popular however is the "talking drum". The "talking drum" is commonly used during traditional ceremonies. It is widely acknowledged that when some of these drums are expertly sounded, they are capable of conveying specific meaning.

Fig.2.7   Source: images of
Drums. Google.com

Gong: Gong is a rimmed metal disk that produces a loud, sonorous tone when struck with a padded mallet carried about by a town crier or hung in a frame. It is used as a signal or to inform people about important messages. It is also used as a musical instrument. There are two types of gong; the wooden and the steal/metallic. The voice of the town crier or village Gong man is usually heard in the early hours of the morning preceded by the sound of a gong. He announces important meetings, ceremonies, messages and imminent troubles.

Fig.2.8   Source: images of Gong.
Google.com

4.0   CONCLUSION

This unit has exposed you to the different types of traditional Telecommunications systems with their description and how they work. Illustrations were also given to you in each case.

5.0 SUMMARY

This unit has listed to you the different types of traditional telecommunications systems, it has also given you the description and how they work with their diagrams. Just as this unit, the next unit will identify the modern telecommunications systems with their descriptions and illustrations.

6.0 TUTOR-MARKED AASSIGNMENT

1. List and discuss five traditional telecommunications system.
2. At least sketch any traditional telecommunications systems.

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UNIT 3   MODERN TELECOMMUNICATIONS

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
          3.1   Examples, descriptions and illustrations of Modern
                  Telecommunications systems
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

This unit takes on the modern Telecommunications systems by identifying each one of them, describing them and how they work. This unit will also give you the diagrammatic representation of each of the modern telecommunications system identified.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

- identify the different Modern telecommunications systems.
- describe Modern Telecommunications systems and how they work.
- sketch any Modern Telecommunications systems.

3.0   MAIN CONTENT

3.1   Examples, descriptions and Illustrations of Modern Telecommunications Systems

Towards the end of 20th Century, with the advent of technology, various modern systems have been invented and developed to fit into the information explosions. These modern systems of communication are described with illustrations below:

Electrical Telegraph: this invention is a step ahead the normal telegraph as it employed the use of electricity to communicate across a distance using the speed of light. It uses coded electrical signals to pass on information via dedicated electrical wiring. Electrical telegraphy dates from the early 1800s, and is distinct from the later electrical telephony,

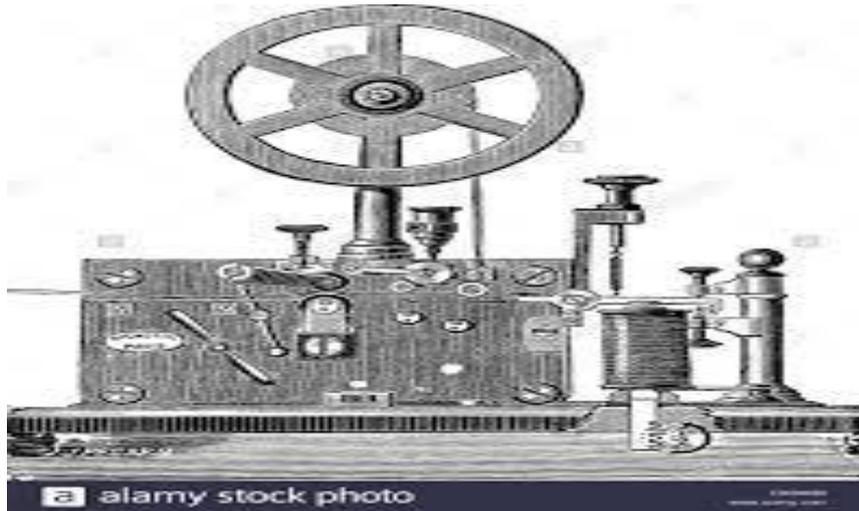which uses the analogue magnitude of electrical signals to transmit information

Fig.3.1   Source: images of Electrical Telegraph. Google.com

Facsimile (Fax):Also known as Fax is a copy or duplicate of an old book, manuscript, map, art print, or other item of historical value that is as true as the original copy as possible. Thistype telecommunication system allows information to be sent across distance. Usually persons will send it across and the machine will bring out exactly as it is being sent.

Fig.3.2   Source: images of Fax machines. Google.com

Telephone: Alternatively referred to as a phone, a telephone is a device that converts analog audio into electrical signals that can be transferred to other telephone users (Computer Hope, 2018). The telephone enables people to communicate with others all over the world. The first sets of telephones developed were in like the ticker of the telegram. It transfers audio communication in form of sound over a cabled aided means roll over across the seas connecting various points together. Usually an

organization owns it before individuals were able to purchased personal telephones.

Fig.3.3   Source: images of Telephones. Google.com

Television: television uses both audio and vision technology to pass across information to various society. Television is a <u>machine</u> with a <u>screen</u>. The word "television" emanates from two words "tele" and "vision". Tele is a Greek work meaning *far away or distance*) and vision is another word for *sight*). Televisions receive <u>broadcasting</u> <u>signals</u> and turn them into <u>pictures</u> and <u>sound</u>. Older Televisions had a large <u>cathode ray tube</u> in a large wooden frame and sat on the floor like <u>furniture</u>. Newer TVs are much lighter and flatter. A Television can show pictures from many <u>television networks</u>. Nowadays, computers and <u>mobile devices</u> also be used for watching <u>television programs</u>.

Television was invented in the 1920s but the equipment was expensive and can be seen in very few houses. Moreover, the pictures were very poor. By the 1950s, these problems had been fixed and Televisions became widespread and can be seen in more houses.

At first, all televisions used an <u>antenna</u> (or aerial). This would pick up <u>television programmes</u> from <u>broadcasting</u> stations. A Television station could be many miles or kilometers away, and can still be received. <u>Cable television</u> and <u>Satellite television</u> can provide more programs at once than broadcast can.

All televisions have screens where the picture is viewed. Before the 1950s they were usually "<u>black and white</u>", which made everything look grey, but all modern TVs show colors. Most 20th century screens also had rounded corners. That is because television screens were <u>cathode ray tubes</u>. These are like heavy glass jars with one side bulging out to form the screen.

Today <u>flat panel displays</u> are the usual kind. These are usually flat rectangles with straight edges. This long rectangle looks more like the shape of a <u>movie theatre</u> screen. This is called <u>widescreen</u> and can be of any size. The early 21st century is also seen to produce screen which is curved in shape. This century also is when <u>digital television</u> transmission became more common than <u>analog television</u>.

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Fig.3.4   Source: images of Television. Google.com

Radio: Radio (two way radio) electromagnetic data communications do not have to depend on microwave or satellite links, especially for short ranges such as within an office setting. Broadcast radio is a wireless transmission medium that distributes radio signals through the air over both long distances and short distances. Radio is being used increasingly to connect computers and peripheral equipment or computers and local area networks. The greatest advantage of radio for data communications is that no wires need be installed. Radio waves tend to propagate easily through normal office walls. The devices are fairly inexpensive and easy to install. Radio also allows for high data transmission speeds.

Fig.3.5   Source: Source: images of Radio. Google.com

Networked computer: Computer being the most sophisticated machine ever invented by man could mean different thing to different people. As many books and authors that we have, so is the definition of computer that we have. But in general context the most acceptable definition of a computer is an electronic device (hardware), which under the control of a well-structured and installed program (software) is capable of accepting data through the input unit, process the data in the processing unit and produce the result as information in the output unit. It also has the ability to store the data, instructions and information for as long as the user desires in the storage unit.

With the above definition and characteristics of information, computer may not be classified as a telecommunication system if it is not networked because the sole aim a telecommunication system is for it to be capable of transmitting information over long distance. Hence, computer network is an example of modern telecommunication system

Computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications. Computing devices exchange data, information or resources with each other using connections between nodes. These connections are established using an idea of cabling. These cables can be wires (twisted wires and coaxial cables) or optic cables. The connections can also be wireless such as Wi-Fi.
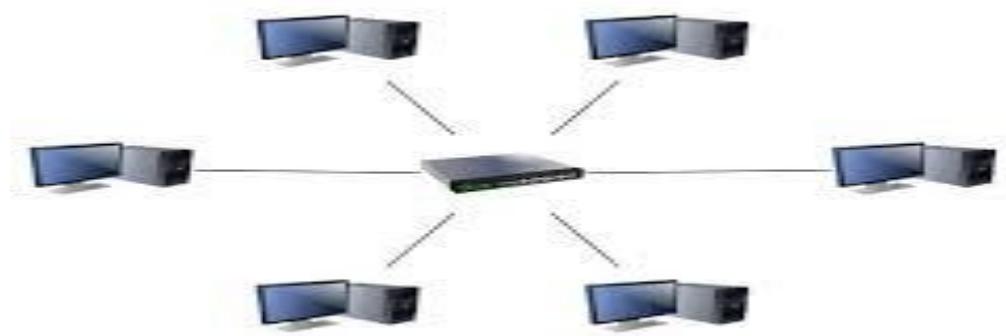
Fig.3.6: Wired network using cables

Fig.3.7: Wireless network using router
Source: Wired and Wireless computer network images. Google.com

4.0   CONCLUSION

This unit has helped you in identifying Modern Telecommunications systems with their description and how they work. Illustrations were also given to you in each case.

5.0   SUMMARY

This unit has listed to you the different types of Modern Telecommunications systems; it has also given you the description and how they work with their diagrams. The next module takes on Telecommunications Systems, their components and functions.

6.0   TUTOR-MARKED ASSIGNMENT

1.   List and explain five modern telecommunications systems.
2.   Sketch any Modern Telecommunications systems.

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MODULE 3   TELECOMMUNICATIONS SYSTEMS

Unit 1   Telecommunications systems-meaning, components and functions
Unit 2   Telecommunications channels
Unit 3   Telecommunications processors

UNIT 1   TELECOMMUNICATIONS SYSTEMS-MEANING, FUNCTIONS AND COMPONENTS

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
    3.1   Telecommunications Systems – Meaning and Examples
    3.2   Components of telecommunications Systems
    3.3   Functions of Telecommunications Systems
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

This unit will expose you to the definition, functions and components of telecommunications' systems. This module is divided into three (3) units. Unit 1 will explain to you in details what Telecommunications systems are all about in relation to modern telecommunications systems, what makes up telecommunications systems and their functions. Unit 2 and 3 will take on telecommunications channels and telecommunications processors respectively. Telecommunications channels and telecommunications processors are two of the five components of a telecommunications system.

2.0   INTENDED LEARNING OUTCOMES

At the end of this unit, you should be able to:

- Define telecommunications systems.
- Enumerate the components of telecommunications systems.
- List the functions of telecommunications systems.

3.0   MAIN CONTENT

3.1   Telecommunications Systems- Meaning and Examples

A telecommunications system is a collection of compatible hardware (the physical electronic device) and software (those instructions or written programs that controls the physical devices) arranged to communicate idea, messages, information and knowledge from one location to another over a distance. Telecommunications systems can transmit texts, graphics, images, sounds (audio) or video messages. Examples of telecommunications system are the modern telecommunication systems mentioned and described in module 2, unit 2. They are television, radio, telephones, fax, networked computers and so on.

3.2   Components of Telecommunications' Systems

For a telecommunications system to be able to transmit or receive data, messages and information over distances, there must be some essential components embedded in the systems. These are discussed below:

Computers: Two important characteristics of computers are that it processes and store data and information. Therefore in every telecommunications systems, there must be a computer that will process the information to be transmitted and store them (even if it is going to be for a short period) before transmission and reception.

Terminals: terminals are any input and output devices that sends and receives data or information. For every information that is to be transferred over a distance, there must be a device (input) to transmit that information by the sender and also a device (output) to receive the information by the receiver. Example can be a telephone or a computer can be a terminal to send and receive information over a distance.

Communication channels: these are links through which data or voices are transmitted between sending and receiving devices in a network. A channel can use different kinds of media for transmission which can be wired or wireless. Wired media involves the idea of cabling where cables and wires are used to link a network whereas wireless media does not require the use of cables rather information are transmitted through the air. Examples of wired media are twisted wire, coaxial cable and fiber optics cable while examples of wireless media include microwave/radio wave and satellites. This will be discussed in details in unit 2.

Communication Processors: these are devices that support data transmission and reception a telecommunications system or network. Without a communication processor in a telecommunication system, it may not possible for transmission to take place over a distance. They are many but some of the examples of the processors that will be discussed in unit 3 are front-end processors, concentrators, controller, multiplexer, router and MODEM.

Telecommunication software: these are special instructions/programs that control input and output activities and manage other functions of the communication network. This software resides in the host computer, front-end processor and other processors in the network. The main functions of telecommunication software in a telecommunication system are network control, access control, transmission control, error detection/correction and security

SELF-ASSESSMENT EXERCISES
Give three examples of communication processors and explain.

3.3   Functions of Telecommunications Systems

For a telecommunications system to transmit and receive information over a distance, it must perform some certain functions which are largely invisible to human using the system. These functions are enumerated below:

Transmission: Telecommunications system transmits data and information from the sender to the receiver in a network through communication wired/wireless media

Interface: It establishes the interface between the sender and the receiver
Routing: It chooses the shortest and most efficient path to transmit information

Processing: It performs elementary processing in order to ensure the right messages gets to the right destination.

Editorial: It performs editorial tasks on data such as checking errors and rearranging the format

Conversion: It helps in changing speeds and codes from one device to another. For example, converting messages from the speed of communication in a computer to the speed of a telecommunication line or from one format to another

Control: Lastly, telecommunications system controls the flow of information e.g. routing information, polling receivers and providing network structure maintenance.

4.0   CONCLUSION

This unit dwells on telecommunication systems, their components and their functions. At the end of this study unit, it is expected that you should understand what telecommunications systems are made up of.

5.0   SUMMARY

In this unit, you were exposed to telecommunications system, their components and functions.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Explain the functions of network control software, access control software, transmission control software, error detection/correction software.
2.   What is security control software in a telecommunication system?

7.0   REFERENCES/FURTHER READINGS

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UNIT 2   TELECOMMUNICATIONS CHANNELS

1.0   INTRODUCTION

This unit will take you on the wired and wireless media that links the sender and receivers in a telecommunication network.

2.0   INTENDED LEARNING OUTCOMES
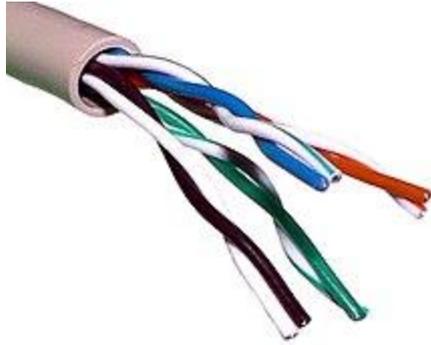
By the end of this unit, you will be able to:
- explain different examples of wired and wireless media
- describe each of the telecommunication media and explain how they work.

3.0   MAIN CONTENT

3.1   Wired Media and Examples

Wired media involves using cables or wires to link a sender and receiver in a network. Examples of wired media are twisted wire, coaxial cable and fiber optics cable. These three examples will be discussed in details below:

Twisted pair/wire: this is one of the original and oldest transmission medium. These types of wires are used in telephone systems in a building and mostly installed for analog communication. The twisted pair is composed of a copper conductor insulated by a plastic and twisted into pairs. As greater transmission capacities are needed, bundles of insulated twisted pairs will be wrapped into large cable often several inches thick. These cables carry as many as several hundreds of twisted pairs. The cable is covered by net and plastics and either suspended on poles or buried underground. The problem with twisted pairs is the occurrence of crosstalk at a transmission frequency above 1 Mega Hertz(1 MHZ). Attempt to overcome this problem led to the development of coaxial cable.

Fig.2.1   Source: images of twisted pairs. google.com

Coaxial cable: coaxial cable is a single wire with very high capacity that is, bandwidth. It consists of thickly insulated copper wire, which can transmit a larger volume of data that twisted pair can. The insulation is covered with a wire mesh that keeps out electrical noise. There is a further overall covering for the protection of the overall assemblage. The greater capacity of coaxial cable allows it to carry many channels simultaneously eliminating the need for thousands separate wires. It is frequently used in place of twisted pairs for important links in a telecommunications network because it is faster, free of interference in transmission and has very high speed.

Fig.2.2   Source: images of coaxial cable. google.com

Fiber Optics: fiber optic consists of specially treated thousands of clear glass fiber, the thickness of a human hair bounded into cables. Data to be sent down the cable arrives as electrical signal. A converter accepts the signal and encodes them as varying intensities of light that are emitted by a light source. The light detector at the other end of the cable converts the light signals back into electrical signal that can be sent over to the conventional electronic communication path/channel (twisted pair or coaxial cable). This means it is best used as a backbone of a network. In most networks, fiber optics cable is used as the high speed trunk line, while twisted pair and coaxial cable are used to connect the trunk line to individual devices. Fiber optic is faster, lighter and more durable than other wire media and well suited to systems requiring transfer of large volumes of data. It is highly efficient and has high immunity from electronic disturbances and physical tampering.

Fig.2.3   Source: images of fiber optics. google.com

3.2   Wireless media and examples

Wireless media does not require the use of cables rather information is transmitted through the air. The reason why wireless transmission has emerged as an important alternative to wired transmission. Examples of wireless media to be discussed in this unit include microwave and satellites.

Microwave: microwave facilities do not use cables or wires rather data are transmitted through the air between microwave stations. It transmits high frequency radio signals through the atmosphere and are widely used for high volume, long distance, point-to-point communication. It is therefore called radio transmission. Transmission occur in a straight line and do not bend with the curvature of the earth therefore microwave relay station are placed between 25-30 miles apart. Signals will be obstructed with greater interval because of the spherical nature of the earth. Microwave transmission typically has high bandwidth of 4-12 GB, so they can carry many channels of television programming or thousands of telephone conversation. Signals can be adversely affected by atmospheric condition especially fog or rapidly changing temperature. This condition is known as fading. It can be compensated for, to some extent by use of space diversity i.e. placing two antennas at different elevation on the tower.
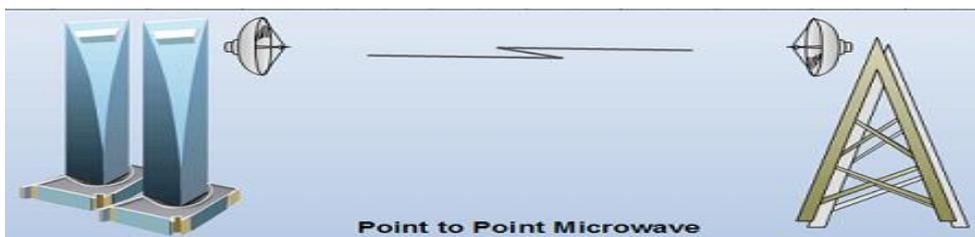

Fig.2.4   Source: images of microwave facility. google.com

Satellites: satellite transmission uses microwave i.e. radio signals. It provides a means of transmitting telecommunications all over the globe without the need for network of wires and cables. It also facilitates communication over long distances to overcome the problem of

curvature of the earth. They orbit earth at a speed that enables them to stay above the same place on earth at all times. This type of orbit is called geostationary or geosynchronous orbit because the satellite's orbital speed operates in synchronicity with the earth's rotation. The satellites receive transmission from earth and transmit them back to numerous earth station receivers scattered within the receiving coverage area of the satellite. This relay function makes it possible for satellites to operate as a "bent pipes". Bent pipes are wireless transfer for point-to-point and point-to-multipoint transmissions. Communication satellites are used by telephone and television companies to transmit signals across the globe. Ships, air planes and land navigators also receive signals from satellites to determine geographic positions
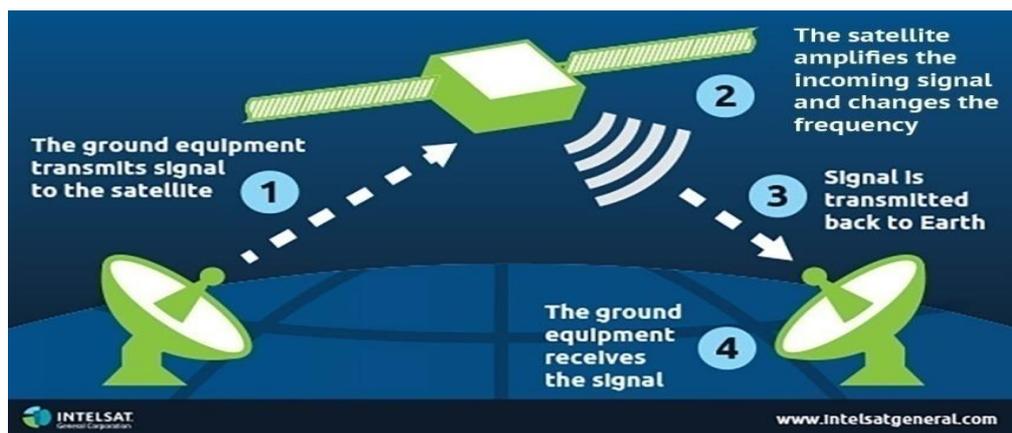

Fig.2.5   Source: images of microwave facility. google.com

4.0   CONCLUSION

This unit provided you with various examples of wired and wireless media. Explanations on each of the examples were properly highlighted.

5.0   SUMMARY

Telecommunications channel is an important component of telecommunication system. In this unit, you were exposed to the various telecommunications channels; both wired and wireless. The next unit will take you through another of the component of telecommunications system which telecommunications processors.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Give three examples of wireless media or transmission.
2.   Identify their strength and weaknesses.
3.   Explain how fiber optic works.

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UNIT 3   TELECOMMUNICATIONS PROCESSORS

CONTENTS

1.0   INTRODUCTION

This unit will describe and explain to you some of the devices that support data transmission and reception in a telecommunications system.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:
identify different types of telecommunications processors
describe some of the types of telecommunications processors
sketch some of the types of telecommunications processors.

3.0   MAIN CONTENT

3.1   Telecommunications processors and types

As earlier mentioned in unit 1, telecommunication processors are devices that support data transmission and reception in a telecommunications system or network. Without a these processors in a telecommunication system, it may not possible for transmission to take place over distance. There are many types of telecommunication processors but some them will be discussed.

Multiplexer: a multiplexer is a device that enables a single communication channel to carry data transmission from multiple sources simultaneously. The multiplexer divides the communication channel so that it can be shared by multiple transmission devices. The multiplexer may divide a high speed channel into multiple channels of slower speed or may assign each transmission source a very small slice of time for using the high speed channel. This process is done by a technique called Multiplexing. Multiplexing combines multiple analog or digital signals bound for transmission through a single communication line or computer channel. This technique has been introduced to increase

channel utilization in multicomputer communication systems and time sharing systems and also to reduce the communication cost.
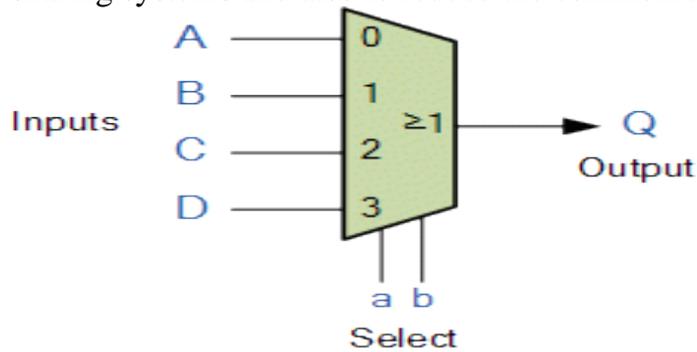

Fig.3.1   Source: images of multiplexer. google.com

Router: Kizza (2009) referred to router as a general purpose device that interconnect two or more heterogeneous networks represented by Internet Protocol (IP) subnets or unnumbered point to point lines. Simply put, a router is an intermediary device that connects different networks by interpreting protocol information and selectively forwarding information through the most effective route available. They are usually dedicated special purpose computers with separate input and output interfaces for each connected network.

Fig.3.2   Source: images of router. google.com

MODEM: MODEM is abbreviation for MODulation DEModulation. This device translates digital signals from a computer into analog form so that they can be transmitted over analog telephone lines. The MODEM is also used to translate analog signal back into digital form for the receiving computer. According to Bradley (2019), a MODEM is a hardware networking device that converts data to a signal so it can be easily sent and received over a phone line, cable, or satellite connection. If transmission is to take place over an analog telephone line, the MODEM converts data between analog and digital formats in real time for two-way network communication. However, in the case of the digital MODEM which is popular today, the signal doesn't require the analog-to-digital conversion.

Fig.3.3
Source: images of MODEM. google.com

Front-end processors: this is a small computer dedicated to communication management attached to the main computer in a telecommunication system. This small computer performs special processing related to communications such as error control, controlling, routing, speed and signal conversion, formatting and editing. It takes some load off the host computer. The front end processor is largely responsible for collecting and processing input and output data to and from terminals and grouping characters into complete messages for submission to the Central Processing Unit (CPU) of the host computer.

Fig.3.4   Source: images of front-end processor. google.com

Concentrators: Concentrators are programmable telecommunications computer that collects information and temporarily store these information from terminals until enough information are ready to be sent economically to the receiver. Once the information is enough to be sent, the concentrator then send signals to the host computer. It normally acts as an efficient forwarder of data transmission signals.

Controller: this is a specialised minicomputer that supervises communication traffic between the CPU and the peripheral devices such as terminals and printers. The controller manages messages from these

devices and communicates them to the CPU. It also routes output from the CPU to the appropriate peripheral devices.

4.0   CONCLUSION

This unit identified five major types of telecommunications processors. The functions of each of the processors were clearly spelt out to you.

5.0   SUMMARY

Telecommunication processors are processors with specific optimisations to support telecommunication systems. They however exist in a wide variety of forms and can be categorised based on the telecommunication system with which it is expected to work with. This unit has put you through the major types of telecommunications processors and their functions in a telecommunications system. The next module dwells on telecommunication networks.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Give three examples of communication processors and explain.
2.   Explain front-end processor.

7.0   REFERENCES/FURTHER READINGS

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MODULE 4   TELECOMMUNICATIONS NETWORKS

Unit 1   Telecommunications Networks: An Overview
Unit 2   Geographical Networks
Unit 3   Network Topology

UNIT 1   TELECOMMUNICATIONS   NETWORKS: AN
OVERVIEW

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
        3.1   Telecommunications Network – Concepts and Meaning
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

Telecommunications networks can be classified into two" geographical scope and the type of service they render. They can also be classified by their shape known as topology. This module is however divided into three (3) units. Unit 1 will take you through what telecommunications network entails. Unit 2 and 3 will take on the two classifications of telecommunications networks; geographical networks and network topology respectively.

Many people use the terms "computer networks" and "telecommunications networks" interchangeably even though they are almost the same. This unit will put you through the distinction between the two concepts and teach you how to the use the terms correctly. However, this unit will begin with the definition and the importance of a network specifically. This will make you appreciate the main concept "telecommunication networks"

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

•   define a network.
•   enumerate the importance of a network
•   explain the concepts "Computer Networks" and Telecommunications Networks.

3.0   MAIN CONTENT

3.1   Telecommunications Network – concepts and meaning

A network is a planned or organisation of separate autonomous units interconnected for the purpose of achieving some goals that is more than any unit can achieve individually. Networks are about sharing resources of files, documents, images, computers, servers, printers, scanners etc. with each other. Networking any organisation depends on the requirement of the organisation scale and usability. There is need for feasibility study before deciding to choose any type of network. Picking wrong set of options can cost waste of money, time and resources. However, computer networks are mostly used interchangeably with telecommunication networks even though they have a slight distinction. This will be discussed in the sections below.

3.1.1 Computer Networks

In computer science, network is used to link two or more computers. Network users are able to share files, printers, scanners and other resources, send electronic messages and run programs on other computers. On the broader scale computer networking is collection of multiple computers, printers, scanners and other devices to communicate and share information with each other. Sharing files, software etc. cannot be possible without the concept of networking; networks have made lives easier for many people in their professions. One can command the computer to print the document out without even sitting on it.

Computers are common too every houses and offices now. Every profession sees them as a must have machine. If you have more than one computer at your place of work (whether corporate organisation or business organisation) having them networked is as important and useful as having the computer! In computer networks, computing devices exchange data with each other using connections between nodes. These data links are established over cable media such as wires or optic cables, or wireless media such as Wi-Fi. The computer network is an example of a telecommunications network and is mostly based on physical arrangement of computers in a network which is called network topology. This will be discussed in unit 2.

3.1.2 Telecommunications Networks

A telecommunications network is a combination of nodes and links which are arranged in a manner so that the message may pass from one part of the network to the other by traveling over variable nodes. There

are transmission links that connect the nodes together. The nodes use circuit switching, message switching or packet switching to pass the signal through the correct links and nodes to reach the correct destination terminal. Each terminal in the network in most cases contain a unique address so that messages can be routed to the correct recipients Telecommunications can greatly increase and expand resources to all types of people. For example, businesses need a greater telecommunications network if they plan to expand their company. With Internet, computer, and telephone networks, businesses can allocate their resources efficiently

As earlier stated, telecommunications improves interaction and information transfer over large distances. Businesses and other organizations use telecommunications to expand their networks. With telecommunications networks, businesses and other corporate organizations can allocate their resources efficiently. Also, Information can be transferred from one device to the next. Telecommunications networks can range from a Local Area Network (LAN) to a Wide Area Network (WAN) according to how they are classified. The difference between the types of networks is in their sizes. These types of networks work at certain speeds, also known as broadband. This will be discussed in unit 3 of this module.

4.0   CONCLUSION

This unit provided you with the basic concepts of telecommunications network. Computer network is one of the types of telecommunication however; a clear distinction understanding of the relationship between a computer network and a telecommunication was clearly spelt out.

5.0   SUMMARY

Optimum networks can be built with complete knowledge and understanding of telecommunication and computer network. This unit has demonstrated to you an overview of telecommunications networks for better understanding.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Identify and explain the types of telecommunications networks.
2.   What is the relationship between a computer network and a telecommunication network?

7.0   REFERENCES/FURTHER READINGS

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UNIT 2   GEOGRAPHICAL NETWORKS

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
       3.1   classification of Telecommunications Network based on
              geographical scope
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

The basic difference in the types of networks is in their sizes and certain speeds with which they work known as broadband. This unit will pick on the geographical scope of telecommunication networks and put you through the some of them based on their sizes and type of services they render.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

•   classify telecommunications networks based on their sizes and type of services.
•   discuss the type of services they render.

3.0   MAIN CONTENT

3.1   Classification of Telecommunications Network on Geographical Scope

There are many types of telecommunications networks that can be formed geographically, most commonly used are Local Area Networks (LAN), Wide Area Network and Metropolitan Area Network (MAN). Others are:

WLAN-Wireless Local Area Network
SAN - Storage Area Network, It can also refer with names like System Area Network, Server Area Network, or sometimes Small Area Network
CAN - Campus Area Network, Controller Area Network, and often Cluster Area Network

PAN - Personal Area Network
DAN - Desk Area Network

Local Area Network (LAN) is technical name for computer networks which is normally developed among a single house, office etc. It connects networking devices within a short spam of area. LAN uses TCP/IP network protocol for communication between computers. It is often but not always implemented as a single IP subnet. Since LAN is operated in short area so it can be control and administered by single person or organisation. Enormous work is being done on LAN by networking device manufacturers and it is still going on, every now and then there is new and better solution to network multiple computers. LAN is been implemented and been replaced by WLAN already, LAN however is still used and understanding it is very important before moving to better and enhance solutions. LAN operates through cables and network cards. Later WLAN was formed through LAN concept. LAN is the original network out of which the other networks mentioned above are formed according to requirements.

WAN - Wide Area Network: Is communication among computers which are located far from each other. Internet is one classic example of WAN; it is the collection of large number of computers connecting together to share information with each other and accessible from everywhere.

As "word" Wide implies, WAN, cover large distance for communication between computers. The Internet itself is the biggest example of WAN which is covering the entire earth. WAN is distributed collection of geographically LANs. A network connecting device router connects LANs to WANs. WAN used network protocols like ATM, X.25, and Frame Relay for long distance connectivity.

WLAN - Wireless - Local Area Network: WLAN is Wireless Local Area Network which performs same function as LAN does but wirelessly i.e. no wires are involved in communication between computers. A LAN based on wireless network technology is mostly referred to as Wi-Fi. Unlike LAN, in WLAN no wires are used, but radio signals are the medium for communication. Wireless network cards are required to be installed in the systems for accessing any wireless network around. Mostly wireless cards connect to wireless routers for communication among computers or accessing WAN. MAN - Metropolitan Area Network: is not used as commonly as WAN and LAN networks are, it possess its importance when it comes to connecting two offices or organisation remotely located together to build networks among computing systems. It covers large area but not as much as WAN is capable of. It has its own importance for some government bodies and organisations on larger scale. MAN, metropolitan area network falls in middle of LAN and WAN, It covers

large span of physical area than LAN but smaller than WAN, such as a city.

CAN - Campus Area Network: Networking spanning with multiple LANs but smaller than a Metropolitan area network, MAN. This kind of network mostly used in relatively large universities or local business offices and buildings.

SAN - Storage Area Network: SAN technology is used for data storage and it has no use for most of the organisation but data oriented organizations. Storage area network connects servers to data storage devices by using Fiber channel technology.

SAN - System Area Network: SAN, system area networks are also known as cluster area network and it connects high performance computers with high speed connections in cluster configuration.

4.0   CONCLUSION

This unit identified some of the types of networks according to their sizes and the services they render.

5.0   SUMMARY

Designing a network using geographic scope sometimes depends on how large or how small the settings are. The next unit takes on the network topology.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Discus the types of telecommunications networks based on geographical scope.
2.   Discuss the type of services telecommunications networks render.

7.0   REFERENCES/FURTHER READINGS

An Overview of Computer Network Topology. Retrieved athttp://www.wifinotes.com/computer-networks/network-topology.html on 20/ 5/2019

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UNIT 3   NETWORK TOPOLOGY

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
          3.1   Classification of Telecommunications Network Based on
                    Physical Layout
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Reading

1.0   INTRODUCTION

In computer networks, computing devices exchange data with each other using connections between nodes. This unit gives you detailed description of the physical layout and designs of computer networks.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

- identify different network topologies
- describe the network topologies with illustrations.

3.0   MAIN CONTENT

3.1   Classification of Telecommunications Network Based on Physical Layout

Network topology is basically defined as layout or designs of network. Computers are connected using the design of the topology. These topologies can be either physical or logical design. Physical topology refers to physical design of network which includes devices, cables, location and installation of network where as in logical topology it is the amount of data to be transferred within the network as apposed in its design.

There are five different Networking Topologies. They are:

a)   Bus
b)   Star
c)   Ring
d)   Mesh

e)   Tree.

When networks are design using multiple topologies it is called Hybrid Networks, this concept is usually utilised in complex networks where larger number of computer clients are required. The network topologies listed above are explained with illustrations below:

Bus Topology: A bus network is essentially a single multi-dropped line shared by many nodes. Bus topology is one of the easiest topologies to install; it does not require lots of cabling. There are two most popular Ethernet cable types which are used in this topology they are: 10Base-2 and 10BaseT. Bus topology based networks works with very limited devices. It performs fine as long as computer count remain within 12 – 15, problems occurs when number of computer increases. Bus topology uses one common cable (backbone) to connect all devices in the network in linear shape. Network interface cards of all network devices are attached to single communication medium backbone cable. When any computer sends out message (containing the address of all the receiving nodes) in the network, it is broadcasted in the entire network but only intended computer accepts the message and process it. Bus topology provide simplicity to the network, however there is big disadvantage of this topology, if main single network cable somehow gets damaged, it will shut down the entire network no computer will run on network and no communication can be made among computers until backbone cable is replaced. Bus network are more reliable than star or ring configurations because the node failure does not affect the entire network. New nodes may be added at any point by simply tapping onto the bus line.
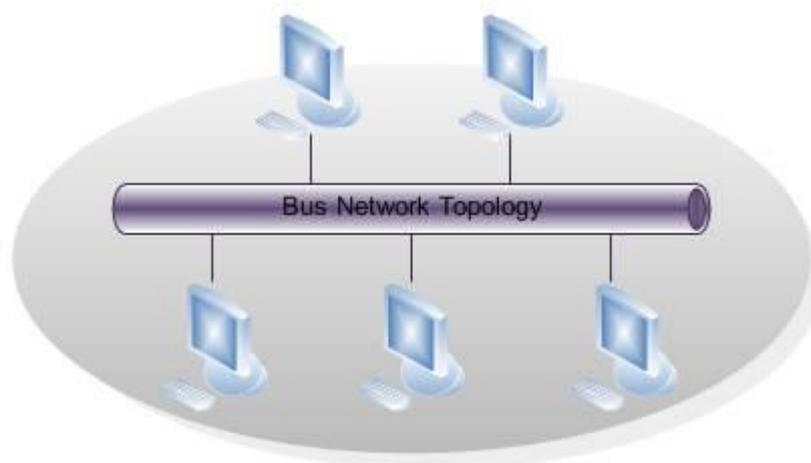

Fig.3.1   Source: wifinotes.com

Ring Topology: Ring topology is one of the old ways of building computer network design. FDDI, SONET or Token Ring technologies are used to build ring technology. It is not widely popular in terms of

usability. In ring network topology computers and other networking devices are attached to each other in such a way that they have devices adjacent to each other (Left and right side). All messages travelled in the same directory either clockwise or anticlockwise. They do not have the central computer system controlling the operation of the network. Instead, the various computers in the network are arranged in a ring form. Each computer may communicate with any other computer in the ring. The messages from one computer in the ring must be addressed that is, identified specifically to the destination computer. A bit pattern called a TOKEN is passed from node to node. If a node that is not ready to transmit receives a token, if a node that is not ready to transmit receives a token, it passes the token to the next node. If the node is ready to transmit, it removes the token, transmits the desired data to the appropriate node and then passes the token to the next node. When a node transmits data, it also transmits the address of the node that is to receive the data. This is known as TOKEN PASSING. Rings are formed from point-to-point lines, therefore, in case of failure of any device or cable the whole network will be down and communication will not be possible.
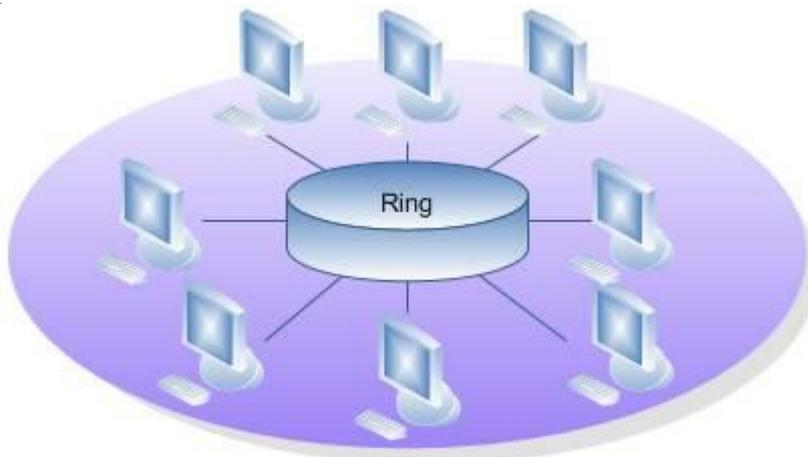

Fig.3.2   Source: wifinotes.com

Star Topology: This is the most commonly used network topology design you will come across in LAN computer networks. In Star, all computers are connected to central device called hub, router or switches using Unshielded Twisted Pair (UTP) or Shielded Twisted Pair (STP) cables. Therefore, the configuration is totally centralised. In star topology, we require more connecting devices like routers, cables unlike in bus topology where entire network is supported by single backbone. The most practical point of Star topology success is that the entire network does not go down in case of failure of a computer or cable or device, it will only affect the computer whose wire failed. The rest of the network will be working fine. However, in case of failure of central communication device such as Hub, Router or Switch the entire network

will collapse. Star topology is widely used in homes, offices and in buildings because of its commercial success.
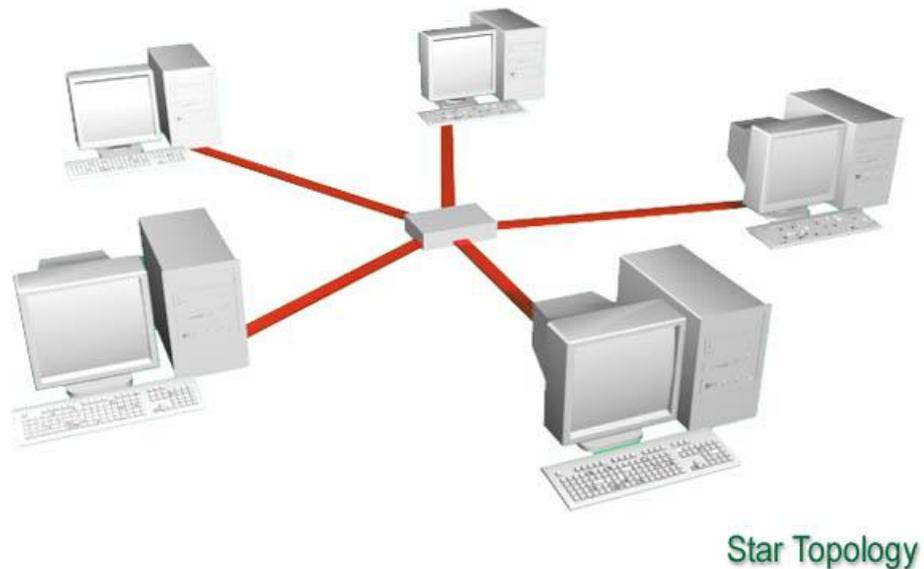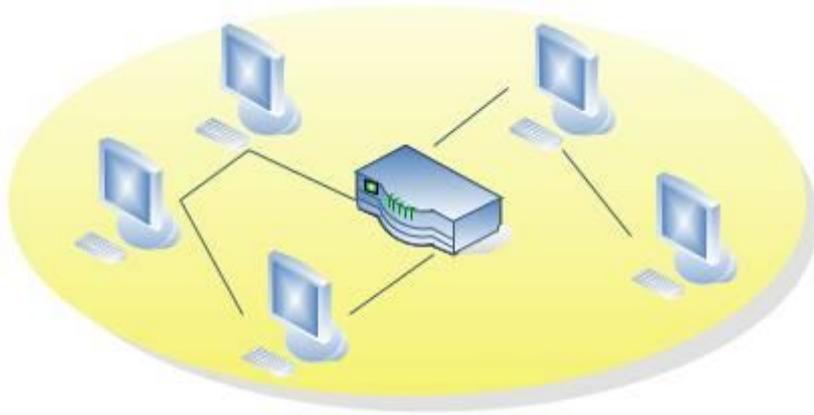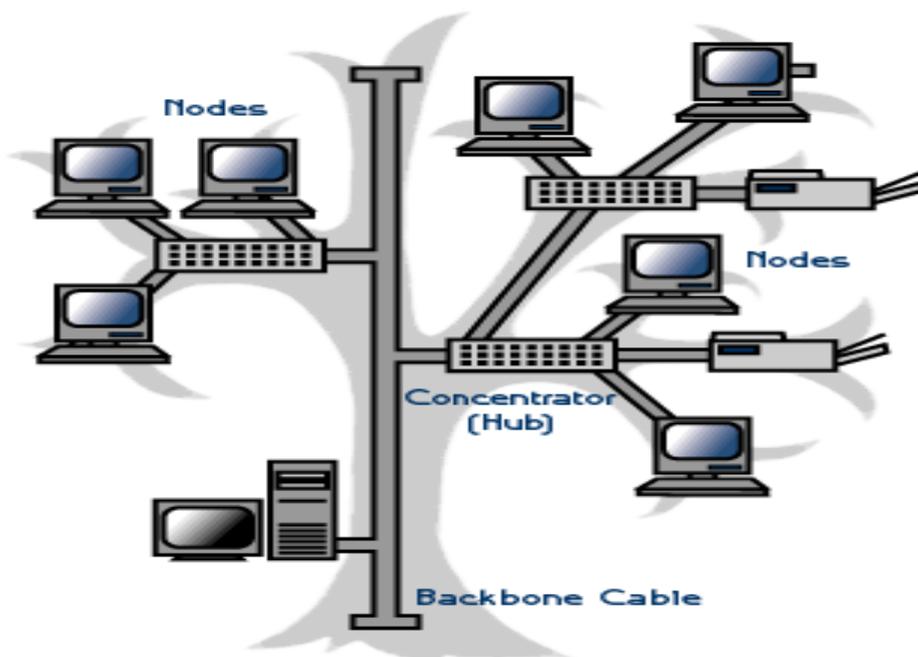

Star Topology

Fig.3.3
Source: wifinotes.com

Mesh Topology or distributed: Mesh topology is designed over the concept of routing. Basically it uses router to choose the shortest distance for the destination. In topologies like star, bus etc., message is broadcasted to entire network and only intended computer accepts the message, but in mesh the message is only sent to the destination computer which finds its route itself with the help of router. In mesh network, there is no master, there is no servant, and device is on its own. No central device oversees a mesh network and no set route is used to pass information back and forth between computers. Instead, each computer contains everything it needs to serve as a relay point for sending information to any other computer on the network. Therefore, we do not expect that any resources in computer A should be in computer 2. But we should be able to see the directory of each terminal in other terminals. It is therefore strictly distributed. There is no duplication of resources; every computer has its own resources with which to send and receive information. Internet is based on mesh topology. Routers plays important role in mesh topology, routers are responsible to route the message to its destination address or computer. When every device is connected to every other device it is known as full mesh topology and if every device is connected indirectly to each other then it is called partial mesh topology.

Fig.3.4
Source: wifinotes.com

Tree Topology: Just as name suggest, the network design is little
confusing and complex to understand at first but if we have better
understanding of Star and Bus topologies then Tree is very simple. Tree
topology is basically the mixture of many Star topology designs
connected together using bus topology. Devices like Hub can be directly
connected to Tree bus and each hub performs as root of a tree of the
network devices. Tree topology is very dynamic in nature and it holds
potential of expandability of networks far better than other topologies
like Bus and Star.

Fig.3.5   Source: wifinotes.com

4.0   CONCLUSION

Topologies are essence of computer networks design. Efficient and cost effective networks can be built based on the complete knowledge and understanding of computer networks devices, techniques and how they are designed. However, any mistake in choosing inappropriate devices and techniques can lead to waste of time, resources and efforts.

5.0   SUMMARY

This unit provided you with the detailed explanation and description of the network topology. You should be able to identify the different physical and logical designs of a network when you come across one.

6.0   TUTOR-MARKED ASSIGNMENT

The existing network topology in your organisation is being overloaded and you need expansion.

1.   What type of network topology would you suggest as the system administrator in the organisation?
2.   Identify any four (4) advantages and disadvantages of each of the network topologies.
3.   Explain the concept of TOKEN PASSING in a ring network.

7.0   REFERENCES/FURTHER READINGS

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MODULE 5   IMPACT OF TELECOMMUNICATIONS IN THE SOCIETY

Unit 1   Impact of Telecommunications on the Social Sector
Unit 2   Impact of Telecommunications on the Educational Sector
Unit 3   Impact of Telecommunications on the Economic Sector

UNIT 1   IMPACT OF TELECOMMUNICATIONS ON THE SOCIAL SECTOR

CONTENTS

1.0   Introduction
2.0   Intended Learning Outcomes
3.0   Main Content
       3.1   Telecommunications and the Social Sector
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

There are so many sectors in our society today each occupied with service delivery and one activities or the other. For efficient service delivery, most of these sectors have adopted the use of Telecommunications. This module looked at the impact (both negative and positive) of telecommunication in some of these sectors in the society. Advancements in telecommunication technologies have greatly impacted on the way people interact with one another socially at the global level. This unit will dwell on both the positive and negative impact of telecommunication on the social sector.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

- explain how Telecommunications has impacted positively on the social
- sector.
- discuss the negative impacts of telecommunications on the social sector.

3.0   MAIN CONTENT

3.1   Telecommunications and the Social Sector

The word social refer to the way of life of people living in a geographical area. These people interact with one another through communication. Due to the unstable nature of human being, people get to lose contact. One fastest means of getting in touch is through telecommunication with one another. The role of telecommunications in social relationship is very significant because it is now seen and felt as a big part of our modern society and we can't live a comfortable life without it anymore. Moreover, no society can live without information as it seen as a life blood of the society. Therefore, telecommunication integrates the society socially and allows information sharing over a long distance.

3.1.1 Positive Impacts of Telecommunications on the Social Sector

There are quite a number of positive impacts of telecommunications on the social sectors. Some of them are discussed below:

Social interaction: people easily make friends which lead to long lasting relationships, spouses are being met which leads to marriage through social media. People also get to know more about their own culture and other people's culture. Gone are the days when people are being referred to as not being social or uncivilised because they have not travelled wide to know about other people and their culture (how they eat, dress and greet, what they eat, their general way of life and their environmental conditions). Telecommunications has made it possible to stay in your room and still be all around the world with a click. In recent years the popularity of social networking sites has increased. These sites allow users to communicate with each other as well as post photographs, events and profiles for others to see and comment.

Relationship Management: keeping relationship is an achievement of telecommunications to humanity. Nowadays people hardly visit one another probably due to distance or their busy schedules. This has posed so many threats to many relationships. With the advent of telecommunication, getting in touch is made easier. Social greetings and messages are sent through telephone conversation, Short Message System (SMS), chatting, voice and video calls to see one another.

Access to entertainment: telecommunications has increased the public ability to access music and film. With television and radio people can watch and listen to existing music and films. Now with the advent of

Internet people can watch films and listen to music they have not watched or heard before. They can even watch television on the Internet for broadcasts of what they have missed on their favorite programs

Technological foundation for societal communication: communication is said to play a central role in the fundamental operations of a society-from business to government to family. Telecommunications provide a synergy for social interaction to take place between these societies by using web browsing, cell phone calling, instant messaging, chatting (voice and video) and so on. These has progressively improved and integrated how we work, play and live generally

3.1.2 Negative Impact of Telecommunications on the Social Sector

Despite the fact that there are certain significant roles played by telecommunications in the society, there are still some negative impacts that need to be addressed.

Increased rate of social vices: telecommunications has increased the rate of social vices in the society. Uncontrolled use of technology and its application has increased the rate at which youths and even elderly exhibit unhealthy social behavior. Fraudulent activities are being perpetrated through telecommunications systems such as phones and social media.

Decrease in the rate of visitation: physical contact among friends and families improves friendship and family ties respectively. Since the advent of telecommunications, there has been a general decrease in physical contact among friends and families. People stay apart even if they live close for several months and years without seeing face to face. This is because they can write few texts of greeting to one another or talk on phone for few minutes there by reducing physical social contacts and interactions.

Lack of non-verbal cues or expression: talking on phones does not have the same taste as talking to someone in physically. Some people may read different meaning to what is said when there is no face to face communication. Moreover people can imitate tone of voice; facial expression is not seen so as to decode better the meaning of what is being said. Though some social media sites allow people to see one another while chatting, this cannot still be compared to physical contact with your loved one especially when you need a shoulder to cry or lean on.

Aids lying and cheating: people tend to lie when they are talking on phone as there are neither eye contacts nor body language. Lies can easily be detected to a certain extent during face to face interaction. Cheating has become the order of the day as a lot of relationships have been severed through telecommunications systems. Spouses cheat and lie using these technologies causing a lot of emotional trauma and depression which either leads to health challenges and eventually causes break up in most relationships.

SELF-ASSESSMENT EXERCISES

List and discuss four negative impacts of telecommunication on social sector of the society.

4.0   CONCLUSION

Telecommunications has played a great impact on the social sector. This unit has delivered to you some of the positive and negative impacts of telecommunications on the social sector.

5.0   SUMMARY

This unit identified and explained some positive and negative impacts of telecommunications on the social sector of the society. This is what we experience in every stages of our social life.

6.0   TUTOR-MARKED ASSIGNMENT

1.   Identify three positive impacts of telecommunications on the social sector of the society.

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UNIT 2   IMPACT OF TELECOMMUNICATIONS ON THE EDUCATIONAL SECTOR

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         3.1   Telecommunications and Educational Sector
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7.0   References/Further Readings

1.0   INTRODUCTION

The impact of telecommunications on educational sector cannot be over emphasised as telecommunication offers the educational sector tremendous potentials and opportunities to achieve the mission and vision of any educational institution. This unit takes you through some of the positive and negative impact of telecommunication on education sector.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

•   explain how Telecommunications has impacted positively on the educational sector
•   discuss the negative impacts of telecommunications on the educational sector.

3.0   MAIN CONTENT

3.1   Telecommunications and the Educational Sector

Prior to the digital age, education meant only attending schools at normal schools hours. However, with the advent and growth of telecommunication a lot have changed. Telecommunications service such as the Internet helps students do a lot of researches, read more on what is being taught in a normal school settings, do assignments and enjoy what is known as distance learning or e-learning. E-learning basically helps students opt for higher education in their preferred courses. Almost all types of courses you can think of are available in such distance learning institutions, and they have lecturers who give classes and notes to their students on-line, just like the way it happens in

the pre-digital schools setting. There is quite a number of the impact telecommunications has on education. However some positive and negative impacts will be mentioned below.

3.1.1 Positive Impacts of Telecommunications on Educational Sector Below are some of the Positive Impacts of Telecommunications on Education

Facilitates distance learning: Things are very easy as far as distance learning is concerned, and the only telecommunication products required is a computer with internet connection, and then the students can start with their course of study. The institutions benefit as they are able to admit more students thereby having more advantage over institutions that are yet to embrace distance learning. Students do not need to leave their city or country of resident to join any institution of their choice. Many known institutions use telecommunications to offer a variety of courses that students can study from the comfort of their own home. This helps them save a lot of money that would be spent on transportation, accommodations and other charges. Furthermore, these online courses allow students to choose their hours of learning, as students can continue with their job and education at the same time. For example, a student may decide to complete his/her job during the day and study at night or vice versa depending on his/her job schedule.

Research databases and websites: most telecommunication systems offer access to documents and databases located on the Internet. These resources are usually current, providing access to information with very little time between collection and publication of the information. Since the databases are electronic, many provide the comfort of using keyword, title, and author to search for and locate the desired information faster and more efficiently than traditional methods. Through telecommunications, these searches can be conducted from any location once there is network.

Tele and video-conferencing: These refer to a two way interactive exchange through telecommunications. Teleconferencing and video conferencing is possible on the Internet if the appropriate audios and videos are put in place. Students and teachers from different part of the globe share their knowledge electronically as if they are together in a classroom. Telecommunications is changing the way students learn, where they learn, when they learn and who teaches them. Through telecommunications, the typical classroom is no longer bound by four walls but open to include interactions among students, teachers and experts. These has made teaching and learning more interesting as experiences can be shared from varied sources from all over the world.
Aids in administrative tasks: Earlier school administrations involve a lot of paper work. For today's school administrators, telecommunications

has been seen to serve as managerial and organisational tools. Messages are now been sent electronically to staff and students in institutions. Examinations are being conducted electronically to ease the stress of marking. Messages can be grouped and stored in electronic folders for easy retrieval. In addition, school records, such as attendance and grades, can be easily and quickly transmitted between institutions. Admissions are communicated to students electronically and registrations are done electronically in almost all schools.

3.1.2 Negative Impact of Telecommunications on the Educational Sector

Telecommunications has positively affected the educational system which only very few were mentioned above. However, there are still a lot of negative impacts telecommunications has on education. Few of them are discussed below:

Waste of time: Time is valuable to both learners and educators in any institution as time is fixed for all activities. However, technologies are prone to errors just like humans. There are lot of technical errors when using technologies such as server error and connectivity problems which could take a lot of time to fix thereby hindering the learning process which in most cases lead to frustration both for the learners and educators. This discourages the use of telecommunications by students and educators despite its esteemed benefits.

Sources of distractions: Present generation of students are addicted to social networking that they are on social network sites even while in class thereby not listening to lectures. They are always busy checking their posts and updates, counting the number of likes and checking status of their family and friends and commenting on other people's posts. All these activities create a lot of distractions to students and create a huge gap between them and their education.

Promotes cheating: Telecommunications is making students more lazy by giving them powers to control almost everything with a click of mouse. Cheating is an illegal activity in any educational environment which attracts certain penalty, but technology has made it more powerful and easy to engage in. It has really become very tough to control this activity especially in during examinations. Smart phones are used to commit this atrocity because of its advanced features and instant Internet accessibility which compel them to use it without hassle.

Replacing physical books with electronic-books- Reading physical book is gradually going into extinction as the world is shrinking day by day. Hardly will you find a house with a shelf stacked with books.

Important materials are being compressed in phones, laptops, tablets and so on. Books have now become e- books. Books that are supposed to be a real asset have become a virtual asset to many. Electronic books which may not be cost effective also cause eye strain at times. E-books are not compatible in all devices so your laptops or tablets should have e-book reader to access electronic books and the worst part is e-book can easily be hacked by hackers.

4.0   CONCLUSION

Telecommunications has so many impacts on the educational sector which cannot be exhausted in this unit. However, this unit has delivered to you some of the positive and negative impacts of telecommunications on the educational sector.

5.0   SUMMARY

This unit identified and explained some positive and negative impacts of telecommunications on the educational sector of the society. As a student you might have experienced some of these impacts either positively or negatively.

6.0   TUTOR-MARKED ASSIGNMENT

1.   List three positive impacts of telecommunications on the educational sector.
2.   Discuss two negative impacts of telecommunications on the educational sector.

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UNIT 3   IMPACT OF TELECOMMUNICATIONS ON THE ECONOMY SECTOR

CONTENTS

1.0   INTRODUCTION

Telecommunications has great impact on any nation's economy. As a result of these impacts, economy without telecommunication cannot be thought of for one moment in this modern world. This unit takes you through some of the positive and negative impact of telecommunication on economy sector.

2.0   INTENDED LEARNING OUTCOMES

By the end of this unit, you will be able to:

- explain how telecommunications has impacted positively on the economy sector.
- Discuss the negative impacts of the telecommunications on the economy sector.

3.0   MAIN CONTENT

3.1   Telecommunications and the economy sector

The advanced technology and new innovations has made the world is now a global village. The overall economic activities of every nation basically depend on the utilization of the advanced technology of communication (telecommunications system). Emerging development of telecommunication is viewed as one of the most vital factors enhancing the overall economic development of most developing countries. The growth of telecommunication technology augment the existence of telecommunication industry in any economy as it is important tool for sharing information as well as a base for instituting financially important product and services market. Telecommunication enhances the

economic growth of any country by connecting to the international financial market, the domestic financial market and also product and services market. In essence, telecommunications is an important tool for businesses, because it enables companies to communicate effectively with customers and deliver high standards of customer service. It is also a key element in teamwork thus allowing employees to collaborate easily from wherever they are located. Mobile telecommunication gives companies the opportunity to introduce more flexible working by allowing employees to work efficiently from home. The introduction of smartphones gives employees new levels of productivity and capability on the move. All these are geared towards improving the economy of any nation. However despite the good role telecommunications has played in the growth of economy, there is also a lot of negative role that is been displayed by fraudulent people.

3.1.1 Positive Impacts of Telecommunications on Economy

Below are some of the positive impacts of telecommunications on economy:

Improves Customer Service: Through telecommunication, customer service of organisations has greatly improved there by boosting the economy. Telephones and Internet services (specifically e-mails) are important elements of a customer service strategy. By using call and SMS management techniques, incoming calls can be handled quickly, even when lines are busy, and you can route calls to employees with the right skills to deal with the inquiry and also reply to SMS which may be responded to immediately or at a later time depending on how SMS inquiry is programmed. E-mails can be sent to customers informing them about their status or issues relating to their transactions. Status of accounts may not need travelling down to banks for enquiry. This can be done through a click. Telephone can also be used to contact customers in case of any irregularities in transaction and also to notify customers on certain issues relating to transaction. Customers may not need to travel down to organisations except on rare occasions where their presence may be required.

Improves Communication and Collaboration: Collaboration is the coming together of experts all over the globe in order to share knowledge and their expertise. Through collaboration of different departments and organisations, company's performance in projects such as new product development, customer relationship management and quality initiatives can be improved. Collaborative and complex problem solving is very important in organisations as it seen as the essence of the work of many employees. Telecommunications system helps project teams maintain momentum and make important decisions. Collaboration

can be achieved through Internet services such as teleconferencing or a web conference using a smartphone or computer with Internet connectivity. This can help minimise the risk of travelling and also save the expense required in travelling their by boosting the economy.

Encourage Good Governance: A knowledge society creates awareness to people that play an important role to form a very good government. Telecommunications helps a nation to achieve this goal by integrating the government and its various departments and citizens to know about their needs and meet these needs perfectly and righteously. It can also help developing countries achieve their goal of development through modernization, industrialization and automation. It enables people to enjoy the enormous power of e-governance. With the aid of the internet and telephony communication is made easy, data can be shared, ideas and information can be exchanged in order to help the society transform into an information society. Each citizen becomes a good voter to boost the overall growth and development of a country by bringing about positive social changes in growth, progress and above all modernisation. Through telecommunications, a country can do well in the mobilisation of natural resources and its capital. The nation can create an atmosphere of technological know-how in order to create an effective digital infrastructure for delivering services digitally. Telecommunications has no alternate for the achievement of constantly rising of national and international goals for betterment, higher income standards and a momentous transformation from traditional society to modern society.

Boosts Economic Growth of different sectors: Everyone has experienced the importance and the benefits of telecommunication in the society and in daily lives. It has become an interesting part of our lives and we continue to discover the importance it has on agriculture, transportation, health, business and administration. Detecting earthquakes before they happen to warn farmers, figuring out that there is going to be a hurricane or severe weather conditions, or other natural disasters are all thanks to this technology. This has saved the nation of so many disasters that would have affected the economy negatively. Other than agriculture, telecommunication is also used to fly and land airplanes, manage vehicles and control passenger information for safety reasons in transportation. In health, telecommunication has helped in curbing the danger posed by many diseases which would have caused the nation many losses to lives and properties.

3.1.2 Negative Impact of Telecommunications on Economy Sector

In as much as telecommunications has affected the economy positively. It has also posed a threat to the nation's economy. Few of the negative impact of telecommunications on economy are discussed below:

No Face-To-Face Contact among employees and between employees and customers: For companies that have branches all over the globe, telecommunication systems may allow company employees to interact from different locations, but doesn't offer colleagues the chance to enjoy a face–to–face interaction. Most of the meetings held over video conference systems are mostly business or project oriented and do not allow for physical socialisation. This could lead to bad relationship at work and may affect business performance in the future. Also some categories of customers prefer to see the people they are dealing with and have a face-to- face interaction with them especially when it involves huge amount of money. This has affected many businesses because some customers have pulled out from profitable businesses because of their lack of trust in technology.

Isolation between Employers and Their Employees: The distinction between working at home and working in the office is the presence of colleagues. However, the use of telecommunication systems has encouraged many employers and employees to adopt the work-from-home job format otherwise known as telecommuting. Working all alone throughout a day keeps employers and employees apart and might affect performance negatively. Though most companies organise for physical meetings periodically, it may still not be enough to address some underlying work issues. When colleagues are working apart, they won't have extra time to share professional ideas or office gossip. Interaction is hugely embedded on computer or online based systems, which can cut connections between colleagues when they breakdown or when there is no network. And since telecommunication systems cost lots of data bundles to run, there can be a limit to the extent at which employees interact. That may lead to partial or even complete isolation among employees and/or employers. This psychological aspect of being separated from the office environment especially with things that has to do with development and occurrences is very important for many people. These set of people like to interact with colleagues and to share what they are doing, therefore lack of having colleagues around could affect the quality of their work in a negative way.

Security Issues: One major drawback of the new economy that's centered on telecommunications and its use is security attacks and threats. An organisation's data or information may not be as secure

online as it is on paper. Telecommunications is open to online security threats including viruses and other software and hardware concerns. With sensitive data being transmitted and shared over the Internet and other networks, there's a possibility people will try to hack it either for their own pleasure or for use by the competitors. And in order to avoid that, system users need to update passwords on a regular basis or invest in advanced data encryptions. That makes communication through video conferences, teleconferences and video calls, unsafe and costly to a larger extent.

Increase costs associated with communication: Acquiring and setting up telecommunication equipment and software installation require a huge finance. Procuring high-quality webcams, LCD screens, sophisticated video conferencing software etc. and getting them set up, remains a huge task for many businesses. Also, before officially introducing the system to the business, it is necessary to train employees on how to use the new telecommunication technologies which mean more spending is required. The need for regular system maintenance attracts enormous costs. In essence, setting up a telecommunication system might bring convenience and flexibility, but it may lead to increased costs in the long run.

4.0   CONCLUSION

This unit states the most important impacts of telecommunications on any nation's economy. However, there are more of the positive and negative impacts of telecommunications on the economy sector.

5.0   SUMMARY

This unit identified and explained some positive and negative impacts of telecommunications on the economy. As a student you might have experienced some of these impacts either positively or negatively.

6.0   TUTOR-MARKED ASSIGMENTS

1.   Identify more impacts of telecommunications on economy. Each of the identified impacts should have a scenario.
2.   Explain how telecommunications has impacted positively on the economy sector.

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