Министерство науки и высшего образования Российской Федерации
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И. В. ЯГУНИНА

АНГЛИЙСКИЙ ЯЗЫК:
ИНФОКОММУНИКАЦИОННЫЕ ТЕХНОЛОГИИ

Уфа 2022

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Цель пособия – углубление и усвоение необходимого терминологического минимума в процессе работы с текстами по специальности, дальнейшее совершенствование навыков чтения, перевода и аннотирования оригинальной литературы. Включены разнообразные лексические и грамматические задания, направленные на расширение знаний и закрепление навыков устной речи как при повседневном общении, так и при общении в профессиональной сфере.

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INTRODUCTION

Учебное пособие предназначено для студентов II курса, обучающихся по направлениям 11.03.02 Инфокоммуникационные технологии и системы связи. Цель пособия – обеспечить усвоение необходимого терминологического минимума, помочь студентам преодолеть трудности, характерные для технического текста, совершенствовать технику чтения и адекватного перевода литературы по специальности, а также обогатить, закрепить и систематизировать навыки устного общения по специальности.

Данное пособие состоит из 15 уроков, последовательно связанных между собой тематически, и текстов по специальности для дополнительного чтения. Тексты заимствованы из специальной научной литературы на английском языке и ориентируют студентов на совершенствование навыков технического перевода современной публицистики. Тематика текстов разнообразна и направлена на обогащение словарного запаса, необходимого для чтения технических текстов. Тексты содержат большое количество терминологических единиц, что помогает студентам правильно пользоваться лексикой по специальности. Для достижения осмысленного чтения текста предварительно предлагается проработать тематический словарь, приведенный в начале каждого урока.

Для закрепления навыков перевода технической литературы и устной речи по специальности тексты каждого урока снабжены системой лексических и грамматических упражнений, построенных исключительно на материале приведенного текста. Послетекстовые упражнения направлены на активизацию навыков пользования технической терминологией и ставят целью обеспечение практики устной речи на базе информации, полученной из текстов. Грамматические упражнения создают условия для повторения и закрепления грамматических конструкций при чтении и в устной речи по технической тематике.

В пособии представлены тексты для внеаудиторного чтения.

UNIT I

WHAT IS INFOCOMMUNICATIONS?

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

expansion	увеличение (в размере, объеме, количестве); распространение; рост, развитие
data	данные, информация
to emerge	появляться; всплывать; выходить
convergence	схождение в одной точке; сближение
means	средство; способ, метод; возможность
transmission	передача, перенос данных
fiber - optics	волоконно-оптический кабель; волоконная оптика
satellite	искусственный спутник

Read and translate the Text

WHAT IS INFOCOMMUNICATIONS?

Infocommunications is the natural expansion of telecommunications with information processing and content handling functions including all types of electronic communications (fixed and mobile telephony, data communications, media communications, broadcasting, etc.) on a common digital technology base, mainly through Internet technology.

The term Infocommunications, or in short form, Infocom(s) or Infocomm(s) first emerged in the beginning of eighties at scientific conferences and then was gradually adopted in the 1990s by the players of telecommunications sector, including manufacturers, service providers, regulatory authorities and international organizations to clearly express their participation in the convergence process of the telecommunications and information technology sectors. The convergence process is triggered by the huge scale development of digital technology. Digital technology

has unified, Internet technology radically reshaped telecommunications, integrated information processing and content management functions.

The term Infocommunications is also used in a wider sense as a shorter form of information and communication(s) technology (ICT).

The terms infocom(s) and infocommunications are also used to express the integration of the information technology and telecommunication sectors, or simply to interpret the abbreviation ICT.

Telecommunication is communication at a distance by technological means, particularly through electrical signals or electromagnetic waves.

Early telecommunication technologies included visual signals, such as beacons, smoke signals, semaphore telegraphs, signal flags, and optical heliographs. Other examples of pre-modern telecommunications include audio messages such as coded drumbeats, lung-blown horns, and loud whistles.

Electrical and electromagnetic telecommunication technologies include telegraph, telephone, teleprinter, networks, radio, microwave transmission, fiber optics, communications satellites and the Internet. [1], [64]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Infocommunications includes all types of electronic communications on a common digital technology base.
2. The term Inforcommunications appeared only in the XXI century.
3. ICT is an extended synonym for IT.

4. Mass communication media are considered to be the Media and Content products.
5. Telecommunications is a type of communication taking place only through electromagnetic waves.

3. Match the words with their definitions

1. processing	a) the size of something, especially when it is big
2. broadcasting	b) to make a machine or piece of equipment start to work
3. scale	c) an organization or company whose job is to make a service available to people
4. to adopt	d) putting information into a computer in order to organize it
5. to trigger	e) a situation in which people or things gradually become the same or very similar
6. provider	f) to decide to start using a particular idea, plan, or method
7. convergence	g)sending out messages or programmes to be received by radios or televisions

4. Use the words in the box to complete the sentences

means	visual	information	digital	providers

1. Infocoms is based on common ….. technology.
2. Internet technology reshaped integrated ….. processing.
3. Manufactures and service ….. adopted the term ICT in the 1990s.
4. TC is communication at a distance by technological ….. .
5. Early telecommunication technologies included ….. signals.

5. Answer the following questions using information from the text

1. What does Infocommunications comprise?
2. When did the term Infocoms first emerge?

3. What gave rise to the convergence process of the telecommunications and information technology?
4. Do audio-visual services refer to as ICT products?
5. What means are used in communication at a distance?

6. Put the verbs in the brackets into the correct tense-forms

1. Infocommmunications (to include) all types of electronic communication.
2. The term Infocommunications (to adopt) in the 1990s.
3. The convergence process (to trigger) by the huge scale development of digital technology.
4. The term ITC (to define) as an extended synonym for information technology.
5. Beacons, smoke flags (to be) early telecommunication technologies.

7. Fill in the blanks with prepositions

1. Infocommunications is based … a common digital technology.
2. The term Inforcommunications was adopted in the 1990s … the players of telecommunications.
3. The term ICT is an extended synonym … IT.
4. Infocommunications is communication … distance.
5. Telecommunications is communication … technological means.

8. Find the statements in the Text you agree and disagree with. Give your reasons

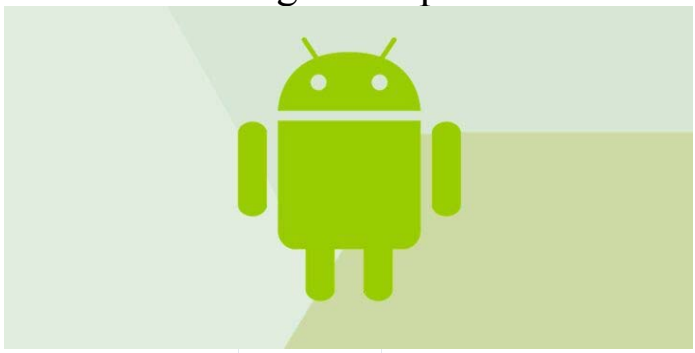
9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts …

1. The Radio took 38 years to reach an audience of 50 million.

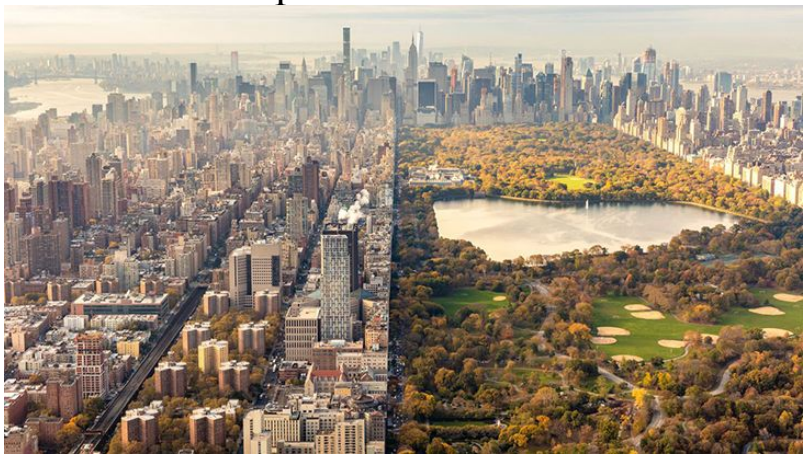
You would think the invention of the radio would be a big deal, but it took 38 years for the radio to reach an audience of 50 million. Meanwhile, the iPod only took 3 years to reach the same milestone!

2. “Android” is gender specific.



The word “Android” literally means a human with a male robot appearance. The female equivalent of this word is a “Gynoid.”

3. The first cell phone call was in New York City.



In 1973, the first ever mobile phone call was made by Martin Cooper, an employee of Motorola, made from the streets of New York City. It wasn’t until 19 years later when Neil Papworth sent the first SMS message, which

brings us onto our next tech fact: the first commercial text message was sent in 1992. [2]

Supplementary reading

What is communication?

1. **Read the Text and do the tasks that follow it**

What is communication?

Communication is a process of transferring information from one entity to another.

What is an entity? Let's call the entity that transfers information Sender and the entity that receives the information Receiver.

The sender and the receiver can be people, animals or devices. It can also include other beings, but since this website is about communication in the workplace, we'll leave animals, dead people and angels out of this conversation.

Information is exchanged between people via words, gestures/signs and body language. The entities (sender and receiver) can be:

• One sender to one receiver
• One sender to many receivers
• Many senders to one receiver
• Many senders to many receivers. This sounds crazier than it is, as an example think of a chorus singing at a church.

Business communication takes place in the context of people and organizations transacting business, so the definition of communication as listed at the top of the page applies.

The entities exchanging information are employees, customers, bosses, boards, stockholders, companies, departments and so forth. One specific - and subjective - dynamic that applies to business communication is that it tends to use its own "language" (business jargon) and the entities (sender and receiver) tend to adopt and maintain their public identities while communicating. In some sense, business communication is not as authentic as other types of communication.

Communication in its most basic sense is transferring information from sender to receiver. The various definitions of communication (organizational, business, interpersonal and so forth) are just flavors of the basic definition of communication. Communication in its most expansive sense is everything and anything (not just information) that gets sent and received. Under this definition, all sentient beings are constantly communicating. But that's a whole different conversation that we won't get into just yet. [3], [4]

2. Say whether the following statement

Information is one of a kind depending on the context.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

Communication can take place only between entities.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) Information is exchanged between people via words, gestures/signs and body language.

b) Communication is everything and anything (not just information) that gets sent and received.

c) Communication is a method of transferring data from one entity to another.

5. Make up a short plan of the Text. Retell the Text according to your plan

UNIT II

TELECOMMUNICATIONS: PRINCIPLE OF WORK

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

recipient	адресат, получатель
destination	1) назначение, предназначение; 2) место назначения, пункт назначения; 3) *информ.* адресат информации
fascimile	1) телефакс, факс, устройство электронной передачи документов; 2) факсимильная связь
to provide	1)снабжать; доставлять; обеспечивать (*кого-л./ что-л.*) 2) давать, предоставлять; обеспечивать
to relay	1) передавать, транслировать (*по радио, телевидению*); 2) отправлять, пересылать, посылать (*сообщение, информацию*)
conductor	1) проводник (вещество); 2) проводник; провод, жила (кабеля)
current	(электрический) ток
dots and dashes	точки-тире (в азбуке Морзе)
sequence	последовательность; ряд; очерёдность, порядок следования
core	1) ядро (*операционной системы*); 2) сердечник; магнитный сердечник;
to emit	1) выпускать; издавать; 2) излучать; испускать; выделять
ordinary	обычный, обыкновенный; ординарный; простой
frequency	частота (*характеристика вращения, излучения и т.д.*)
to modulate	1) регулировать; корректировать; 2) *радио* понижать частоту

Read and translate the Text

TELECOMMUNICATIONS: PRINCIPLE OF WORK

Telecommunications embraces all devices and systems that transmit electronic signals across long distances. Telecommunications allows people around the world to contact one another, to access information instantly, and to communicate from remote areas. Telecommunications usually involves a sender of information and one or more recipients linked by a technology, such as a telephone system, that transmits information from one place to another. Telecommunications devices convert different types of information, such as sound and video, into electronic signals. The signals can then be transmitted by means of media such as telephone wires or radio waves. When a signal reaches its destination, the device on the receiving end converts the electronic signal back into an understandable message, such as sound over a telephone, moving images on a television, or words and pictures on a computer screen. Telecommunications enables people to send and receive personal messages across town, between countries, and to and from outer space. It also provides the key medium for news, data, information and entertainment.

Telecommunications messages can be sent in a variety of ways and by a wide range of devices. The messages can be sent from one sender to a single receiver (point-to-point) or from one sender to many receivers (point-to-multipoint). Personal communications, such as a telephone conversation between two people or a facsimile (fax) message, usually involve point-to-point transmission. Point-to-multipoint telecommunications, often called broadcasts, provide the basis for commercial radio and television programming.

Telecommunications begin with messages that are converted into electronic signals. The signals are then sent over a medium to a receiver, where they are decoded back into a form that the person receiving the message can understand. There are a variety of ways to create and decode signals and many different ways to transmit signals.

Devices such as the telegraph and telephone relay messages by creating modulated electrical impulses, or impulses that change in a systematic way. These impulses are then sent by wires, radio waves, or other media to a receiver that decodes the modulation. The telegraph, the earliest method of delivering telecommunications, works by converting the

contacts (connections between two conductors that permit a flow of current) between a telegraph key and a metal conductor into electrical impulses. These impulses are sent along a wire to a receiver, which converts the impulses into short and long bursts of sound or into dots and dashes on a simple printing device. Specific sequences of dots and dashes represent letters of the alphabet.

The telephone uses a diaphragm (a small membrane) connected to a magnet and a wire coil to convert sound into electrical impulses. When a person speaks into the telephone's microphone, sound waves created by the voice move the diaphragm, which in turn creates electrical impulses that are sent along a telephone wire. The receiver's wire is connected to a speaker, which converts the modulated electrical impulses back into sound.

Broadcast radio and cellular radio telephones are examples of devices that create signals by modulating radio waves. A radio wave is one type of electromagnetic radiation, a form of energy that travels in waves. Microwaves are also electromagnetic waves, but with shorter wavelengths and higher frequencies. In telecommunications, a transmitter creates and emits radio waves. The transmitter electronically encodes sound or other information onto the radio waves by varying either the amplitude (height) of the radio waves, or by varying the frequency (number) of the waves within an established range. A receiver (tuner) tuned to a specific frequency or range of frequencies will pick up the modulation added to the radio waves.

Most personal computers communicate with each other and with larger networks, such as the Internet, by using the ordinary telephone network. Since the telephone network functions by converting sound into electronic signals, the computer must first convert its digital data into sound. Computers do this with a device called a modem, which is short for modulator/demodulator. [5], [18]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.

Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Nowadays telegraphs are broadly used in the world.
2. Telecommunications permits people al over the world to contact one another.
3. Telecommunications messages can be sent only by a few specific devices.
4. Telephone impulses change in a systematic way.
5. Computers transmit analog information.

3. Match the words with their definitions

1. membrane	a) the flat surface on a computer, television, or piece of electronic equipment where words and pictures are shown
2. modem	b) to change from one system, use, or method to another, or to make something do this
3. screen	c) a thin layer of tissue that covers, separates, or connects cells or parts of a person, animal, or plant
4. to convert	d) a piece of equipment that allows you to connect a computer to the Internet
5. to decode	e) to change digital electronic signals into a picture and sound on your television
6. device	f) a set of computers connected to each other in such a way that each computer can send and receive information to and from the other computers
7. network	g) a machine or piece of equipment that does a particular thing

4. Which of the three answers best matches the meaning of the italicized word in the following sentences

1. The word frequency means ….
a) telegraph; b) media; c) a message; d) a number of repetitions
2. The word network implies …
a) matrix; b) cross lines; c) connected system; 4) broadcast
3. The best explanation of the word data is….
1) a number; 2) a season; 3) facts; 4) transmission
4. The word message refers to …
a) a connection; b) a piece of news; c) an error; d) a letter.
5. The best explanation of the word satellite might be …
a) portable radio set; b) an artificial object in space; c) a person you spend a lot of time with; d) a planet moving round another planet [5]

5. Answer the following questions using information from the text

1. How are the participants of telecommunications connected?
2. How can the messages be sent?
3. How does telecommunications begin?
4. In what way do telegraph and telephone relay messages?
5. What is a radio way?
6. How does the computer function?

6. Put the verbs in the brackets into the correct tense-forms

1. Telecommunications usually (to involve) an information sender and recipients.
2. Telecommunications devices (to convert) different types of information.
3. The signals (to transmit) via media such as wires or radio waves.
4. Point-to-multipoint telecommunications (to provide) the basis for radio and television programming.
5. There (to be) a variety of ways to create and decode signals and many different ways to transmit signals.
6. The impulses (to send) along a wire to a receiver.

7. Fill in the blanks with prepositions

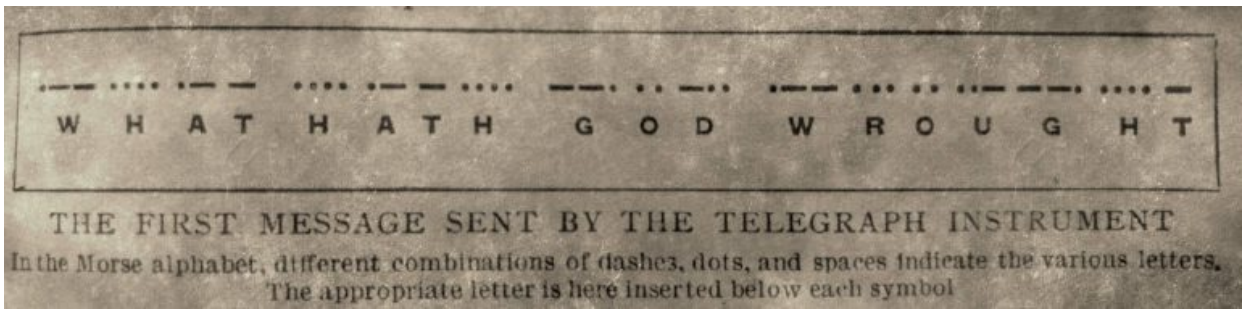
1. Telecommunications allows people around the world to communicate … remote areas.
2. Telecommunications messages can be sent … a wide range of devices.
3. A receiver converts the impulses … short and long bursts of sound or … dots and dashes.
4. Electrical impulses are sent … a telephone wire.
5. Analog signal can be transmitted … the telephone network.

8. Speak about the role telecommunications plays in our daily life. Work in pairs

9. Make up a short plan of the Text. Retell the Text according to your plan

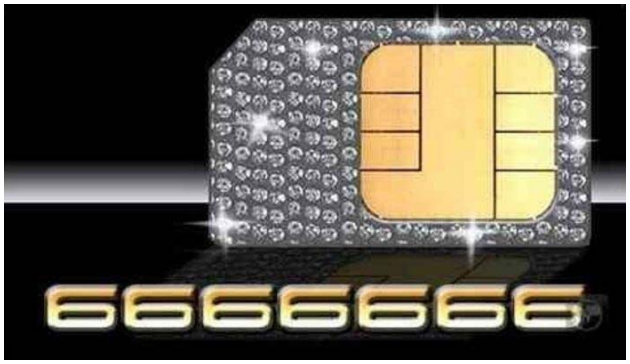
10. Interesting facts …

1. On May 24th, 1844, Samuel Morse sent the first message over the Baltimore–Washington telegraph line. The first transmission was, "What hath God wrought." [6]



THE FIRST MESSAGE SENT BY THE TELEGRAPH INSTRUMENT
In the Morse alphabet, different combinations of dashes, dots, and spaces indicate the various letters. The appropriate letter is here inserted below each symbol

2. The mobile phone number **666 6666 fetched £1.5 million** in a charity auction in Qatar in 2007.



3. Frigensophobia is the fear that using your mobile is damaging your brain. [7]

Supplementary reading

Current development of telecommunications

1. Read the Text and do the tasks that follow it

Personal computers have pushed the limits of the telephone system as more and more complex computer messages are being sent over telephone lines and at rapidly increasing speeds. This need for speed has encouraged the development of digital transmission technology. Innovations in fiber-optic technology will hopefully keep up with the growing use of personal computers fir telecommunications. The next generation of cellular phones and televisions will also benefit from the speed and clarity of digital technology.

Telecommunications and information technologies are merging and converging. This means that many of the devices we associate with only one function may evolve into more versatile equipment. This convergence is already happening in various fields. Advanced telephones with keyboards and small screens are now developed that can access the Internet and receive e-mail. Personal computers can now access information and video entertainment and are in effect becoming a combined television set and computer terminal.

Television sets, which we currently associate with broadcast and cable-delivered video programming, are able now to gain access to the Internet through add-on appliances. Future modifications and technology innovations may blur the distinctions between appliances even more.

Convergence of telecommunication technologies will also trigger a change in the content available and the composition of the content provider. Both television and personal computers will be incorporating new multimedia, interactive and digital features. For example, an entertainment program might have on-screen pointers to World Wide Web containing more information about actors. In the near term, before the actualization of a fully digital telecommunication world, devices like modems will still be necessary to provide an essential link between the old analog world and the upcoming digital one. [5], [8]

2. Say whether the following statement

More and more complex computer messages are despatched via telephone lines and at hastily growing speeds.

1) is true 2) there is no information in the text
3) is false

3. Say whether the following statement

Telecommunication is the technique of transmitting a message from one point to another.

1) is true 2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) Communication is everything, not just information, that gets sent and delivered.

b) Television sets benefit from modern digital technologies.

c) Convergence of telecommunications and information technologies expands the limits of various fields.

5. Make up a short plan of the Text. Retell the Text according to your plan

UNIT III

WIRELESS COMMUNICATION

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

transmitter	1) трансмиттер, передатчик; 2) преобразователь, датчик
to generate	производить, создавать, образовывать, формировать
wireless	беспроводной, беспроволочный
flexibility	эластичность, гибкость, упругость
installation	установка; сборка; инсталляция
vehicle	1) транспортное средство; 2) средство передачи, распространения чего-л.; 3) проводник (звука, света)
to overlap	частично покрывать; заходить один за другой; перекрывать
oscillator	генератор, излучатель
drawback	недостаток, препятствие; помеха
to disturb	нарушать ход, движение, равновесие
to involve	включать в себя, касаться, затрагивать
to require	1) требовать(ся); 2) нуждаться в чем-л.

Read and translate the Text

WIRELESS COMMUNICATIONS

Wireless communications are various telecommunications systems that use radio waves to carry signals and messages across distances. Wireless communications systems use devices called transmitters to generate radio waves. A microphone or other mechanism converts messages, like sounds or other data, into electronic impulses. The transmitters change, or modulate, the radio waves so they can carry the impulses, and then transmit the modulated radio signals across distances. Radio receivers pick up these signals and decode them back into original

messages. Commercial radio and television are also wireless telecommunications system, but radio and television are mainly public broadcast services rather than personal communications systems.

Wireless communications allow people greater flexibility while communicating, because they do not need to remain at a fixed location, such as a home or office. Wireless technologies make communications services more readily available than traditional wire-based services (such as ordinary telephones), which require the installation of wires. This is useful in places where only temporary communications services are needed, such as at outdoor festivals or large sporting events. These technologies are also useful for communicating in remote locations, such as mountains, jungles, or deserts, where telephone service might not exist. Wireless services allow people to communicate while in a car, airplane, or other moving vehicle. Police, fire, and other emergency departments use two-way radio to communicate information between vehicles that are already responding to emergency calls, which saves valuable time. Construction and utility workers frequently use hand-held radios for short-range communication and coordination. Many businesspeople use wireless communications, particularly cellular radio telephones, to stay in contact with colleagues and clients while traveling.

All wireless communications devices use radio waves to transmit and receive signals. These devices operate on different radio frequencies so that signals from one device will not overlap and interfere with nearby transmissions from other devices.

Wireless communications begin with a message that is converted into an electronic signal by a device called a transmitter. The transmitter uses an oscillator to generate radio waves. The transmitter modulates the radio wave to carry the electronic signal and then sends the modified radio signal out through space, where it is picked up by a receiver. The receiver decodes or demodulates the radio wave and plays the decoded message over a speaker. Wireless communications provide more flexibility than wire-based means of communication. However, there are some drawbacks. Wireless communications are limited by the range of the transmitter (how far a signal can be sent), and since radio waves travel through the atmosphere, they can be disturbed by electrical interferences (such as lightning) that cause static.

Wireless communications systems involve either one-way transmissions, in which a person merely receives notice of a message, or

two-way transmissions, such as a telephone conversation between two people. An example of a device that sends one-way transmission is a pager, which is a radio receiver. When a person dials a pager number, the pager company sends a radio signal to the desired pager. The encoded signal triggers the pager circuitry and notifies the customer carrying the pager of the incoming call with a tone or a vibration, and often the telephone number of the caller. Advanced pagers can display short messages from the caller, or provide news updates or sports scores.

Two-way transmissions require both a transmitter and a receiver for sending and receiving signals. A device that functions as both a transmitter and a receiver is called a transceiver. Cellular radio telephones and two-way radios use transceivers, so that back-and-forth communication between two people can be maintained. Early transceivers were very large, but they have decreased in size due to advances in technology. Fixed-base transceivers, such as those used at police stations, can fit on a desktop, and hand-held transceivers have shrunk in size as well. Several current models of hand-held transceivers weigh less than 0.2 kg. [5], [9]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Telecommunication systems use electrical signals to carry messages.
2. Radio receivers are used for decoding signals back into original messages.

3. Several wireless devices can operate on one radio frequency.

4. Radio waves can be disturbed by electrical interferences that cause static.

5. The transmitter generates radio waves itself.

3. Match the words with their definitions

1. to modulate	a)to receive an electronic signal on a radio or similar piece of equipment
2. to pick up	b) a system of circuits that an electric current flows around
3. to provide	c) to change the energy level or frequency of a radio wave
4. flexible	d) to cause something to exist or be available
5. circuitry	e) able to make changes in an altering situation
6. interference	f) a radio used for sending and receiving messages
7. transceiver	g) radio signals that make the sound or picture of a radio or television programme difficult to hear or see clearly, or the noise caused by this

4. Use the words in the box to complete the sentences

operate	decode	communicate	devices	functions

1. Wireless communications systems use ….. called transmitters to generate radio waves.
2. Radio receivers ….. the signals into original messages.
3. Wireless communications allow people to ….. in remote locations.
4. All wireless communication devices ….. on different radio frequencies.
5. A transceiver is a device that ….. as both a transmitter and a receiver.

5. Answer the following questions using information from the text

1. What are the functions of transmitters?
2. What are the functions of receivers?

3. What are the advantages of wireless communication?
4. What are the basic principles of wireless communications?
5. What devices use transceivers?

6. Put the verbs in the brackets into the correct tense-forms

1. A microphone (to convert) messages like sounds or other data into electronic impulses.
2. Traditional wire-based services (to require) the installation of wires.
3. Wireless communications begin with a message that (to convert) into an electronic signal.
4. Wireless communications (to limit) by the range of the transmitter.
5. Wireless communications (to be) more flexible than wire-based means of communication.

7. Define the part of speech of the underlined word: the Gerund or the Participle. Explain your choice. Translate these sentences into Russian

1. Wireless communications allow people greater flexibility while communicating.
2. These technologies are also useful for communicating in remote locations.
3. Many businesspeople use wireless communications to stay in contact with colleagues and clients while traveling.
4. The encoded signal triggers the pager circuitry and notifies the customer carrying the pager of the incoming call with a tone or a vibration.
5. Two-way transmissions require both a transmitter and a receiver for sending and receiving signals. [5]

8. Divide the text into logical parts and express the main idea of each part in one sentence

9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts…

1. ”Gangnam Style” by PSY is still the most viewed videos of all time with more than 2,840,000,000 views. [10]

2. Did you know that there is a list of strangest WiFi hotspots? Number one being the world’s most active volcano the Masaya Volcano, Nicaragua or ‘The Mouth of Hell’ as it is affectionately known. Researchers are installing 80 wireless sensors in the hope that it can predict a volcanic eruption. [11]

Supplementary reading

Modes of Wireless Communications

1. Read the Text and do the tasks that follow it

Wireless communications systems have grown and changed as technology has improved. Several different systems are used today, all of which operate on different radio frequencies. New technologies are being developed to provide greater service and reliability.

Radio operators still monitor distress channels, but maritime and aviation telecommunications systems now use high-frequency radios and satellites capable of transmitting speech, rather than wireless telegraphy, to send messages. Aircraft pilots use radios to communicate with air traffic controllers at airports and also to communicate with other pilots. Navigation beacons are equipped with transmitters that send automated signals to help ships and aircraft in distress determine their positions. While high-frequency radio can transmit signals over long distances, the quality of these signals can be diminished by bad weather or by electrical interference in the atmosphere, which is often caused by radiation from the sun.

Police, fire, and other emergency organizations, as well as the military, have used two-way wireless radio communication since the 1930s. Early vehicle-based radios were large, heavy units. After the invention of the transistor in 1948, radios shrank in size to small hand-held radio transceivers, which civil authorities now use to communicate with each other directly. Public two-way radios with several frequency options are widely available as well. Usually limited in range to a few miles, these units are great aids for such mobile professionals as construction workers, film crews, event planners, and security personnel. Simpler two-way radios, called walkie-talkies, have been popular children's toys for years.

Long-range broadcast services and frequencies, in what is known as the shortwave radio band (with frequencies of 3 to 30 megahertz), are available for amateur or ham radio operators. Shortwave radio broadcasts can travel long distances because of the concentration of ionized, or electrically charged, particles in the layer of the atmosphere known as the ionosphere. This layer reflects radio signals, sending signals that are transmitted upward back to earth. This skipping of waves against the ionosphere can greatly increase the range of the transmitter. The degree of reflectivity of the ionosphere depends on the time of day.

Cellular radio telephones, or cell phones, combine their portable radio capability with the wired, or wireline, telephone network to provide mobile users with access to the rest of the public telephone system used by non-mobile callers. Modern cellular telephones use a network of several short-range antennas that connect to the telephone system. Because the antennas have a shorter range, frequencies can be reused a short distance away without interference.

Satellite communications services connect users directly to the telephone network from almost anywhere in the world. Special telephones are available to consumers that communicate directly with communications satellites orbiting the earth. The satellites transmit these signals to ground stations that are connected to the telephone system. These satellite services, while more expensive than cellular or other wireless services, give users access to the telephone network in areas of the world where no telephone service exists.

The number of companies offering wireless communications services has grown steadily in recent years. In 1988 about 500 companies offered cellular radio telephone (cell phone) services. By 1995 that number had grown to over 1500 companies serving millions of subscribers. Wireless communication is becoming increasingly popular because of the convenience and mobility it affords, the expanded availability of radio frequencies for transmitting, and improvements in technology. [5], [12]

2. Say whether the following statement

Cellular phones provide connection of users to the rest of the public telephone system.

1) is true 2) there is no information in the text
3) is false

3. Say whether the following statement

Shortwave radio broadcasts because there is no interference.

1) is true 2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) The number of wireless communication modes has increased in recent years.

b) New wireless communication technologies provide greater service.

c) Wireless communications connect users in different ways.

5. Make up a short plan of the Text. Retell the Text according to your plan

UNIT IV

TELECOMMUNICATION NETWORK

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

terminal	конечный пункт, терминал, устройство
node	узел, узловая точка
circuit switching	коммутация цепей, коммутация каналов в сети
message switching	коммутация сообщений
to route	направлять электрический сигнал, телефонный звонок и т.п. по конкретной линии связи, сети
link	линия связи; канал связи
regardless of	не обращая внимания; невзирая на; независимо от
plane	плоскость, плоская поверхность; уровень

Read and translate the Text

TELECOMMUNICATION NETWORK

A telecommunication network is a collection of terminals, links and nodes which connect together to enable telecommunication between users of the terminals. Networks may use circuit switching or message switching. Each terminal in the network must have a unique address so messages or connections can be routed to the correct recipients. The collection of addresses in the network is called the address space.

The links connect the nodes together and are themselves built upon an underlying transmission network which physically pushes the message across the link.

Examples of telecommunication networks are:

- computer networks
- the Internet
- the telephone network
- the global Telex network

Messages are generated by a sending terminal, then pass through the network of links and nodes until they arrive at the destination terminal. It is the job of the intermediate nodes to handle the messages and route them down the correct link toward their final destination.

The messages consist of control (or signaling) and bearer parts which can be sent together or separately. The bearer part is the actual content that the user wishes to transmit (e.g. some encoded speech, or an email) whereas the control part instructs the nodes where and possibly how the message should be routed through the network. A large number of protocols have been developed over the years to specify how each different type of telecommunication network should handle the control and bearer messages to achieve this efficiently.

All telecommunication networks are made up of five basic components that are present in each network environment regardless of type or use. These basic components include terminals, telecommunications processors, telecommunications channels, computers, and telecommunications control software.

- Terminals are the starting and stopping points in any telecommunication network environment. Any input or output device that is used to transmit or receive data can be classified as a terminal component.
- Telecommunications processors support data transmission and reception between terminals and computers by providing a variety of control and support functions. (i.e. convert data from digital to analog and back)
- Telecommunications channels are the way by which data is transmitted and received. Telecommunication channels are created through a variety of media of which the most popular include copper wires and coaxial cables. Fiber-optic cables are increasingly used to bring faster and more robust connections to businesses and homes.
- In a telecommunication environment computers are connected through media to perform their communication assignments.
- Telecommunications control software is present on all networked computers and is responsible for controlling network activities and functionality.

Early networks were built without computers, but late in the 20th century their switching centers were computerized or the networks replaced with computer networks.

In general, every telecommunications network conceptually consists of three parts, or planes (so called because they can be thought of as being, and often are, separate overlay networks):

- The control plane carries control information (also known as signalling).
- The data plane or user plane carries the network's users' traffic.
- The management plane carries the operations and administration traffic required for network management.

The data network is used extensively throughout the world to connect individuals and organizations. Data networks can be connected together to allow users seamless access to resources that are hosted outside of the particular provider they are connected to. The Internet is the best example of many data networks from different organizations all operating under a single address space. [13], [14]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. A telecommunication network is a set of connected terminals, links and nodes which enable users to create telecommunication.
2. Each network terminal may have a few addresses.
3. Every telecommunication network consists of five elements.
4. Telecommunications control software is responsible for receiving data.
5. The control plane carries signalling.

3. Match the words with their definitions

1. robust	a) in between two stages, places, levels, times etc
2. media	b) the process of giving someone or something a particular job, title, or status
3. intermediate	c) the means by which you get to something
4. control software	d) a type of very strong wire used for sending large amounts of information at high speeds
5. coaxial	e) the information that passes through a communications system
6. assignment	f) a way of communicating information and ideas, especially to a lot of people
7. traffic	g) programs used by computers for doing particular jobs
8. access	h) strong and successful, firm and determined

4. Fill in a suitable word or word combination from the box

address planes component sending data media

1) Any device used to transmit or receive data can be classified as a terminal … .

2) Each terminal in the network must have a unique … .

3) Telecommunications channels are the means by which … is transmitted and received.

4) Messages are generated by a … terminal.

5) Every telecommunication network conceptually consists of three … .

6) In a telecommunication environment computers are connected through … to perform their communication assignments.

5. Answer the following questions using information from the text

1. What is telecommunication network?
2. How does telecommunication network function?
3. What is the intermediate node used for?
4. What main components does the telecommunication network include?
5. What are the main parts of telecommunication network?

6. Put the verbs in the brackets into the correct tense-forms

1) The collection of addresses in the network (to call) the address space.
2) Early networks (to buil) without computers.
3) The bearer part is the actual content that the user (to wish) to transmit.
4) Control software (to be) responsible for controlling network activities and functionality.
5) The control plane (to carry) control information.
6) A large number of protocols (to develop) over the years.
7) The links (to connect) the nodes together.

7. Supply "a/an/the" where necessary. Note where you can use "a/an/the" or zero(-) article

1) … collection of …addresses in … network is called … address space.
2) … data network is used extensively throughout … world to connect …individuals and …organizations.
3) …five basic components are present in …each network environment regardless of …type or …use.
4) Transmission network physically pushes … message across … link.
5) Each different type of …telecommunication network should handle … control.

8. Divide the text into logical parts. Give the title to each part

9. Make the short plan of the text. Retell the text according to your plan

10. Interesting facts .....

1. The Internet is the short version of a series of concepts that began to emerge since the 1960s. In 1974, the word ‘internet’ first appeared in a book called ‘Internet Transmission Control Program’. It comes from the concept of ‘internetworking’ or ‘inter-system-networking’.

2. The first webcam of history was used to track the operation of a coffee machine. It was implemented in the computer lab of the University of Cambridge. The engineers wanted to know if the coffee was ready before going down it – the machine was on another floor. [15]

Supplementary reading

Communication channels

1. Read the Text and do the tasks that follow it

The term "channel" has two different meanings. In one meaning, a channel is the physical medium that carries a signal between the transmitter and the receiver. Examples of this include the atmosphere for sound communications, glass optical fibers for some kinds of optical communications, coaxial cables for communications by way of the voltages and electric currents in them, and free space for communications using visible light, infrared waves, ultraviolet light, and radio waves. This last channel is called the "free space channel". The sending of radio waves from one place to another has nothing to do with the presence or absence of an atmosphere between the two. Radio waves travel through a perfect vacuum just as easily as they travel through air, fog, clouds, or any other kind of gas besides air.

The other meaning of the term "channel" in telecommunications is seen in the phrase communications channel, which is a subdivision of a transmission medium so that it can be used to send multiple streams of information simultaneously. For example, one radio station can broadcast radio waves into free space at frequencies in the neighborhood of 94.5 MHz (megahertz) while another radio station can simultaneously broadcast radio waves at frequencies in the neighborhood of 96.1 MHz. Each radio station would transmit radio waves over a frequency bandwidth of about 180 kHz centered at frequencies such as the above, which are called the "carrier frequencies". Each station in this example is separated from its adjacent stations by 200 kHz, and the difference between 200 kHz and 180 kHz is an engineering allowance for the imperfections in the communication system.

In the example above, the "free space channel" has been divided into communications channels according to frequencies, and each channel is assigned a separate frequency bandwidth in which to broadcast radio waves. This system of dividing the medium into channels according to frequency is called "frequency-division multiplexing" (FDM).

Another way of dividing a communications medium into channels is to allocate each sender a recurring segment of time (a "time slot", for

example, 20 milliseconds out of each second), and to allow each sender to send messages only within its own time slot. This method of dividing the medium into communication channels is called "time-division multiplexing" (TDM), and is used in optical fiber communication. Some radio communication systems use TDM within an allocated FDM channel. Hence, these systems use a hybrid of TDM and FDM. [16], [64]

2. Say whether the following statement

A channel can be described only as the physical instrument carrying a signal between the transmitter and the receiver.

1) is true 2) there is no information in the text
3) is false

3. Say whether the following statement

Each channel has its own frequency bandwidth to broadcast radio waves.

1) is true 2) there is no information in the text
3) is false

4. What is the main idea of the text

a) Radio waves travel easily both through a perfect vacuum and through air, fog, clouds or any other kind of gas besides air.

b) The medium is divided into channels according to frequency.

c) The term "channel" in telecommunications has two main meanings.

5. Make the short plan of the text. Retell the text according to your plan

UNIT V

TYPES OF AREA NETWORKS – LAN, MAN and WAN

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

inseparable	неотъемлемый, неотделимый
to process	обрабатывать, обработать
to share data	обмениваться данными
a switch	переключатель, выключатель, коммутатор
to design	проектировать, конструировать, разрабатывать
to maintain	поддерживать, обслуживать
access	доступ, допуск
tolerance	выносливость, терпимость; допуск
propagation	распространение

Read and translate the Text

The electronic transmission of information over distances, called telecommunications, has become virtually inseparable from computers: Computers and telecommunications create value together.

Telecommunications are the means of electronic transmission of information over distances. The information may be in the form of voice telephone calls, data, text, images, or video. Today, telecommunications are used to organize more or less remote computer systems into telecommunications networks. These networks themselves are run by computers.

A telecommunications network is an arrangement of computing and telecommunications resources for communication of information between distant locations.

A telecommunications network includes the following components:

1. Terminals for accessing the network
2. Computers that process information and are interconnected by the network
3. Telecommunications links that form a channel through which information is transmitted from a sending device to a receiving device.

4. Telecommunications equipment that facilitates the transmission of information.

5. Telecommunications software that controls message transmission over the network.

The Network allows computers to connect and communicate with different computers via any medium. LAN, MAN and WAN are the three major types of the network designed to operate over the area they cover. There are some similarities and dissimilarities between them. One of the major differences is the geographical area they cover, i.e. LAN covers the smallest area, MAN covers an area larger than LAN and WAN comprises the largest of all.

Local area network is a privately owned network that interconnects processors, usually microcomputers, within a building or on a campus site that includes several buildings. It connects network devices in such a way that personal computer and workstations can share data, tools and programs. The group of computers and devices are connected together by a switch, or stack of switches, using a private addressing scheme as defined by the TCP/IP protocol. Private addresses are unique in relation to other computers on the local network. LANs cover smaller geographical area. One can use it for an office building, home, hospital, schools, etc. LAN is easy to design and maintain. A Communication medium used for LAN has twisted pair cables and coaxial cables. It covers a short distance, and so the error and noise are minimized.

Characteristics of a LAN:

a. LANs are the principal tool of workgroup computing

b. LANs ensure high-speed communication within a limited area and enables the users to share facilities (peripherals) connected to it.

c. Usually include a large-capacity, secondary storage device, where database and applications software are maintained, managed by a microcomputer acting as a file server that delivers data or program files to other computers.

d. Facilities (peripherals) may include jukebox optical memory and fast printers.

e. Frequently, one of the facilities (peripherals) in a LAN is the gateway hardware and software that give the network users access to other networks.

f. More group members may connect to the network from remote sites using wireless telecommunications.

g. Links and equipment of LANs are owned by the user company and these networks are generally much faster than WANs.

h. LANs are generally composed of a network of microcomputers

Metropolitan Area Network (MAN covers a larger area than that of a LAN and smaller area as compared to WAN. It connects two or more computers that are apart but resides in the same or different cities. It covers a large geographical area and may serve as an ISP (Internet Service Provider). MAN is designed for customers who need a high-speed connectivity. Speeds of MAN ranges in terms of Mbps. It's hard to design and maintain a Metropolitan Area Network.

Characteristics of a WAN:

a. The information system of an entire organization may be structured as a hierarchy. The WANs system architecture looks very much like an organization chart.

b. WANs connect all the divisional minicomputers to the headquarters mainframe with a variety of local microcomputers and terminals located at remote sites connected, in turn, to the minicomputers.

c. WANs provide the backbone through which all other nodes (computers and terminals) communicate.

d. WANs often use telecommunication links and equipment provided by specialized vendors, called common carriers.

e. WANs serve to interconnect multiple LANs and can make specific resources available to a large number of workstations.

Wide Area Network (WAN) is a computer network that extends over a large geographical area, although it might be confined within the bounds of a state or country. A WAN could be a connection of LAN connecting to other LAN's via telephone lines and radio waves and may be limited to an enterprise (a corporation or an organization) or accessible to the public. The technology is high speed and relatively expensive.

There are two types of WAN: Switched WAN and Point-to-Point WAN. WAN is difficult to design and maintain. Similar to a MAN, the fault tolerance of a WAN is less and there is more congestion in the network. A Communication medium used for WAN is PSTN or Satellite Link. Due to long distance transmission, the noise and error tend to be more in WAN.

Characteristics of a WAN:

a. Purpose of MANs is to interconnect various LANs within a metropolitan area, that is, within approximately a 50 - mile range.

b. Generally, the speed of MANs is equal to that of LANs and they use similar technology. [17], [18]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. The Network provides computers connection and communication with different computers via special medium.
2. Private addresses are individual in relation to other computers on the local network.
3. LANs cover smaller geographical area and are privately owned.
4. LAN serves as an Internet Service Provider.
5. WAN is not difficult to design and maintain.
6. The number of servers and terminals is the largest in LAN.
7. The technology of WAN is high speed and relatively expensive.

3. Match the words with their definitions

1. network	a) information in the form of text, numbers, or symbols that can be used by or stored in a computer
2. switch	b) a piece of computer equipment consisting of at least a keyboard and a screen, that you use for putting in or taking out information from a large computer

3. data	c) a computer that is used only for storing and managing programs and information used by other computers
4. medium	d) a place where lines in a network cross or join
5. terminal	e) a system or group of connected parts
6. node	f) a piece of equipment that is sent into space around the Earth to receive and send signals or to collect information
7. satellite	g) a way of communicating information and news to people, such as newspapers, television etc
8. server	h) a small object that you push up or down with your finger to turn something electrical on or off

4. Which of the three answers best matches the meaning of the italicized word in the following sentences

1. The best explanation of the word “terminal” is ….
a) A final point in space or time; b) A device at which a user enters data or commands for a computer system ; c); A point of connection for closing an electric circuit. d) a building at an airport;
2. The word “network” implies …
a) matrix; b) cross lines; c) connected system; 4) broadcast
3. The word “node” means….
1) a piece of equipment; 2) a peak of something; 3) thickening;
4) transmissive capacity
4. The word “medium” refers to …
a) environment; b) tools; c) an art material; d) an agent.
5. The best explanation of the word “server” might be …
a) the means or equipment facilitating the performance of an action;
b) maintaining device; c) computer program to access to a centralized resource ; d) a machine for performing calculations automatically

5. Answer the following questions using information from the text

1. What is a network?
2. What are the common types of networks?
3. What is LAN?
4. What is MAN?
5. What is WAN?
6. What are the main characteristics of a LAN?
7. What are the main characteristics of a MAN?
8. What are the main characteristics of a WAN?

6. Make up a sentence using the words and phrases

1. Network, decades, a global, to set up, it, takes,.
2. The combination of the interconnected networks, it, possible, to dial any other phone, for any phone in the world, makes.
3. In addition to, a lot of different tasks, perform, many e-readers, can, displaying e-books.
4. The address space, in the network, is, the collection of addresses, called.
5. Of different types, of telephone networks, a huge, there, are, amount.

7. Translate into Russian. Explain the sequence of tenses

1. She was informed a week ago that the company had paid all the accounts.
2. The guide told us that they had been building this opera house since 2012.
3. The customers were aware that the firm had ordered new equipment.
4. The secretary said that she had prepared all the documents.
5. The director asked us if we had finished the job.

8. Choose the correct voice. Translate the sentences into Russian

1. Currently information technology (is impacting/is impacted) modern life all over the world.

2. Computerized databases are broadly (using/used) to store different kinds of confidential data of political, social, economic or personal nature.

3. However, the rapid development of information technology (has led/has been leading) to the growth of new forms of crimes.

4. These crimes (having/have) no boundaries and may (affect/affecting) any country across the globe.

5. The new boundaries, which (manifest/are manifested) in the monitor screen, passwords etc. have (created/been created) new personalities, groups, organizations, and other new forms of social, economic, and political groupings in the cyber world of bits. [19]

9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts …

1. Previously telephones used copper cables to carry out communication. there were Exchanges where rows of Operators manually handled all the phone calls to their respective recipients. and as there were people handling calls. number of calls that could be maintained at any given moment was limited. [20]

2. By accessing any website, a stream of information must bounce between anywhere from 3 to dozens of other routers on the internet, all run by ISPs and interconnected. A response is then sent back to reach your computer again, and then transfer begins. This happens in a fraction of a second. [21]

Supplementary reading

A telecommunication network

1. Read the Text and do the tasks that follow it

A telecommunications network is a collection of terminal nodes, links and any intermediate nodes which are connected so as to enable telecommunication between the terminals. The transmission links 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 usually has a unique address, so messages or connections can be routed to the correct recipients. The collection of addresses in the network is called the address space.

Examples of telecommunications networks are:

computer networks

the Internet

the telephone network

the global Telex network

A telephone network is a telecommunications network used for telephone calls between two or more parties. There are a number of different types of telephone network:

• A landline network where the telephones must be directly wired into a single telephone exchange. This is known as the public switched telephone network or PSTN.

• A wireless network where the telephones are mobile and can move around anywhere within the coverage area.

• A private network where a closed group of telephones are connected primarily to each other and use a gateway to reach the outside world. This is usually used inside companies and call centers and is called a private branch exchange (PBX).

Public telephone operators (PTOs) own and build networks of the first two types and provide services to the public under license from the national government. Virtual Network Operators (VNOs) lease capacity wholesale from the PTOs and sell on telephony service to the public directly.

The public switched telephone network (PSTN) is the aggregate of the world's circuit-switched telephone networks that are operated by national, regional, or local telephony operators, providing infrastructure and services for public telecommunication. The PSTN consists of telephone lines, fiber optic cables, microwave transmission links, cellular networks, communications satellites, and undersea telephone cables, all interconnected by switching centers, thus allowing any telephone in the world to communicate with any other. Originally a network of fixed-line analog telephone systems, the PSTN is now almost entirely digital in its core network and includes mobile and other networks, as well as fixed telephones.

The technical operation of the PSTN adheres to the standards created by the ITU-T. These standards allow different networks in different countries to interconnect seamlessly. The E.163 and E.164 standards provide a single global address space for telephone numbers. The combination of the interconnected networks and the single numbering plan make it possible for any phone in the world to dial any other phone.

A wireless network is any type of computer network that uses wireless data connections for connecting network nodes. Wireless networking is a method by which homes, telecommunications networks and enterprise (business) installations avoid the costly process of introducing cables into a building, or as a connection between various equipment locations. Wireless telecommunications networks are generally implemented and administered using radio communication. This implementation takes place at the physical level (layer) of the OSI model network structure. Examples of wireless networks include cell phone networks, Wi-Fi local networks and terrestrial microwave networks.

A cellular network or mobile network is a radio network distributed over land areas called cells, each served by at least one fixed-location

transceiver, known as a cell site or base station. In a cellular network, each cell characteristically uses a different set of radio frequencies from all their immediate neighboring cells to avoid any interference.

When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

Although originally intended for cell phones, with the development of smartphones, cellular telephone networks routinely carry data in addition to telephone conversations.

The Global System for Mobile Communications (GSM) network is divided into three major systems: the switching system, the base station system, and the operation and support system. The cell phone connects to the base system station which then connects to the operation and support station; it then connects to the switching station where the call is transferred to where it needs to go. GSM is the most common standard and is used for a majority of cell phones. [22]

2. Say whether the following statement

Telecommunications network nodes are connected with the help of transmission links.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

A cellular network consists of undersea cables, fiber optic cables and telephone lines.

1) is true
2) there is no information in the text
3) is false

4. Continue the sentence

1. A private network is…

a) usually used inside companies and call centers.
b) operated by national, regional, or local telephony operators.
c) a radio network distributed over land areas called cells.

2. Each terminal in the network has …
a) a unique address, so messages or connections can be routed to the correct recipients.
b) examples of telecommunications networks.
c) a different set of radio frequencies from all their immediate neighboring cells to avoid any interference.

3. GSM is the most common …
a) combination of the interconnected networks and the single numbering plan.
b) type of computer network that uses wireless data connections.
c) standard used for a majority of cell phones.

4. Wireless networking is a method …
a) of avoiding the costly process of introducing cables into a building.
b) of avoiding any interference.
c) of communicating with each other moving through more than one cell during transmission. [22]

5. Make up a short plan of the Text. Retell the Text according to your plan

UNIT VI

NETWORK TOPOLOGY

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

network topology	сетевая топология: расположение элементов (звеньев, узлов и т.д.) коммуникационной сети
to map	рисовать карту (*чего-л.*), изображать в виде карты
capability	способность, возможность
circuit	*эл.* цепь, контур; схема
twisted pair	витая пара (*вид кабеля*)
hub	1) ядро (сети); 2) концентратор (в сетях – сетевой аппаратный узел, к которому подключаются все компьютеры в сети топологии «звезда»; активные концентраторы могут восстанавливать и ретранслировать сигналы; пассивные концентраторы просто выполняют коммутацию)
bus	шина; канал (*передачи информации*)
host	а) главный компьютер; б) ведущий узел (*в сети*)
to implement	выполнять, осуществлять; обеспечивать выполнение, приводить в исполнение

Read and translate the Text

Network topology

Network topology is the arrangement of the various elements (links, nodes,etc.) of a computer network. Essentially, it is the topological structure of a network, and may be depicted physically or logically. Physical topology refers to the placement of the network's various components, including device location and cable installation, while logical topology shows how data flows within a network, regardless of its physical design. Distances between nodes, physical interconnections, transmission rates, and/or signal types may differ between two networks, yet their topologies may be identical.

A good example is a local area network. Any given node in the LAN has one or more physical links to other devices in the network; graphically

mapping these links results in a geometric shape that can be used to describe the physical topology of the network. Conversely, mapping the data flow between the components determines the logical topology of the network.

There are two basic categories of network topologies:

1. Physical topologies
2. Logical topologies

The shape of the cabling layout used to link devices is called the physical topology of the network. This refers to the layout of cabling, the locations of nodes, and the interconnections between the nodes and the cabling. The physical topology of a network is determined by the capabilities of the network access devices and media, the level of control or fault tolerance desired, and the cost associated with cabling or telecommunications circuits.

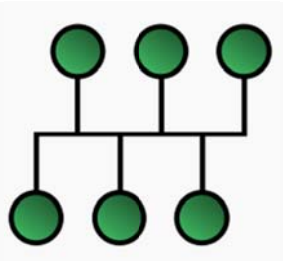
The logical topology, in contrast, is the way that the signals act on the network media, or the way that the data passes through the network from one device to the next without regard to the physical interconnection of the devices. A network's logical topology is not necessarily the same as its physical topology. For example, the original twisted pair Ethernet using repeater hubs was a logical bus topology with a physical star topology layout.

Point-to-point

The simplest topology is a permanent link between two endpoints. Switched point-to-point topologies are the basic model of conventional telephony. The value of a permanent point-to-point network is unimpeded communications between the two endpoints. The value of an on-demand point-to-point connection is proportional to the number of potential pairs of subscribers, and has been expressed as Metcalfe's Law.

Using circuit-switching or packet-switching technologies, a point-to-point circuit can be set up dynamically, and dropped when no longer needed. This is the basic mode of conventional telephony.

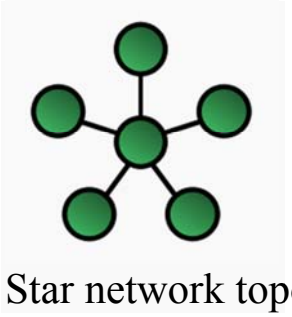
Bus



Bus network topology

In local area networks where bus topology is used, each node is connected to a single cable. Each computer or server is connected to the single bus cable. A signal from the source travels in both directions to all machines connected on the bus cable until it finds the intended recipient. If the machine address does not match the intended address for the data, the machine ignores the data.

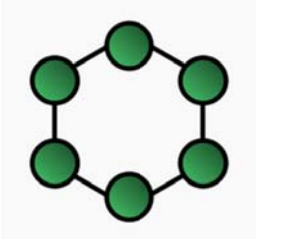
Star



Star network topology

In local area networks with a star topology, each network host is connected to a central hub with a point-to-point connection. In Star topology every node (computer workstation or any other peripheral) is connected to central node called hub or switch. The switch is the server and the peripherals are the clients. The network does not necessarily have to resemble a star to be classified as a star network, but all of the nodes on the network must be connected to one central device. All traffic that traverses the network passes through the central hub. The hub acts as a signal repeater. The star topology is considered the easiest topology to design and implement. An advantage of the star topology is the simplicity of adding additional nodes. The primary disadvantage of the star topology is that the hub represents a single point of failure.

Ring

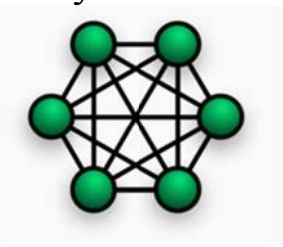


Ring network topology

A network topology that is set up in a circular fashion in which data travels around the ring in one direction and each device on the ring acts as a repeater to keep the signal strong as it travels. Each device incorporates a receiver for the incoming signal and a transmitter to send the data on to the

next device in the ring. The network is dependent on the ability of the signal to travel around the ring. When a device sends data, it must travel through each device on the ring until it reaches its destination. Every node is a critical link.

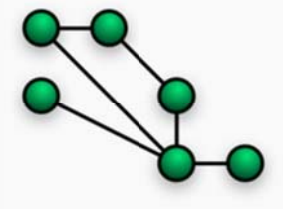
Fully connected network



Fully connected mesh topology

A fully connected network is a communication network in which each of the nodes is connected to each other. A fully connected network doesn't need to use switching nor broadcasting. However, its major disadvantage is that the number of connections grows quadratically with the number of nodes and so it is extremely impractical for large networks. A two-node network is technically a fully connected network.

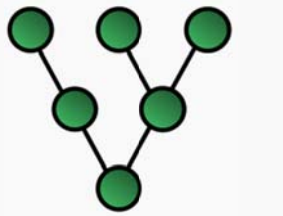
Partially connected



Partially connected mesh topology

The type of network topology in which some of the nodes of the network are connected to more than one other node in the network with a point-to-point link – this makes it possible to take advantage of some of the redundancy that is provided by a physical fully connected mesh topology without the expense and complexity required for a connection between every node in the network.

Tree



Tree network topology

This particular type of network topology is based on a hierarchy of nodes. The highest level of any tree network consists of a single, 'root' node, this node connected either a single (or, more commonly, multiple) node(s) in the level below by (a) point-to-point link(s). These lower level nodes are also connected to a single or multiple nodes in the next level down. Tree networks are not constrained to any number of levels, but as tree networks are a variant of the bus network topology, they are prone to crippling network failures should a connection in a higher level of nodes fail/suffer damage. Each node in the network has a specific, fixed number of nodes connected to it at the next lower level in the hierarchy, this number referred to as the 'branching factor' of the tree. This tree has individual peripheral nodes. [23], [29], [50], [65]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Logical topology doesn't consider physical design of a network.
2. Physical topology mentions device location and cable installation.
3. The logical topology means the way by which the data travels through the network.
4. The star topology is the easiest one to be designed and implemented.

5. In a tree network topology data passes around the ring only in one direction.

3. Match the words with their definitions

1. layout	a) likely to do something or be affected by something, especially something bad
2. redun-dancy	b) the amount by which the size of a part of a machine can be different from the standard size before it prevents the machine from operating correctly
3. prone	c) a piece of computer equipment used for connecting one part of a computer system to another part, or for connect ing several computers to each other to form a network
4. bus	d)the way in which the different parts of something are arran ged
5. tolerance	e) something such as a button or a key that controls the electrical supply to a light,piece of equipment, machine etc
6. node	f) the use of electronic equipment or systems designed to operate instead of another piece of equipment orsystem if that fails
7. hub	g) a point on a computer network where a message can be created or received
8. switch	h) a set of wires that send information from one part of a computer system to another

4. Fill in a suitable word or word combination from the box

access	ability	component	placement	hierarchy	switching

1) The network depends on the ….. of the signal to travel around the ring.
2) Physical topology refers to the …... of the network's various components.
3) The physical topology of a network is defined by the capabilities of the network ….. devices and media.

4) A fully connected network doesn't need to use ….. nor broadcasting.
5) Tree network topology is based on a ….. of nodes.

5. Answer the following questions using information from the text

1. What is network topology?
2. What can you say about the physical topology of the network?
3. What topology is set up in a circular fashion?
4. What is the major disadvantage of a fully connected network?
5. Tree network topology is based on a hierarchy of nodes, isn't it?

6. Put the verbs in the brackets into the correct tense-forms

1. The hub (to represent) a single point of failure.
2. The switch (to be) the server and the peripherals (to be) the clients.
3. Physical topology (to consider) the location of the network various components.
4. The network physical topology (to determine) by the capabilities of the network access devices and media.
5. Each device (to incorporate) a transmitter to send the data on to the next device in the ring.

7. Define the part of speech of the underlined word: the Gerund or the Participle. Explain your choice. Translate these sentences into Russian

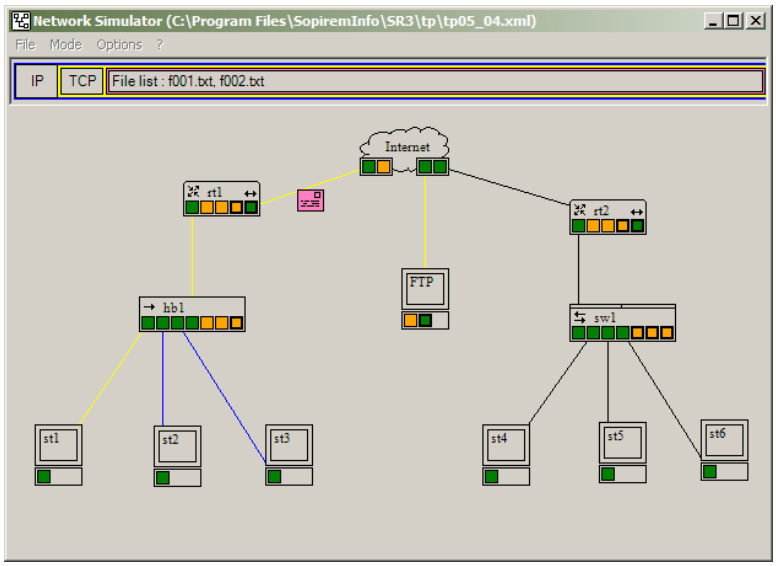
1. The original twisted pair Ethernet using repeater hubs was a logical bus topology with a physical star topology layout.
2. A fully connected network doesn't need to use switching nor broadcasting.
3. Each device incorporates a receiver for the incoming signal.
4. Any given node in the LAN has one or more physical links to other devices in the network.
5. Graphically mapping these links results in a geometric shape.

8. Describe each network topology. Work in pairs

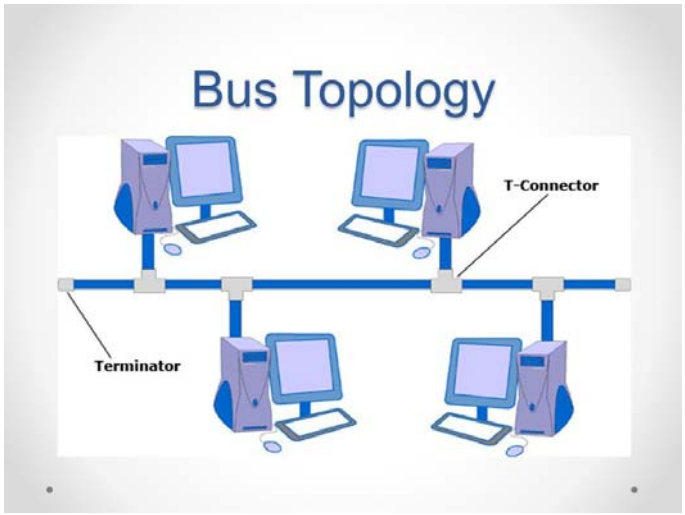
9. Make the short plan of the text. Retell the text according to your plan

10. Interesting facts…

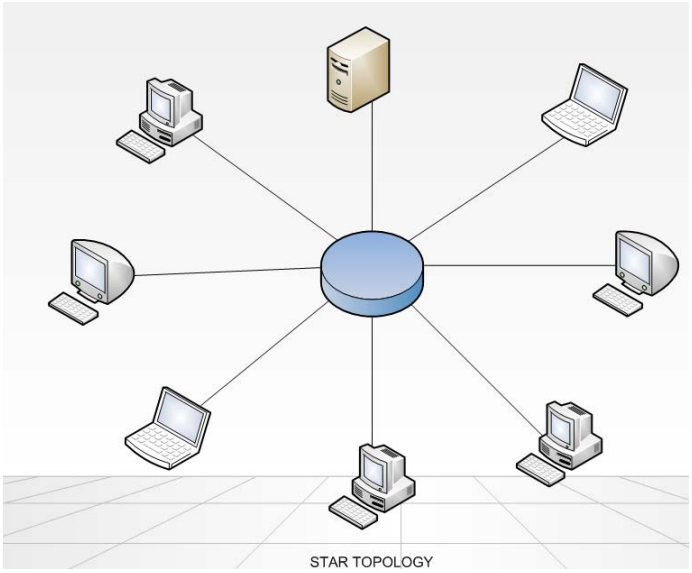
1. A network simulator is software that predicts the behavior of a computer network. In simulators, the computer network is modeled with devices,links, applications etc. and the network performance is reported. Simulators come with support for the most popular technologies and networks in use today such as 5G, Internet of Things (IoT), Wireless LANs, mobile ad hoc networks, wireless sensor networks, vehicular ad hoc networks, cognitive radio networks, LTE etc.



2. The bus topology is the cheapest and most reliable topology because it can be run without buying specialist network equipment and doesn't rely on each node being active.



3. The best cabled network topology for large businesses is the star topology. This is because it is easier to control from a central console as the management software just needs to communicate with the switch to get full traffic management features. [24]



Supplementary reading

Peer-to-peer network

1. Read the text and do the tasks that follow it

A network consists of multiple computers connected using some type of interface, each having one or more interface devices such as a Network Interface Card (NIC) and/or a serial device for PPP networking. Each computer is supported by network software that provides the server or client functionality. The hardware used to transmit data across the network is called the media. It may include copper cable, fiber optic, or wireless transmission. The standard cabling used for the purposes of this document is 10Base-T category 5 Ethernet cable. This is twisted copper cabling which appears at the surface to look similar to TV coaxial cable. It is terminated on each end by a connector that looks much like a phone connector. Its maximum segment length is 100 meters.

In a server based network, there are computers set up to be primary providers of services such as file service or mail service. The computers providing the service are called servers and the computers that request and use the service are called client computers.

In a peer-to-peer network, various computers on the network can act both as clients and servers. For instance, many Microsoft Windows based computers will allow file and print sharing. These computers can act both as a client and a server and are also referred to as peers. Many networks are combination peer-to-peer and server based networks. The network operating system uses a network data protocol to communicate on the network to other computers. The network operating system supports the applications on that computer. A Network Operating System (NOS) includes Windows NT, Novell Netware, Linux, Unix and others. [25]

2. Say whether the following statement

Computer network is set of computers which are attached to each other for the purpose of video and voice chat.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

The computers that request and use the service are called client computers.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the text

a) A peer-to-peer network involves two or more computers that share individual resources.Each computer in the network acts as the client as well as the server, communicating with the other computers directly.

b) In a peer-to-peer network files and folders can be configured to allow network users to copy them, but not alter them in their original location.

c) The "peers" are computer systems which are connected to each other via the Internet.

5. Make the short plan of the text. Retell the text according to your plan

UNIT VII

BASIC ELEMENTS OF DATA COMMUNICATION

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

alternating current	переменный ток
to apply to	направлять (*внимание, энергию; на что-л.*); накладывать, наносить; прикладывать
navigational beacon	навигационный маяк
to reverse	менять, изменять на прямо противоположное
to propagate	транслировать; передавать сигналы
solid	сухое вещество
substance	субстанция, сущность, вещество, материя
to separate	отделять, разделять, разъединять
to excite	возбуждать (*ток*); создавать электромагнитное поле
refraction	преломление, рефракция

BASIC ELEMENTS OF DATA COMMUNICATION

There are three basic elements in telecommunication technology and these include a transmitter, a transmission medium and a receiver.

1. A transmitter is a device that collects information and transforms it into a signal.

In electronics and telecommunications a transmitter or radio transmitter is an electronic device which, with the aid of an antenna, produces radio waves. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna. When excited by this alternating current, the antenna radiates radio waves. In addition to their use in broadcasting, transmitters are necessary component parts of many electronic devices that communicate by radio, such as cell phones, Wi-fi and Bluetooth enabled devices, garage door openers, two-way radios in aircraft, ships, and spacecraft, radar sets, and navigational beacons. The

term transmitter is usually limited to equipment that generates radio waves for communication purposes; or radiolocation, such as radar and navigational transmitters. Generators of radio waves for heating or industrial purposes, such as microwave ovens or diathermy equipment, are not usually called transmitters even though they often have similar circuits.

The term is popularly used more specifically to refer to transmitting equipment used for broadcasting, as in radio transmitter or television transmitter. This usage usually includes both the transmitter proper as described above, and the antenna, and often the building it is housed in.

A transmitter can be a separate piece of electronic equipment, or an electrical circuit within another electronic device. The purpose of most transmitters is radio communication of information over a distance. The information is provided to the transmitter in the form of an electronic signal, such as an audio (sound) signal from a microphone, a video (TV) signal from a TV camera, or in wireless networking devices a digital signal from a computer. The transmitter combines the information signal to be carried with the radio frequency signal which generates the radio waves, which is often called the carrier. This process is called modulation. The information can be added to the carrier in several different ways, in different types of transmitter. In an amplitude modulation transmitter, the information is added to the radio signal by varying its amplitude. In a frequency modulation transmitter, it is added by varying the radio signal's frequency slightly. Many other types of modulation are used.

A radio transmitter is an electronic circuit which transforms electric power from a battery or electrical mains into a radio frequency alternating current, which reverses direction millions to billions of times per second. The energy in such a rapidly-reversing current can radiate off a conductor as electromagnetic waves. The transmitter also "piggybacks" information, such as an audio or video signal, onto the radio frequency current to be carried by the radio waves. When they strike the antenna of a radio receiver, the waves excite similar (but less powerful) radio frequency currents in it. The radio receiver extracts the information from the received waves.

2. A transmission medium is the device that carries the signal and delivers it to the receiver.

A transmission medium is a material substance (solid, liquid, gas, or plasma) which can propagate energy waves. For example, the transmission

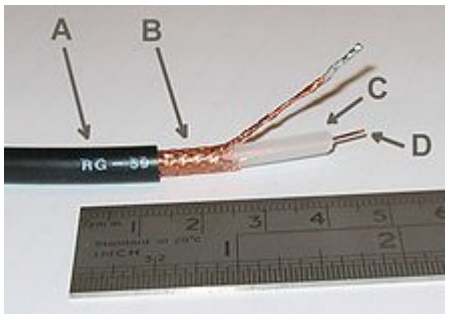
medium for sound received by the ears is usually air, but solids and liquids may also act as transmission media for sound.

The absence of a material medium can also be thought of as a transmission medium for electromagnetic waves such as light and radio waves. While material substance is not required for electromagnetic waves to propagate, such waves are usually affected by the transmission media through which they pass, for instance by absorption or by reflection or refraction at the interfaces between media.

The term transmission medium can also refer to the technical device which employs the material substance to transmit or guide the waves. Thus an optical fiber or a copper cable can be referred to as a transmission medium.

A transmission medium can be classified as a:

- Linear medium, if different waves at any particular point in the medium can be superposed;
- Bounded medium, if it is finite in extent, otherwise unbounded medium;
- Uniform medium or homogeneous medium, if its physical properties are unchanged at different points;
- Isotropic medium, if its physical properties are the same in different directions.



Coaxial Cable, one example of a transmission medium

Electromagnetic radiation can be transmitted through an optical media, such as optical fiber, or through twisted pair wires, coaxial cable, or dielectric-slab waveguides. It may also pass through any physical material which is transparent to the specific wavelength, such as water, air, glass, or concrete. Sound is, by definition, the vibration of matter, so it requires a physical medium for transmission, as does other kinds of mechanical waves and heat energy. Historically, various other theories were used in science and thought to be necessary to explain the transmission medium. However, it is now known that electromagnetic waves do not require a

physical transmission medium, and so can travel through the "vacuum" of free space. Regions of the insulative vacuum can become conductive for electrical conduction through the presence of free electrons, holes, or ions. Many transmission media are used as a communications channel.

3. Receiver is the device that accepts the signal and converts it back into useful information.

A radio receiver is an electronic circuit that receives its input from an antenna, uses electronic filters to separate a radio signal from all other signals picked up by this antenna, amplifies it to a level suitable for further processing, and finally converts through demodulation and decoding the signal into a form usable for the consumer, such as sound, pictures, digital data, navigational positions, etc.

Early broadcast radio receiver--wireless Truetone model from about 1940 [26], [63]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...

I'll never believe that...
I can't agree that...

1. In electronics and telecommunications a transmitter or radio transmitter is an electronic device producing radio waves via antenna.
2. A transmitter is a device that converts the signal produced by a sensor into a standard instrumentation signal.
3. Electromagnetic waves such as light and radio waves can't be transmitted in the absence of a material medium (the vacuum of empty space).
4. We use different types of cables or waves to transmit data.
5. A radio receiver is an electronic device that receives radio waves and converts the information carried by them to a usable form.

3. Match the words with their definitions

1. separate	a) the fact of something not existing or not being present
2. property	b) the exact size, degree, strength etc of something, usually expressed in numbers of standard units
3. absorption	c) to recognize that something is true, fair, or right
4. accept	d) not joined to something else
5. absence	e) the process by which something takes in a substance, form of energy, or liquid
6. equipment	f) the process of using something
7. usage	g) a quality or feature of something
8. transparent	h) the distance between two waves of sound or light that are next to each other
9. wavelength	i) the tools, machines, or other things that you need for a particular job or activity
10. measurement	j) simple, clear, and easy to understand

4. Complete the sentences with the facts from the text

1) A transmission medium is the device …
2) A radio transmitter is an electronic circuit …
3) A radio receiver is an electronic circuit…
4) Electromagnetic radiation can be transmitted through …
5) The purpose of most transmitters is …

5. Answer the following questions using information from the Text

1) What are the basic elements of data communication?
2) What does transmitter usually generate radio waves for?
3) What is a transceiver?
4) How does a radio transmitter operate?
5) May solids and liquids act as transmission media for sound?

6. Put the verbs in the brackets into the correct tense-forms

1) The radio receiver (to extract) the information from the received waves.
2) Transmitters (to be) necessary component parts of many electronic devices.
3) A transmission medium (to deliver) the signal to the receiver.
4) Electromagnetic waves (not to require) a physical transmission medium.
5) The waves usually (to be affected) by the transmission media through which they pass.

7. Make up new words with the same root and define the part of the speech

Transmit, operate, locate, receive, use, broadcast, base, control

8. Name the main basic components of data communication and characterize each one. Work in pairs

9. Underline the sentences containing the basic information and summarize the general ideas of the text

10. Interesting facts…

1. Switzerland has around 300 national and local cable TV networks, which have a household penetration rate of 74%.

2. Space-based telecommunications infrastructure is crucial for Arctic science, as well as for environmental monitoring. It has facilitated passive and active Earth observation systems, global satellite navigation systems, and generally-improved connectivity. Data collected from research in the Arctic, however, is difficult to transmit back to the researchers, as the availability of communication systems is limited in the Arctic. This also applies to the satellite transmission of information back to scientists working in the field, where access to reliable geostationary satellite communication is limited. [27]

Supplementary reading

A radio receiver

1. Read the text and do the tasks that follow it

A radio receiver is an electronic device that takes a transmitted signal, extracts the original signal from it and amplifies that signal. The process of extracting the signal is called demodulation. A radio station, for example, will broadcast a signal which is then detected by a radio receiver. The receiver, in turn, will separate that signal from many others and then play it through its speakers. There are several different types of signals that the receiver can be designed to demodulate and decode including sounds, pictures and digital data, to name a few.

Alexander Stepanovich Popov designed and implemented the first radio receiver in 1896. It was based on electromagnetic waves, which were proven to exist by James Clerk Maxwell only a few years earlier in 1887. It took only a few more years until the first radio system was able to transmit communications across the Atlantic in 1901. In the time between then and the present day, the radio receiver has seen a great many technological advances. One of the most significant advances was the invention of the superheterodyne, or superhet, receiver.

These advances have allowed the radio receiver to become more compact while also being able to receive better signals amid crowded radio traffic. This traffic includes a wide range of radio frequencies that are uses for many purposes. Examples of these frequencies are FM, AM, VHF and UHF, but there are many more ranging from extremely low to extremely high frequencies. The radio receiver is still undergoing many technological advances, especially with the recent increase in the use of digital signals. These digital signals have paved the way for new technologies such as satellite radio and digital TV (DTV).

A radio receiver can come in a great deal of varieties. High fidelity audio receivers are used in home stereo systems not only to listen to radio broadcasts, but also to decode hi-fi signals from other input sources such as DVD players, Blu-Ray Disc players, old-fashioned VCRs and more.

A crystal radio receiver runs on the power that is received from radio waves. Measurement and telemetry receivers measure and report a wide array of data based on the signals received and are used for scientific

purposes. Other varieties include communications receivers, satellite television receivers, portable transistor radios and radio scanners. [28], [29]

2. Say whether the following statement

The receiver can demodulate only special types of signals.

1) is true 2) there is no information in the text
3) is false

3. Say whether the following statement

A crystal radio receiver runs on the power that is received from radio waves.

1) is true 2) there is no information in the text
3) is false

4. What is the main idea of the Text

1. A radio receiver is an electronic device that is widely used.
2. A radio receiver can come in a great deal of varieties.
3. The information produced by the receiver may be in the form of sound, images or data.

5. Make the short plan of the Text. Retell the Text according to your plan

UNIT VIII

BASIC SIGNAL THEORY

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

discrete	обособленный элемент системы, дискретный компонент, дискретный сигнал
to imply	предполагать, подразумевать, заключать в себе, значить
a binary digit	двоичная цифра; двоичный разряд
representation	изображение, образ, картина, представление в каком-л. свете
application	применение, использование, употребление; приложение
charge	(электрический) заряд, количество электричества
pressure	давление; сжатие; надавливание
fluctuation	качание, колыхание; колебание; неустойчивость
condenser	конденсатор
voltage	напряжение
to surpass	превосходить, превышать
parity	соответствие, соотношение
slew	поворот, поворотное движение (*без изменения места нахождения*)

Read and translate the Text

BASIC SIGNAL THEORY

In information and communication technology (ICT), signal theory has to do with basic signal processing as it involves the representation and transmission of information. The term ‘signal’ here refers to electromagnetic or electrical signals.

Signals can be defined as measurable quantities which may be either time-varying or spatial-varying. A signal may be expressed as a function of time and frequency.

When a signal is expressed as a function of time, it can be either discrete (discrete-time signal) or continuous (continuous-time signal).While a discrete-time signal is defined only on a discrete set of times, a continuous-time signal varies and the quantities are defined for a continuous set of times.

When expressed as a function of frequency, the signal is made up of lots of different range of frequencies.

In a more practical sense, there are two basic types of signals:

1. Digital signal
2. Analogue signal

Digital signal can be defined as a discrete signal or discrete-time signal that generates and processes data in form of zeroes and ones (0s and 1s). This implies that digital signals can take on only a discrete set of values. Digital signal is quantized (has finite set of values). The value of a digital signal may be described in terms of voltage pulses that can be sent over transmission medium. As described above, the signal sent is either off (o) or on (1) pluses, representing a binary digit. For example, computers use digital signals. Digital signal can mean two different things: *discrete-time signals* that are digitized, or to the waveform signals in a digital system. Digital signals are digital representations of *discrete-time signals*, which are often produced by changing an analog signal. In most applications, digital signals are represented as binary numbers, so their precision of quantization is measured in bits.

An analog or analogue signal is any continuous signal for which the time varying feature of the signal is a representation of some other time varying quantity. An analog signal uses some property of the medium to convey the signal's information. For example, a barometer uses rotary position as the signal to convey pressure information.

An analog signal has a theoretically infinite resolution. In practice an analog signal is subject to noise and a finite slew rate. Therefore, both analog and digital systems are subject to limitations in resolution and bandwidth. As analog systems become more complex, effects such as non-linearity and noise ultimately degrade analog resolution to such an extent that the performance of digital systems may surpass it. Similarly, as digital systems become more complex, errors can occur in the digital data stream. A comparable performing digital system is more complex and requires more bandwidth than its analog counterpart. In analog systems, it is

difficult to detect when such degradation occurs. However, in digital systems, degradation can not only be detected but corrected as well.

Analogue signal (unlike digital signal) is not discrete and quantized. Analogue signal is continuous in nature and generates continuous values, leading to continuous wave pattern. Analogue signals can be used over a variety of transmission media. For example, telephone lines use analogue protocols.

What Does Signals Do?

- Signals carry information in form of data, image, sound or pictures.
- Computers depend on digital signals for data transmission.
- The computer stores data in form of zeros and ones, which are called binary digits.
- A single binary digit is referred to a bit and a set of 8 bits is called a byte. 1024 byte is equal to 1 kilobyte.

Data can be transferred between computers, using what is called protocol. Either the analogue or digital signals can be used to transmit data or information. However, the type of signal used depends on the communication system and transmission media. [30]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Signals are measurable quantities which may be either time varying or spatial-varying.

2. Analogue signal generates and processes data in form of zeroes and ones.

3. The value of a digital signal may be described in terms of voltage pulses that can be sent over transmission medium.

4. Analogue signal is a response to physical phenomena changes.

5. Each type of signals is continuous in nature and generates continuous values.

3. Match the words with their definitions

frequencies binary resolution continuous a discrete set an analog signal

1) When a signal is expressed as a function of time, it can be either discrete or … .
2) When expressed as a function of frequency, the signal is made up of lots of different range of…
3) Digital signals can take on only … of values.
4) In most applications, digital signals are represented as … numbers.
5) Any information may be conveyed by … .
6) An analog signal has a theoretically infinite … .

4. Answer the following questions using information from the Text

1) How can signals be defined?
2) How may signals be expressed?
3) What are two basic types of signals?
4) How does a discrete-time signal operate?
5) What two things do digital signals mean?
6) What is an analog signal?
7) How does an analog signal differ from the digital one?
8) Is an analogue signal discrete?
9) What does the type of signal depend on?

5. Put the verbs in the brackets into the correct tense-forms

1) The term ‘signal’ here (to refer) to electromagnetic or electrical signals.

2) Digital signal (to be quantized).
3) Discrete-time signals often (to be produced) by changing an analog signal.
4) An analog signal (to differ) from a digital signal in terms of small fluctuations in the signal which are meaningful.
5) Analogue signal (to generate) continuous values.

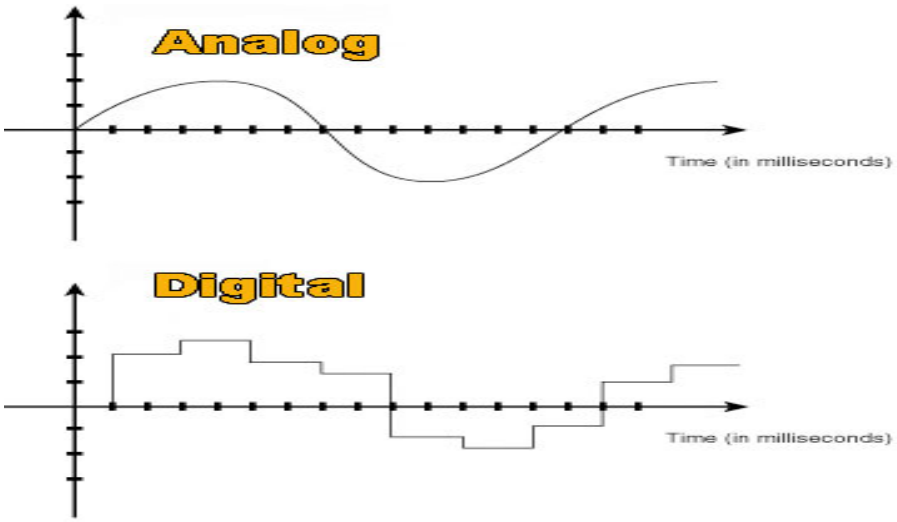
6. Define the part of speech of the underlined words: the gerund or the Participle. Explain your decision. Translate these sentences into Russian

1) The signal sent is either off (o) or on (1) pluses, representing a binary digit.
2) Digital signals are digital representations of discrete-time signals, which are often produced by changing an analog signal.
3) Electrically, the property most commonly used is voltage followed closely by frequency, current, and charge.
4) A comparable performing digital system is more complex and requires more bandwidth than its analog counterpart.
5) Analogue signal is continuous in nature and generates continuous values, leading to continuous wave pattern.
6) ASCII represents numbers using a combination of 7 bits, with an additional bit called the parity bit.

7. Using your knowledge about the complex subject, translate the following sentences into Russian

1) Signal theory is considered to deal with basic signal processing.
2) Digital signal is known to have finite set of values.
3) The voltage is said to be an "analog" of the sound.
4) Computers are known to use digital signals.
5) An analog signal is considered to be subject to noise.
6) Analogue signals are said to be used over a variety of transmission media.

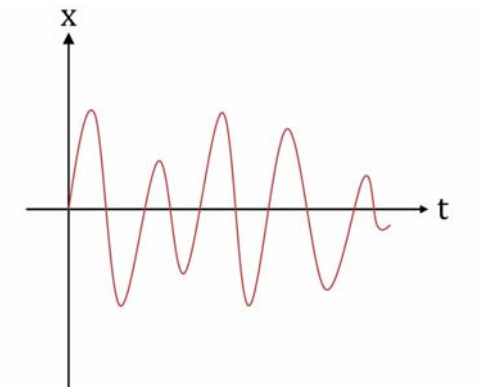
8. Look at the scheme. Try to describe two types of signals



9. Make the short plan of the Text. Retell the Text according to your plan

10. Interesting facts….

1. The primary disadvantage of analog signaling is that any system has noise – i.e., random unwanted variation. As the signal is copied and re-copied, or transmitted over long distances, these apparently random variations become dominant. [31]



2. Human voice is an example of analog signals. When you speak, the voice that is produced travel through air in the form of pressure waves and thus belongs to a mathematical function, having independent variables of space and time and a value corresponding to air pressure. [32]

Supplementary reading

Binary system

1. Read the text and do the tasks that follow it

Binary is a numeric system which uses two numerals to represent all real numbers. While the most common counting system, the decimal system, uses ten numerals, binary uses only 0 and 1.Each digit in a binary number system therefore represents a power of two. The first digit on the right represents the 0th power, the second represents the 1st power, the third represents the 2nd power, and so on. So the number 1 in the decimal system is represented also as 1 in the binary system. The number 23, by contrast, is represented as 10111 (16+0+4+2+1).

The decimal system makes perfect sense for human beings to use. We have ten fingers and ten toes, so when early humans began counting things they turned to these readily available markers. Later, when systems of counting became codified, it was natural to convert the already used decimal system to a representational system. Binary is also a fairly natural system, however, since many things either 'are' or 'are not'. Many spiritualist traditions, such as the Pythagoreans and some Indian mystics, therefore made use of binary beginning in the 6th century BC.

In 1854, a central paper on binary systems was published by the mathematician George Boole. This paper laid out the groundwork for what would eventually be called Boolean algebra. With the advent of electronics, binary systems suddenly made incredible sense. Most electronic systems function on a switch-based system, with current either running or not running. In 1937, Claude Shannon set out the foundations for the theory of circuit design using binary arithmetic. In 1940, the age of

binary computing began with the release of Bell Labs Complex Number Computer, which was able to perform extremely complex mathematical calculations using a binary system.

In a more general sense, binary systems can be anything which offers only two options, not necessarily limited to numerical systems. In the case of electronic switches, for example, the binary system consists of current-no current. A true-false exam is another example of a binary system. Yes-no questions are also binary in nature.

Mathematical methods exist for transforming binary numbers into decimal numbers, and vice-versa. There are also mathematical devices for performing functions such as addition, subtraction, multiplication and division in different base-systems, including binary. While conversion between binary and decimal is somewhat labored, converting between binary and octal or hexadecimal systems, base-eight and base-sixteen respectively, is much easier. This is because both eight and sixteen are powers of two, making them integrate well with binary systems. It is for this reason that both octal and hexadecimal are widely used base-systems in computer applications. [33], [34]

2. Say whether the following statement

Binary uses ten numerals.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

Binary system has a short history.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the text

1) The decimal system makes perfect sense for human beings to use.
2) Binary systems can be anything which offers only two options.
3) Binary system is universal and can represent all real numbers using two numerals.

5. Make the short plan of the text. Retell the text according to your plan.

UNIT IX

DATA TRANSMISSION: SYNCHRONOUS AND ASYNCHRONOUS

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

sequence	последовательность; ряд; очерёдность, порядок (следования)
infrared	инфракрасный
baseband transmission	узкополосная передача; прямая, немодулированная (передача)
passband	полоса пропускания
stream	направление, течение
source	источник
to carry out	выполнять, осуществлять; приводить в исполнение
to signify	значить, означать, обозначать; символизировать
intermittently	периодически; с перерывами, время от времени

Read and translate the Text

Data transmission, digital transmission or digital communications is the physical transfer of data over a point-to-point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibres, wireless communication channels, and storage media. The data is represented as an electromagnetic signal, such as an electrical voltage, radiowave, microwave or infrared signal.

While analog communications is the transfer of continuously varying information signal, digital communications is the transfer of discrete messages. The messages are either represented by a sequence of pulses by means of a line code (baseband transmission), or by a limited set of continuously varying wave forms (passband transmission), using a digital modulation method. The passband modulation and corresponding demodulation is carried out by modem equipment. According to the most common definition of digital signal, both baseband and passband signals representing bit-streams are considered as digital transmission, while an alternative definition only considers the baseband signal as digital, and

passband transmission of digital data as a form of digital-to-analog conversion.

Data transmitted may be digital messages originating from a data source, for example a computer or a keyboard. It may also be an analog signal such as a phone call or a video signal.

Digital transmission or data transmission traditionally belongs to telecommunications and electrical engineering. Basic principles of data transmission may also be covered within the computer science/computer engineering topic of data communications, which also includes computer networking or computer communication applications and networking protocols, for example routing, switching and process-to-process communication.

Data is transferred in the form of bits between two or more digital devices. There are two methods used to transmit data: serial transmission and parallel transmission. Serial data transmission sends data bits one after another over a single channel. Parallel data transmission sends multiple data bits at the same time over multiple channels. Serial transmission has two classifications: asynchronous and synchronous.

Asynchronous transmission uses start and stop bits to signify the beginning bit. This method is used when data is sent intermittently as opposed to in a solid stream. The start and stop bits must be of opposite polarity. This allows the receiver to recognize when the second packet of information is being sent.

Synchronous transmission uses no start and stop bit**s** but instead synchronizes transmission speeds at both the receiving and sending end of the transmission using clock signal(s) built into each component. A continual stream of data is then sent between the two nodes. [35]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I’m sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.

To my mind it's wrong.
I don’t’think that...
It’s impossible that...
I’ll never believe that...
I can’t agree that...

1. Digital communications means discrete messages transferring.
2. A phone call or a video signal is a digital message.
3. The data is represented only as an electrical voltage.
4. Computer communication applications and networking protocols also use basic principles of data transmission.
5. Start and stop bits are not used in synchronous transmission.

3. Match the words with their definitions

1. sequence	a) a situation in which different people or things are equal
2. alternative	b) the order in which a set of things happens or is arranged
3. source	c) having mistakes that prevent from operating correctly
4.voltage	d) something that you can choose instead of something else
5. parity	e) the cause or the place of some-thing where it began
6. polarity	f) a method of sending information between computers
7. corrupted	g) the condition of having opposite electrical charges
8. protocol	h) the amount of power in an electric current

4. Answer the following questions using information from the Text

1) How is the data transmission depicted?
2) What is the main difference between analog and digital communications?

3) What is the aim of modem equipment?
4) What is the aim of codec equipment?
5) What does asynchronous transmission use to signify the beginning bit?
6) How does synchronous transmission act in the same case?

5. Use the words in the box to complete the sentences:

sending	engineering	infrared	modem	originating

1) The data is represented as an electromagnetic signal such as an electrical voltage, radiowave, microwave or … signal.

2) Synchronous transmission coordinates speeds at both the receiving and … end of the transmission.

3) Data transmission traditionally refers to telecommunications and electrical … .

4) Data transmitted may be digital messages … from a data source.

5) The passband modulation and corresponding demodulation is carried out by … equipment.

6. Put the verbs in the brackets into the correct tense-forms

1) The data (to represent) as an electromagnetic signal.

2) Both baseband and passband signals (to view) as digital transmission.

3) Digital communications (to be) the transfer of discrete messages.

4) The source coding and decoding (to carry out) by codec equipment.

5) Data communication also (to include) computer communication applications and protocols.

7. Fill in the blanks with prepositions

1) Analog communications is the transfer … continuously varying information signal.

2) The messages may be represented … a sequence of pulses.

3) A continual stream of data is sent … the two nodes.

4) Clock signals are built … each component.

5) Some bytes could become corrupted … losing bits.

8. Divide the text into logical parts. Give the title to each part

9. Make the short plan of the text. Retell the text according to your plan

10. Interesting facts

1. There is idle time between the transmissions of different data bytes. This idle time is also known as Gap. The gap or idle time can be of varying intervals. This mechanism is called Asynchronous, because at byte level sender and receiver need not to be synchronized. But within each byte, receiver must be synchronized with the incoming bit stream. [35]

2. Data Transmission is a London-based electronic and dance music website founded in February 2008, covering all aspects and all genres of the global scene therein. The aim of the site is to cover all genres without prejudice, combining well-written content and opinion with an element of humour. The site features interviews, articles, a frequently updated news section, reviews, competitions, music videos, video features, podcasts, event listings and a tickets section. [37]

Supplementary reading

Data compression

1. Read the text and do the tasks that follow it

Data compression is the process of transforming information from one representation to another, smaller representation from which the original, or a close approximation to it, can be recovered. The compression and decompression processes are often referred to as encoding and decoding. Data compression has important applications in the areas of data storage and data transmission. Besides compression savings, other parameters of concern include encoding and decoding speeds and workspace requirements, the ability to access and decode partial files, and error generation and propagation.

The data compression process is said to be lossless if data are assured to be identical to the source; otherwise the compression process is said to be lossy. Lossless compression techniques are requisite for applications involving textual data. Other applications, such as those involving voice and image data, may be sufficiently flexible to allow controlled degradation in the data. Data compression techniques are characterized by the use of an appropriate data model, which selects the elements of the source on which to focus; data coding, which maps source elements to output elements; and data structures, which enable efficient implementation.

Information theory dictates that, for efficiency, fewer bits can be used for common events than for rare events. Compression techniques are based on using an appropriate model for the source data in which defined elements are not all equally likely. The encoder and the decoder must agree on an identical model. A static model is one in which the choice of elements and their assumed distribution is invariant. For example, the letter “e” might always be assumed to be the most likely character to occur. A static model can be predetermined with resulting unpredictable compression effect, or it can be built by the encoder by previewing the entire source data and determining element frequencies. The benefits of using a static model include the ability to decode without necessarily starting at the beginning of the compressed data.

An alternative dynamic or adaptive model assumes an initial choice of elements and distribution and, based on the beginning part of the source stream that has been processed prior to the datum presently under consideration, progressively modifies the model so that the encoding is optimal for data distributed similarly to recent observations. Some techniques may weight recently encountered data more heavily. Dynamic algorithms have the benefit of being able to adapt to changes in the ensemble characteristics. Most important, however, is the fact that the source is considered serially and output is produced directly without the necessity of previewing the entire source. [38]

2. Say whether the following statement

The compression and decompression processes are viewed as encoding and decoding.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

Data compression techniques can use different data models.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the text

a) The data compression process is said to be lossless.

b) The encoder and the decoder must agree on an identical model.

c) Data compression is important in many areas of data storage and transmission.

5. Make the short plan of the text. Retell the text according to your plan.

UNIT X

MODULATION AN ITS TYPES

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

to convert	преобразовывать
to depend on	зависеть от
susceptibility	восприимчивость, чувствительность
to tune	настраивать
to swing	качать(ся), колебать(ся)
deviation	отклонение
immunity	невосприимчивость
to respond	отвечать, реагировать
to exhibit	показывать, проявлять, выставлять на показ

Read and translate the Text

Modulation is the process by which voice, music and other "intelligence" is added to the radio waves produced by a transmitter. The different methods of modulating a radio signal are called modes. An unmodulated radio signal is known as a carrier. When you hear "dead air" between songs or announcements on a radio station/ you're "hearing" the carrier. While a carrier contains no intelligence, you can tell it is being transmitted because of the way it quiets the background noise on your radio.

Amplitude modulation

Amplitude modulation (AM) is a technique used in electronic communication, most commonly for transmitting information via a radio carrier wave. AM works by varying the strength of the transmitted signal in relation to the information being sent. For example, changes in the signal strength can be used to specify the sounds to be reproduced by a loudspeaker, or the light intensity of television pixels.

When you speak into the microphone of an AM transmitter, the microphone converts your voice into a varying voltage. This voltage is

amplified and then used to vary the strength of the transmitter's output. Amplitude modulation adds power to the carrier, with the amount added depending on the strength of the modulated voltage. Amplitude modulation results in three separate frequencies being transmitted: the original carrier frequency, a lower sideband below the carrier frequency, and an upper sideband above the carrier frequency.

Each sideband occupies as much frequency space as the highest audio frequency being transmitted. If the highest audio frequency being transmitted is 5 kHz, then the total frequency space occupied by an AM signal will be 10 kHz (the carrier occupies negligible frequency space).

AM has the advantages of being easy to produce in a transmitter and AM receivers are simple in design. Its main disadvantage is its inefficiency. About two-third of an AM signal's power is concentrated in the carrier, which contains no intelligence. One-third of the power is in the sidebands which contain the signal's intelligence. Since the sidebands contain the same intelligence, however, one is essentially "wasted". Of the total power output of an AM transmitter, only about one-sixth is actually productive, useful output.

Other disadvantages of AM include the relatively wide amount of frequency space an AM signal occupies and its susceptibility to static and other forms of electrical noise. Despite this, AM is simple to tune on ordinary receivers, and that is why it is used for almost all shortwave broadcasting.

Frequency modulation

In AM the carrier of the signal will not change in a normally operating transmitter. However, it is possible to modulate a signal by changing its frequency in accordance with a modulating signal. This is the idea behind frequency modulation.

The unmodulated frequency of a FM signal is called its center frequency. When a modulating signal is applied, the FM transmitter's frequency will swing above and below the center frequency according to the modulating signal. The amount of "swing" in the transmitter's frequency in any direction above and below the center frequency is called its deviation. The total frequency space occupied by a FM signal is twice its deviation.

As you might suspect, FM signals occupy a great deal of frequency space. The deviation of a FM broadcast station is 75kHz, for a total

frequency space of 150 kHz/ Most other users of FM (police and fire departments, business radio services, etc.) use a deviation of 5 kHz, for a total frequency space occupied of 10 kHz. For these reasons, FM is mainly used on frequency above 30 MHz, where adequate frequency space is available. This is why most scanner radios can only receive FM signals, since most signals found above 30 MHz are FM.

The big advantage of FM is its audio quality and immunity to noise. Most forms of static and electrical noise are naturally AM, and a FM receiver will not respond to AM signals. FM receivers also exhibit a characteristic known as the capture effect. If two or more FM signals are on the same frequency, the FM receiver will respond to the strongest of the signals and ignore the rest. The audio quality of a FM signal increases as its deviation increases, which is why FM broadcast stations use such large deviation. The main disadvantage of FM is the amount of frequency space a signal requires. [39]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1) The different methods of modulating a radio signals are called modes.
2) The microphone doesn't convert your voice.
3) Amplitude modulation adds power to the carrier.
4) AM receivers are not simple in design.
5) AM has disadvantage of being easy to produce on a transmitter.

6) Scanner radios can receive not only FM signals.
7) FM has no disadvantages.

3. Match the words with their definitions

1. mode	a) the ability of something to support a force or weight without breaking
2. intensity	b) a high-frequency electromagnetic wave modulated in amplitude or frequency to convey a signal
3. strength	c) not achieving maximum productivity; wasting or failing to make the best use of time or resources:
4. carrier	d) the tendency to be easily affected or influenced by something
5. pixel	e) the difference between one number or measurement in a series and the average of all the numbers or measurements in the series
6. inefficient	f) the strength of colour, sound, light or temperature
7. deviation	g) to move, or to make something move, backwards and forwards or from one side to another, especially from a fixed point
8. susceptibility	h) a particular way of doing something
9. swing	i) a piece of equipment that is used for copying a picture or document into a computer
10. scanner	j) the smallest unit of an image on a computer screen

4. Answer the following questions using information from the Text

1. How can one define the term “modulation”?
2. How does amplitude modulation work?
3. What are the advantages of amplitude modulation?
4. How does the frequency modulation work?
5. What are the advantages of amplitude modulation?

5. Put questions to the underlined words

1. An *unmodulated* signal is known as a carrier.
2. This voltage is used *to vary* the strength of a transmitter.
3. AM results in *three* separate frequencies.
4. AM main disadvantage is its *inefficiency*.
5. AM is used for almost all *shortwave* broadcasting.
6. It is possible to modulate a signal by *changing* its efficiency.
7. The total frequency space for FM signal is *twice* its deviation.

6. Put the verbs in the brackets into the correct tense-forms

1. An unmodulated radio signal (to be known) as a carrier.
2. Amplitude modulation (to result) in three separate frequencies.
3. If the highest audio frequency (to be) 5 kHz, then the total frequency space (to be) 10 kHz.
4. The sidebands (to contain) the signal's intelligence.
5. When a modulating signal (to be applied), the FM transmitter's frequency (to swing) above and below the center frequency according to the modulating signal.
6. FM receivers also (to exhibit) a characteristic known as the capture effect.

7. Fill in the blanks with prepositions

1) AM is susceptible … static and other forms of electrical noise.
2) Amplitude modulation results … three separate frequencies.
3) FM signals occupy a great deal … frequency space.
4) FM is mainly used … frequency above 30 MHz.
5) Audio quality and immunity … noise is the big advantage of FM.

8. Divide the text into logical parts. Give the title to each part

9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts….

1. Lack of audio quality is a distinct disadvantage of amplitude modulation. In order to attain high-fidelity reception, all audio frequencies up to 15 kHz must be reproduced. This necessitates bandwidth of 30 kHz since both sidebands must be reproduced. But AM broadcasting stations are assigned bandwidth of only 10 kHz to minimise the interference from adjacent broadcasting stations. This means that the highest modulating frequency can be 5 kHz which is hardly sufficient to reproduce the music properly. [40]

2. Frequency deviation is used in FM radio to describe the difference between the minimum and maximum extent of a frequency modulated signal, and the nominal center or carrier frequency. The term is sometimes mistakenly used as synonymous with frequency drift, which is an unintended offset of an oscillator from its nominal frequency. [41]

Supplementary reading

Demodulation

1. Read the text and do the tasks that follow it

Demodulation is the act of extracting the original information-bearing signal from a modulated carrier wave. Demodulating is necessary because the receiver system receives a modulated signal with specific characteristics, which must be returned to base-band. There are several ways of demodulation depending on what parameters of the base-band signal are transmitted in the carrier signal, such as amplitude, frequency or phase. For example, for a signal modulated with a lineal modulation, like AM (Amplitude Modulated), we can use a synchronous detector. On the other hand, for a signal modulated with an angular modulation, we must use an FM (Frequency Modulated) demodulator or a PM (Phase Modulated) demodulator. Different kinds of circuits perform these functions.

A demodulator is an electronic circuit (or computer program in a software defined radio) that is used to recover the information content from the modulated carrier wave.

An AM signal encodes the information onto the carrier wave by varying its amplitude in direct sympathy with the analogue signal to be sent. There are two methods used to demodulate AM signals.

The envelope detector is a very simple method of demodulation. It consists of a rectifier (anything that will pass current in one direction only), and a low-pass filter. The rectifier may be in the form of a single diode, or may be more complex. Many natural substances exhibit this rectification behaviour, which is why it was the earliest modulation and demodulation technique used in radio. The filter is usually a RC low-pass type, but the filter function can sometimes be achieved by relying on the limited frequency response of the circuitry following the rectifier. The crystal set exploits the simplicity of AM modulation to produce a receiver with very few parts, using the crystal as the rectifier, and the limited frequency response of the headphones as the filter.

An AM signal can be rectified without requiring a coherent demodulator. For example, the signal can be passed through an envelope detector (a diode rectifier and a low-pass filter). The output will follow the same curve as the input baseband signal. There are forms of AM in which

the carrier is reduced or suppressed entirely, which require coherent demodulation. [42]

2. Say whether the following statement

Amplitude, frequency or phase are the parameters necessary for demodulation.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

The envelope detector is the only method of demodulation.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the text

a) We can use only a synchronous detector for demodulating.

b) The process of demodulating is necessary in the process of communication.

c) In some cases coherent demodulation is required.

5. Make up a short plan of the Text. Retell the Text according to your plan.

UNIT XI

PHYSICAL MEDIA FOR TELECOMMUNICAIONS

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

twisted pair	витая пара
electromagnetic interference	электромагнитные помехи
to couple	соединять, связывать
attenuation	затухание
geometric axis	геометрическая ось
shield	экран
coaxial cable	коаксиальный кабель
gutter	желоб, паз, выемка
power loss	потеря мощности
waveguide	волновод
to wrap	заворачивать, обертывать

Read and translate the Text

Twisted pair cabling is a type of wiring in which two conductors are twisted together for the purposes of canceling out electromagnetic interference from external sources; for instance, electromagnetic radiation from unshielded twisted pair cables, and crosstalk between neighboring pairs. It was invented by Alexander Graham Bell.

In balanced pair operation, the two wires carry equal and opposite signals and the destination detects the difference between the two. This is known as differential mode transmission. Noise sources introduce signals into the wires by coupling of electric or magnetic fields. The noise produces a signal which is cancelled at the receiver when the difference signal is taken. This method starts to fail when the noise source is close to the signal wires; the closer wire will couple with the noise more strongly and the common-mode rejection of the receiver will fail to eliminate it. This problem is especially apparent in telecommunication cables where pairs in the same cable lie next to each other for many miles. One pair can

induce crosstalk in another and it is additive along the length of the cable. Twisting the pairs counters this effect as on each half twist the wire nearest to the noise-source is exchanged. Providing the interfering source remains uniform, or nearly so, over the distance of a single twist, the induced noise will remain common-mode. Differential signaling also reduces electromagnetic radiation from the cable, along with the associated attenuation allowing for greater distance between exchanges.

Coaxial cable, or coax, is an electrical cable with an inner conductor surrounded by a flexible, tubular insulating layer, surrounded by a tubular conducting shield. The term coaxial comes from the inner conductor and the outer shield sharing the same geometric axis. Coaxial cable was invented by English engineer and mathematician Oliver Heaviside, who first patented the design in 1880.

Coaxial cable is used as a transmission line for radio frequency signals, in applications such as connecting radio transmitters and receivers with their antennas, computer network connections and distributing cable television signals. One advantage of coax over other types of radio transmission line is that in an ideal coaxial cable the electromagnetic field carrying the signal exists only in the space between the inner and outer conductors. This allows coaxial cable runs to be installed next to metal objects such as gutters without the power losses that occur in other types of transmission lines, and provides protection of the signal from external electromagnetic interference.

Like any electrical power cord, coaxial cable conducts AC electric current between locations. Like these other cables, it has two conductors, the central wire and the tubular shield. At any moment the current is traveling outward from the source in one of the conductors, and returning in the other. However, since it is alternating current, the current reverses direction many times a second. Coaxial cable differs from other cables because it is designed to carry radio frequency current. If an ordinary wire is used to carry high frequency currents, the wire acts as an antenna, and the high frequency currents radiate off the wire as radio waves, causing power losses. To prevent this, in coaxial cable one of the conductors is formed into a tube and encloses the other conductor. This confines the radio waves from the central conductor to the space inside the tube. To prevent the outer conductor, or shield, from radiating, it is connected to electrical ground, keeping it at a constant potential.

An optical fiber or optical fiber is a thin, flexible, transparent fiber that acts as a waveguide, or "light pipe", to transmit light between the two ends of the fiber. The field of applied science and engineering concerned with the design and application of optical fibers is known as fiber optics. Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher bandwidths than other forms of communication. Fibers are used instead of metal wires because signals travel along them with less loss and are also immune to electromagnetic interference. Fibers are also used for illumination, and are wrapped in bundles so they can be used to carry images, thus allowing viewing in tight spaces. Specially designed fibers are used for a variety of other applications, including sensors and fiber lasers.

Optical fiber is also used in imaging optics. A coherent bundle of fibers is used, sometimes along with lenses, for a long, thin imaging device called an endoscope, which is used to view objects through a small hole. Medical endoscopes are used for minimally invasive exploratory or surgical procedures (endoscopy). Industrial endoscopes are used for inspecting anything hard to reach, such as jet engine interiors.

In spectroscopy, optical fiber bundles are used to transmit light from a spectrometer to a substance which cannot be placed inside the spectrometer itself, in order to analyze its composition. A spectrometer analyzes substances by bouncing light off of and through them. By using fibers, a spectrometer can be used to study objects that are too large to fit inside, or gasses, or reactions which occur in pressure vessels. [43], [44], [45]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I’m sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.

I don’t’think that...
It’s impossible that...
I’ll never believe that...
I can’t agree that...

1) The aim of twisted pair is to avoid interference from external forces.
2) Coax is used only in computer connections.
3) Coaxial cable doesn’t differ from other types of cables.
4) An optical fiber transmits light.
5) Signals in optical fiber are subject to electromagnetic interference.
6) Different fibers are used for a variety of applications.

3. Match the words with their definitions

1. attenuation	a) a material or device that conducts or transmits heat, electricity, or sound, especially when regarded in terms of its capacity to do this
2. coaxial cable	b) the amount of information that can be sent each second over a network connection.
3. bandwidth	c) having or showing the capacity to become or develop into something in the future
4. rejection	d) reduction the strength, amount, or size of something
5. twisted pair	e) a very thin string made of glass or plastic, used in telephone and computer systems for sending information in the form of light
6. conductor	f) a type of very strong wire used for sending large amounts of information at highspeeds, for example to cable television or computers
8. optical fiber	g) a refusal to accept, approve, or support something
9. potential	h) a cable consisting of two wires twisted around each other, used especially for telephone or computer applications

4. Use the words in the box to complete the sentences

conductor	opposite	fiber optics	electromagnetic radiation	tubular

1. In pair operation, the two wires carry equal and … signals.
2. Differential signaling reduces … from the cable.
3. The field of applied science and engineering dealing with the design and application of optical fibers is known as… .
4. Coax is an electrical cable with an inner … .
5. Coax has two conductors, the central wire and the … shield.

5. Answer the following questions using information from the text

1. What is the purpose of twisted pair?
2. How can differential mode transmission be described?
3. What cases is coaxial cable used in?
4. Why is one conductor in coaxial cable formed into a tube?
5. Signals travel along fibers with less loss, don't they?
6. What are the spheres of fiber usage?

6. Put the verbs in the brackets into the correct tense-forms

1) Two conductors (to twist) together for the purpose of canceling out electromagnetic interference from external sources.
2) Coaxial cable (to invent) by English engineer and mathematician Oliver Heaviside.
3) The electromagnetic field carrying the signal (to exist) only in the space between the inner and outer conductors.
4) At any moment the current (to travel) outward from the source in one of the conductors and (to return) in the other.
5) A spectrometer (to analyze) substances by bouncing light off of and through them.

7. Translate into Russian the following noun chains. Pay attention to the fact that the last noun is the main one

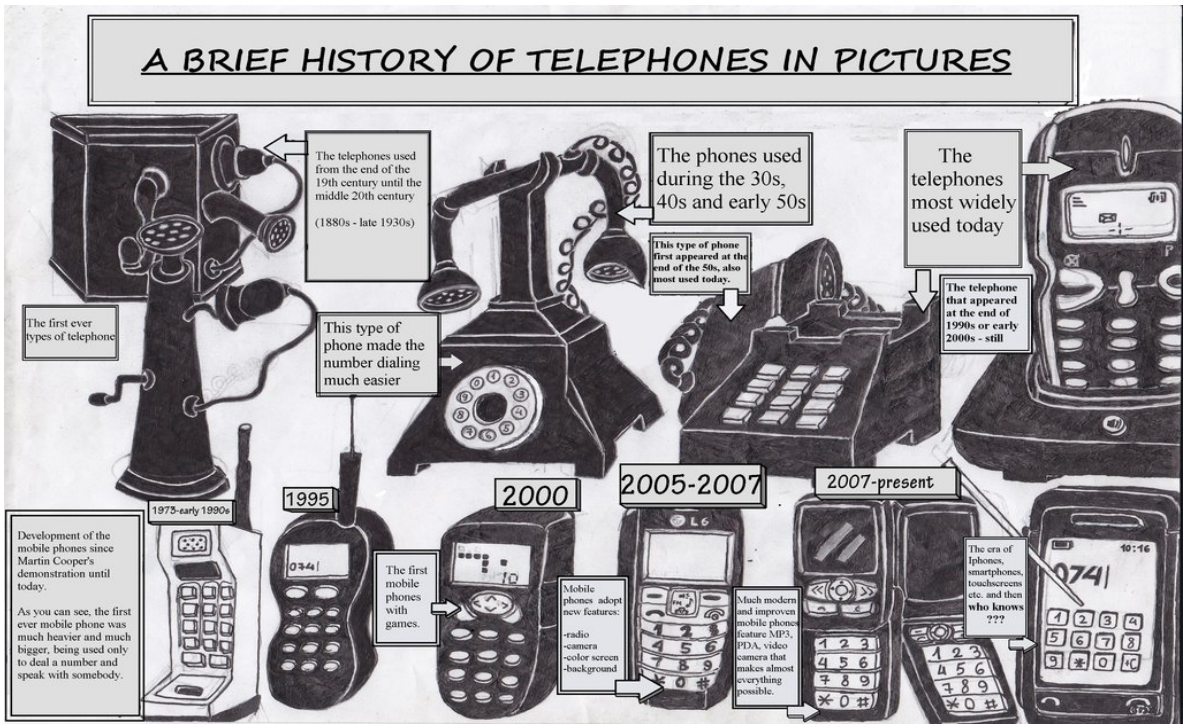
Noise sources, signal wire, transmission line, radio frequency signals, power loss, jet engine interior, pressure vessels

8. Find the statements in the Text you agree and disagree with. Give your reasons

9. Make up a short plan of the text. Retell the text according to your plan

10. Interesting facts ….

1. In 1977 the first optical telephone communication system was installed about 1.5 miles under downtown Chicago. Each optical fiber carried the equivalent of 672 voice channels. [46]



2. Twisted-pair cabling was invented by Alexander Graham Bell in 1881. By 1900 the entire American telephone network was either twisted pair or open wire with transposition to guard against interference. Today, most of the millions of kilometres of twisted pairs in the world are outdoor landlines, owned and maintained by telephone companies, used for voice service. [47]

Supplementary reading

Fiber optic sensors

1. Read the text and do the tasks that follow it

Fibers have many uses in remote sensing. In some applications, the sensor is itself an optical fiber. In other cases, fiber is used to connect a non-fiber optic sensor to a measurement system. Depending on the application, fiber may be used because of its small size, or the fact that no electrical power is needed at the remote location, or because many sensors can be multiplexed along the length of a fiber by using different wavelengths of light for each sensor, or by sensing the time delay as light passes along the fiber through each sensor. Time delay can be determined using a device such as an optical time-domain reflectometer.

Optical fibers can be used as sensors to measure strain, temperature, pressure and other quantities by modifying a fiber so that the property to measure modulates the intensity, phase, polarization, wavelength, or transit time of light in the fiber. Sensors that vary the intensity of light are the simplest, since only a simple source and detector are required. A particularly useful feature of such fiber optic sensors is that they can, if required, provide distributed sensing over distances of up to one meter.

Extrinsic fiber optic sensors use an optical fiber cable to transmit modulated light from either a non-fiber optical sensor or an electronic sensor connected to an optical transmitter. A major benefit of such sensors is their ability to reach otherwise inaccessible places. An example is the measurement of temperature inside aircraft jet engines by using a fiber to transmit radiation into a radiation pyrometer outside the engine. Extrinsic sensors can be used in the same way to measure the internal temperature of electrical transformers, where the extreme electromagnetic fields present make other measurement techniques impossible. Extrinsic sensors measure vibration, rotation, displacement, velocity, acceleration, torque, and twisting.

Common uses for fiber optic sensors include advanced intrusion detection security systems. The light is transmitted along a fiber optic sensor cable placed on a fence, pipeline, or communication cabling, and the returned signal is monitored and analyzed for disturbances. This return

signal is digitally processed to detect disturbances and trip an alarm if an intrusion has occurred. [48]

2. Say whether the following statement

Small size of the fiber helps it to find use in many applications.

1) is true 2) there is no information in the text
3) is false

3. Say whether the following statement

Sensors varying the intensity of light have complex structure.

1) is true 2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) Fiber optic sensors can provide distributed sensing over distances.
b) Fibers have many uses in remote sensing.
c) Optical fibers measure a lot of quantities.

5. Make up a short plan of the Text. Retell the Text according to your plan

UNIT XII

TYPES OF COMMUNICATION SYSTEMS

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

adjustment	регулировка, корректировка, настройка
missile	ракета
lane	полоса, ряд
hardware	аппаратное обеспечение
to extend	тянуть(ся), простирать(ся)
launcher	пусковая установка
simultaneously	одновременно
benefit	преимущество, польза, выгода
collision	столкновение
to tolerate	допускать

Read and translate the Text

TYPES OF COMMUNICATION SYSTEMS

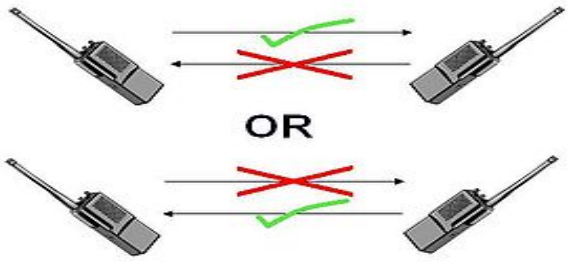
A duplex communication system is a system composed of two connected parties or devices that can communicate with one another in both directions. The term multiplexing is used when describing communication between more than two parties or devices.

Duplex systems are employed in many communications networks, either to allow for a "two-way street" communication between two connected parties or to provide a "reverse path" for monitoring and remote adjustment of equipment in the field.

Systems that do not need the duplex capability use instead simplex communication. These include broadcast systems where one station transmits and the others just "listen" and some missile guidance systems where the launcher needs only to command the missile where to go and the launcher does not need to receive any information from the missile. Also, there are spacecraft such as satellites and space probes that have lost their capability to receive any commands, but they can continue to transmit

radio signals through their antennas. Some early satellites (such as Sputnik 1) were designed as transmit-only spacecraft.

Half-duplex



A simple illustration of a half-duplex communication system.

A half-duplex system provides communication in both directions, but only one direction at a time, not simultaneously. Typically, once a party begins receiving a signal, it must wait for the transmitter to stop transmitting before replying.

An example of a half-duplex system is a two-party system such as a "walkie-talkie" style two-way radio, wherein one must use "Over" or another previously-designated command to indicate the end of transmission, and ensure that only one party transmits at a time, because both parties transmit and receive on the same frequency.

A good analogy for a half-duplex system would be a one-lane road with traffic controllers at each end. Traffic can flow in both directions, but only one direction at a time, regulated by the traffic controllers.

In automatically-run communications systems, such as two-way data-links, the time allocations for communications in a half-duplex system can be firmly controlled by the hardware. Thus, there is no waste of the channel for switching. For example, station A on one end of the data link could be allowed to transmit for exactly one second, and then station B on the other end could be allowed to transmit for exactly one second. And then this cycle repeats over and over again.

Full-duplex

A simple illustration of a full-duplex communication system, although full-duplex is not common in shown handheld radios due to the cost and complexity of common duplexing methods.

A full-duplex allows communication in both directions and, unlike half-duplex, allows this to happen simultaneously. Land-line telephone networks are full-duplex since they allow both callers to speak and be heard at the same time. A good analogy for a full-duplex system would be a two-lane road with one lane for each direction.

Two-way radios can be designed as full-duplex systems which transmit on one frequency and receive on a different frequency. This is also called frequency-division duplex. Frequency-division duplex systems can be extended to farther distances using pairs of simple repeater stations because the communications transmitted on any one frequency always travel in the same direction.

Full-duplex Ethernet connections work by making simultaneous use of two physical pairs of twisted cable wherein one pair is used for receiving packets and one pair is used for sending packets to a directly-connected device. This effectively makes the cable itself a collision-free environment and doubles the maximum data capacity that can be supported by the connection.

There are several benefits to using full-duplex over half-duplex. First, time is not wasted since no frames need to be retransmitted, as there are no collisions. Second, the full data capacity is available in both directions because the send and receive functions are separated. Third, stations do not have to wait until others complete their transmission, since there is only one transmitter for each twisted pair. [49]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I’m sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don’t’think that...
It’s impossible that...

I'll never believe that...
I can't agree that...

1. A duplex communication system is a point-to-point system composed of two connected parties or devices that can communicate with one another in both directions simultaneously.
2. A half-duplex system provides communication in both directions not simultaneously.
3. Traffic in the half-duplex system is regulated by the traffic controllers.
4. Two-way radio can be referred to frequency division duplex system.
5. Full-duplex Ethernet connections work by making concurrent use of a physical pair of twisted cable.

3. Match the words with their definitions

1. capability	a) a situation in which something happens later or more slowly than you expected
2. designate	b) a part of a machine that controls a particular process
3. indicate	c) an accident in which a person or vehicle that is moving crashes into something
4. separate	d) a system for organizing or arranging information
5. repeat	e) to formally choose someone or something for a particular purpose
6. controller	f) to do something again, or to make something happen again
7. collision	g) to show that a particular kind of action or treatment is necessary
8. delay	h) to make certain that something happens or is done
9. scheme	i) the ability to do something
10. to ensure	j) to keep people or things apart from each other

4. Complete the sentences with the facts from the text

1. The term multiplexing is used when describing …
2. Simplex communication includes …
3. A duplex communication system is a system composed of …
4. Land-line telephone networks are full-duplex, since they allow …
5. Frequency-division duplex systems can be extended to farther distances using …

5. Answer the following questions using information from the text

1. How do devices in a duplex system communicate with each other?
2. What are duplex systems employed in communications networks to?
3. When is simplex communication used?
4. What does a half-duplex system provide?
5. What does a full-duplex allow?

6. Put the verbs in the brackets into the correct tense-forms

1. Duplex systems (to be employed) in many communications networks.
2. The launcher (not to need) to receive any information from the missile.
3. There (to be) several advantages to using full-duplex over half-duplex.
4. This cycle (to repeat) over and over again.
5. Some early satellites (such as Sputnik 1) (to be designed) as transmit-only spacecraft.

7. Make up new words of the same root and define their part of the speech

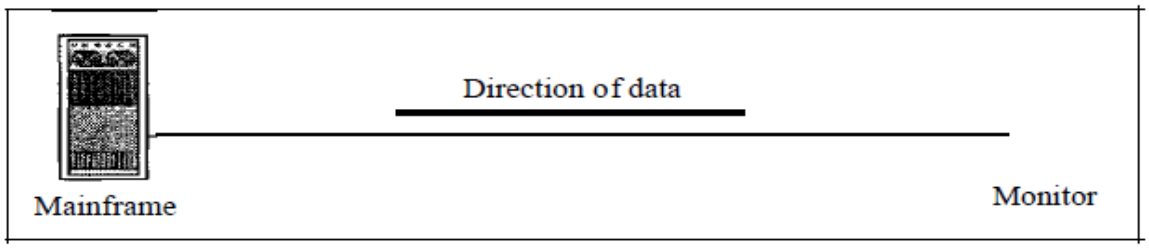
Transmit, operate, direct, receive, use, broadcast, compose, differ, adjust, call

8. Name the main types of communication systems and characterize each one. Work in pairs

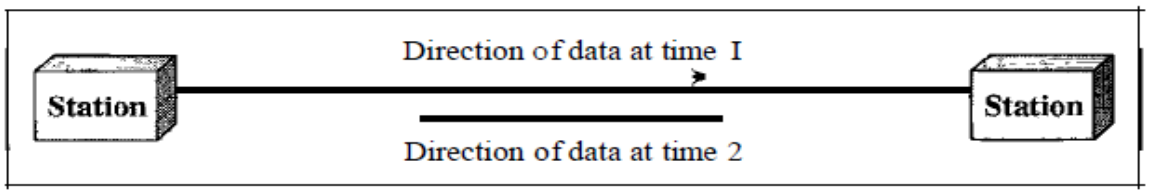
9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts….

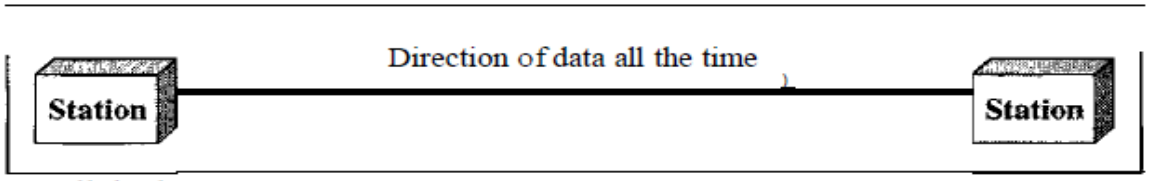
1. Full-duplex audio systems like telephones can create echo which needs to be removed. Echo occurs when the sound coming out of the speaker originating from the far end re-enters the microphone and is sent back to the far end. The sound then reappears at the original source end but delayed. This feedback path may be acoustic, through the air, or it may be mechanically coupled, for example in a telephone handset. Echo cancellation is a signal-processing operation that subtracts the far-end signal from the microphone signal before it is sent back over the network. [50]



a. Simplex



b. Half-duplex



c. Full-duplex

2. In half-duplex communication systems, data can be transmitted in two directions, but not simultaneously. Thus firstly Node 1 transmits data, Node 2 receives, then roles are changing and Node 2 transmits data, Node 1 receives. In duplex communication systems, data can be transmitted in two directions simultaneously. The implementation of bi-directional data transmission is possible due to time or frequency division. An example of

such system is GSM technology, where uplink and downlink channels are organized at different frequencies, so frequency duplex is used. [51]

Supplementary reading

Duplex mismatch

1. Read the Text and do the tasks that follow it

In Ethernet, a duplex mismatch is a condition where two connected devices operate in different duplex modes, that is, one operates in half duplex while the other one operates in full duplex. The effect of a duplex mismatch is a network that works but is often much slower than its nominal speed. Duplex mismatch may be caused by manually setting two connected network interfaces at different duplex modes or by connecting a device that performs autonegotiation to one that is manually set to a full duplex mode.

When a device set to autonegotiation is connected to a device that is not using autonegotiation, the autonegotiation process fails. The autonegotiating end of the connection is still able to correctly detect the speed of the other end, but cannot correct the duplex mode. The standard requires the use of half duplex in these conditions. Therefore, the autonegotiating end of the connection uses half duplex while its peer is locked at full duplex, and this is a duplex mismatch.

Communication is possible over a connection in spite of a duplex mismatch. Single packets are sent and acknowledged without problems. As a result, a simple ping command fails to highlight a duplex mismatch because single packets and their resulting acknowledgments at 1-second intervals do not cause any problem on the network. A terminal session which sends data slowly can also communicate successfully. However, as soon as either end of the connection attempts to send any significant amount of data, the network suddenly slows to very low speed. Since the network is otherwise working, the cause is not so readily apparent.

A duplex mismatch causes problems when both ends of the connection attempt to transfer data at the same time. This happens even if the channel is used in one direction only in case of large data transferring. Indeed, when a large data transfer is sent, data is sent in multiple packets, some of which will trigger an acknowledgment packet back to the sender. This results in packets being sent in both directions at the same time.

In such conditions, the full-duplex end of the connection sends its packets while receiving other packets; this is exactly the point of a full-duplex connection. Meanwhile, the half-duplex end cannot accept the incoming data while it is sending - it will sense it as a collision. The half-duplex device ceases its current transmission and then retries later as per CSMA/CD. As a result, when both devices are attempting to transmit at the same time, packets sent by the full-duplex end will be lost and packets sent by the half duplex device will be delayed or lost.

The lost packets force the TCP protocol to perform error recovery, but the initial recovery attempts fail because the retransmitted packets are lost in exactly the same way as the original packets. Eventually, the TCP transmission window becomes full and the protocol refuses to transmit any further data until the previously-transmitted data is acknowledged. This, in turn, will suspend the new traffic over the connection, leaving only the retransmissions and acknowledgments. Since the retransmission timer grows progressively longer between attempts, eventually a retransmission will occur when there is no reverse traffic on the connection, and the acknowledgment are finally received. This will restart the TCP traffic, which in turn immediately causes lost packets as streaming resumes.

The end result is a connection that is working but performs extremely poorly because of the duplex mismatch. Symptoms of a duplex mismatch are connections that seem to work fine with a ping command, but "lock up" easily with very low throughput on data transfers; the effective data transfer rate is likely to be asymmetrical, performing much worse in one direction than the other. [52]

2. Say whether the following statement

One can send a single packet without any problems.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

Autonegotiation is not only the manufacturer’s default.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the text

a) Communication is possible over a connection in spite of a duplex mismatch.

b) Under the condition of a duplex mismatch one device operates in half duplex while the other one operates in full duplex.

c) All modern LAN equipment comes with autonegotiation.

5. Make the short plan of the Text. Retell the Text according to your plan

UNIT XIII

THE INTERNET

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

to retrieve	извлекать (хранимую) информацию
database	база данных
to distribute	распределять, раздавать, распространять
goods and services	товары и услуги
concept	понятие, идея; общее представление; концепция
mainframe	универсальная вычислительная машина; базовое вычислительное устройство
to log on	входить *в систему*
impact	сильное воздействие; влияние
router	маршрутизатор (устройство для соединения сетей, использующих разные архитектуры и протоколы; осуществляет выбор одного из нескольких путей передачи сетевого трафика, а также фильтрацию широковещательных сообщений для локальной сети)

Read and translate the Text

THE INTERNET

The Internet is a computer-based worldwide information network. The Internet is composed of a large number of smaller interconnected networks called internets. These internets may connect tens, hundreds, or thousands of computers, enabling them to share information with each other and to share various resources, such as powerful supercomputers and databases of information. The Internet has made it possible for people all over the world to effectively and inexpensively communicate with each other. Unlike traditional broadcasting media, such as radio and television, the Internet is a decentralized system. Each connected individual can communicate with anyone else on the Internet, can publish ideas, and can

sell products with a minimum overhead cost. In the future, the Internet may have a dramatic impact on higher education and business as more universities offer courses and more companies offer goods and services online.

Individuals, companies, and institutions use the Internet in many ways. Businesses use the Internet to provide access to complex databases, such as financial databases. Companies can carry out commerce online, including advertising, selling, buying, distributing products and providing after-sales services. Businesses and institutions can use the Internet for voice and video conferencing and other forms of communication that allow people to telecommute, or work from a distance. The use of electronic mail over the Internet has greatly speeded communication between companies, among coworkers, and between other individuals. Media and entertainment companies use the Internet to broadcast audio and video, including live radio and television programs; to offer online chat, in which people carry on discussions using written text; and to offer online news and weather programs. Scientists and scholars use the Internet to communicate with colleagues, to perform research, to distribute lecture notes and course materials to students, and to publish papers and articles. Individuals use the Internet for communication, entertainment, finding information, and to buy and sell goods and services.

The Internet is based on the concept of a client-server relationship between computers, also called a client /server architecture. In a client/server architecture, some computers act as servers, or information providers, while other computers act as clients, or information receivers. The client/server architecture is not one-to-one—that is, a single client computer may access many different servers, and a single server may be accessed by a number of different client computers. Prior to the mid-1990s, servers were usually very powerful computers such as mainframes or supercomputers, with extremely high processing speeds and large amounts of memory. Personal computers and workstations, however, are now capable of acting as Internet servers due to advances in computing technology. A client computer is any computer that receives information from a server and is often a personal computer.

To access information on the Internet, a user must first log on, or connect, to the client computer’s host network. A host network is a network that the client computer is part of, and is usually a local area network (LAN). Once a connection has been established, the user may

request information from a remote server. If the information requested by the user resides on one of the computers on the host network, that information is quickly retrieved and sent to the user's terminal. If the information requested by the user is on a server that does not belong to the host LAN, then the host network connects to other networks until it makes a connection with the network containing the requested server. In the process of connecting to other networks, the host may need to access a router, a device that determines the best connection path between networks and helps networks to make connections. [5], [53]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements
I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. The Internet is a global system of interconnected computer networks .
2. The Internet is a centralized system.
3. The Internet consists of millions of private, public, academic, business and government networks of local to global scope.
4. Advances in computing technology allow personal computers and workstations to act as Internet servers.
5. Electronic mail over the Internet has no impact on communication between companies.

3. Choose the best answer

1. The word Internet refers to …
a) a supercomputer; b) database; c) information network; d) resources
2. The word internets means …
a) hundreds of computers; b) smaller interconnected networks;
c) broadcasting media; d) radio and television.
3. The best explanation of the concept of a client – server architecture will be …
a) some computers act as information providers while other computers act as information receivers; b) very powerful computers act as servers; c) a single client computer may access many different servers; d) personal computers act as Internet servers.
4. The word server implies …
a) a workstation; b) an information provider; c) a supercomputer;
d) an information receiver.
5. Information access on the Internet implies that one should…
a) connect to other networks; b) first log on to the client computer's host network; c) request information from a remote server; d) access a router. [5]

4. Use the words in the box to complete the sentences

interconnected	server	to share	architecture	information

1. The Internet is composed of a large number of ….. networks.
2. Computers are able ….. information with each other.
3. The Internet is based on a client /server ….. .
4. A client computer is any computer that receives information from a ….. .
5. Once a connection is established, the user may request ….. from a remote server.

5. Answer the following questions using information from the text

1. What is the Internet?
2. What does it consist of?
3. The Internet is a decentralized system, isn't it?

4. What concept is the Internet based on?
5. What must a user do to access information on the Internet?

6. Put the verbs in the brackets into the correct tense-forms

A Polite Computer

Computers can solve different problems. One day a famous general was given a computer which (to be) ….. able to answer complicated questions on war problems. The War Office also (to send) ….. an expert to fix the computer. The general (to think) ….. hard over an important military problem for a long time and the computer (to bring) ….. at the right moment to help the general. It (to take) ….. the general ten minutes to set the problem. "The enemy just (to open) ….. fire from the south." The general wanted to know what the results (to be) ….. if he (to attack) ….. the enemy or if he (to remove)….. his army. The computer (to start)… to work at once. While the computer (to operate) ….. by the expert, the general (to watch) ….. the screen flashing. At last the answer (to receive)….. . "Yes!" The general's face (to grow) ….. dark red. He shouted at the top of his voice: "Yes, what?" The computer (to be) ….. half an hour later when the next answer (to come)….. . "Yes? Sir!" [54]

7. Define the part of speech of the underlined words: the Gerund or the Participle. Explain your decision. Translate these sentences into Russian

1. Individuals use the Internet for <u>finding</u> information.
2. Personal computers are capable of <u>acting</u> as Internet servers.
3. The internets may connect tens, hundreds, or thousands of computers <u>enabling</u> them to share information with each other.
4. The host network makes a connection with the network <u>containing</u> the requested information.
5. Companies can carry out <u>selling</u> and <u>buying</u> products online.

8. Speak on pros and cons of the Internet communication. Give your reasons. Work in pairs

9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts….

1. The only country where 100 percent of the population has internet is Iceland. In Colombia, the percentage is 56.9 percent, behind Venezuela, with 57.9 percent, Uruguay (65 percent), Brazil (66.4 percent) and Argentina (69.2 percent)). In China there are the largest number of connected people (721 million) but that only represents 52.2 percent of its inhabitants. [55]

2. Pizza is the Most Digitally Photographed Food. Photos of pizza slice their way to the top of the charts on Instagram. Really, though, the most common food that people showcase on their IG profiles is pizza. According to a *Telegraph* report, that's followed by sushi, coming in at second place. After that comes juicy steak, burgers, and bacon as the most popular food art on the web. [56]

Supplementary reading

The future of the Internet

1. Read the Text and do the tasks that follow it

A major challenge facing the continued growth of the Internet is the difficulty of providing enough bandwidth to sustain the network. As Internet applications become more sophisticated, and as more people around the world use the Internet, the amount of information transmitted across the Internet will demand very high bandwidth connections. While many communications companies are attempting to develop higher bandwidth technologies, it is not known whether the technology will be able to satisfactorily keep up with demand.

Another important question facing Internet growth is the issue of censorship. Because the Internet has grown so rapidly, governments have

been slow to regulate its use and to pass laws regarding what content is acceptable.

Commercial use of the Internet is sure to grow dramatically as more individuals gain access to it. It may be possible in the future to order nearly any goods from Internet sites and have them delivered using the postal service.

The issue of business being conducted over the Internet raises important security issues. Companies doing business over the Internet must have very sophisticated security measures in place so that information such as credit card, bank account, and social security numbers cannot be accessed by unauthorized users. Similarly, government facilities, universities, and institutions must ensure that access to their computers over the Internet is strictly regulated. [57]

2. Say whether the following statement

Commercial use of the Internet is decreasing dramatically.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

The amount of information transmitted over the Internet will demand high bandwidth connections.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) The Internet is the popular with many people, especially young.
b) The Internet growth influences all spheres of human activity.
c) The number of the Internet users will be growing.

5. Make the short plan of the Text. Retell the Text according to your plan

UNIT XIV

COMMUNICATION SATELLITES

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

spacecraft	космический летательный аппарат
to reflect	отражать свет, тепло, звук
to launch	пускать в ход; запускать (ракету и т.п.)
to amplify	усилить
equipment	средства, оборудование
circular	круговой, кольцевой
altitude	высота, вершина
trunk	междугородная линия связи
rotation	вращение, оборот

Read and translate the Text

A communications satellite is any earth-orbiting spacecraft that provides communication over long distances by reflecting or relaying radio-frequency signals.

Some of the first communications satellites were designed to operate in a passive mode. Instead of actively transmitting radio signals, they served merely to reflect signals that were beamed up to them by transmitting stations on the ground. Signals were reflected in all directions, so they could be picked up by receiving stations around the world. Echo 1, launched by the United States in 1960, consisted of an aluminized plastic balloon 30 m in diameter. Launched in 1964, Echo 2, was 41 m in diameter. The capacity of such systems was severely limited by the need for powerful transmitters and large ground antennas.

Satellite communications currently make exclusive use of active systems, in which each satellite carries its own equipment for reception and transmission. Hundreds of active communications satellites are now in orbit. They receive signals from one ground station, amplify them, and then retransmit them at a different frequency to another station. One frequency band used, 500 MHZ wide, is divided into repeater channels of

various bandwidths. A band at 14 GHZ and 11 or 12 GHZ is also much in use, mostly with fixed ground stations. An 80-MH Z-wide band at about 1.5 GHZ is used with small, mobile ground stations (ships, land vehicles, and aircraft). Solar energy cells mounted on large panels attached to the satellite provide power for reception and transmission.

A satellite in a geosynchronous orbit follows a circular orbit over the equator at an altitude of 35,800 km completing one orbit every 24 hours, in the time that it takes the earth to rotate once. Moving in the same direction as the earth's rotation, the satellite remains in a fixed position over a point on the equator, thereby providing uninterrupted contact between ground stations in its line of sight. The first communications satellite to be placed in this type of orbit was Syncom 2 launched by the National Aeronautics and Space Administration (NASA) in 1963. Most of those that followed were also placed in geosynchronous orbit.

Commercial satellites provide a wide range of communications services. Television programs are relayed internationally, giving rise to the phenomenon known as the "global village." Satellites also relay programs to cable television systems as well as to homes equipped with dish antennas. In addition, very small aperture terminals (VSATs) relay digital data for a multitude of business services. Intelsat satellites now carry over 100,000 telephone circuits, with growing use of digital transmission. Digital source coding methods have resulted in a ten-fold reduction in the transmission rate needed to carry a voice channel, thus enhancing the capacity of existing facilities and reducing the size of ground stations that provide telephone service.

Communications satellite systems have entered a period of transition from point-to-point high-capacity trunk communications between large, costly ground terminals to multipoint-to-multipoint communications between small, low-cost stations. The development of multiple access methods has both hastened and facilitated this transition. With TDMA, each ground station is assigned a time slot on the same channel for use in transmitting its communications; all other stations monitor these slots and select the communications directed to them. By amplifying a single carrier frequency in each satellite repeater, TDMA ensures the most efficient use of the satellite's onboard power supply. [5], [58]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Satellites provide wide range of communication services.
2. First satellites operated in an active mode.
3. A satellite in a geosynchronous orbit follows an elliptical orbit.
4. Satellites provide relaying programs only to homes with dish antennas.
5. The satellites moves in the same direction as the Earth rotates.

3. Match the words with their definitions

1. to complete	a) not fixed in one position
2. cell	b) presence in one's view
3. mobile	c) to finish making or doing
4. to launch	d) the smallest structural and functional unit of an organism
5. capacity	e) send a missile, satellite, or spacecraft on its course
6. to be in sight	f) move or cause to move in a circle round an axis or centre
7. vehicle	g) the ability or power to do or understand something
8. to rotate	h) a thing used for transporting people or goods, especially on land, such as a car, lorry or cart

4. Use the words in the box to complete the sentences

uninterrupted	reception	earth-orbiting	reflected	equipment
	picked up	transmission		

1. A satellite is any ….. spacecraft.
2. The satellite provides ….. contact between ground stations in its line of sight.
3. Each satellite carries its own ….. for reception and transmission.
4. Signals were ….. in all directions so they could be ….. by receiving stations around the world.
5. Solar energy cell provides power for ….. and ….. .

5. Answer the following questions using information from the text

1. What is the function of satellites?
2. In what way does the satellite provide uninterrupted contact between ground stations?
3. What were the first communication satellites designed for?
4. What is the "global village"?
5. What is the advantage of a geosynchronous orbit?

6. Put the verbs in the brackets into the correct tense-forms

1. A communications satellite (to provide) communication over long distances by reflecting or relaying radio-frequency signals.
2. Modern satellites (to make) use of active systems.
3. Signal (to reflect) in all directions.
4. Digital source coding methods (to result) in a ten-fold reduction in the transmission rate.
5. A satellite in a geosynchronous orbit (to follow) a circular orbit over the equator.

7. Using your knowledge about the Infinitive, translate the following sentences into Russian. Define the function of the Infinitive in the sentence

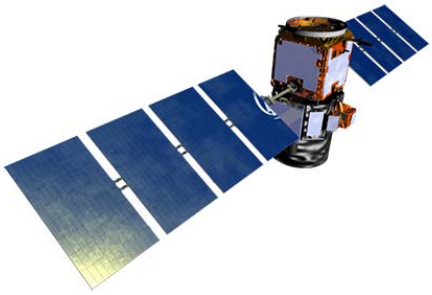
1. Some of the first communications satellites were designed to operate in a passive mode.
2. It takes the earth 24 hour to rotate once.
3. Syncom 2 was the first communications satellite to be placed in orbit.
4. To carry a voice channel, a ten-fold reduction in the transmission was necessary.
5. Early satellites served merely to reflect signals.

8. Speak about the advantages of using communication satellites. Work in pairs

9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts .....

1. The CALIPSO satellite not only measures dust concentration in the atmosphere but also specializes in scaring people in rural areas at night by blasting a 900 feet diameter beam of bright visible light on the ground for a split-second.



2. The largest class of satellites are the Orion spy satellite class. These giant listening devices are equipped with an umbrella-shaped sail that is estimated to be 330 feet in diameter. [59]

Supplementary reading

Recent technical advances

1. Read the Text and do the tasks that follow it

Communications satellite systems have entered a period of transition from point-to-point high-capacity trunk communications between large costly ground terminals to multipoint-to-multipoint communications between small low-cost stations. The development of multiple access methods has both hastened and facilitated this transition. With TDMA, each ground station is assigned a time slot on the same channel for use in transmitting its communications. All other stations monitor these slots and select the communications directed to them. By amplifying a single carrier frequency in each satellite repeater, TDMA ensures the most efficient use of the satellite's onboard power supply.

A technique called frequency reuse allows satellites to communicate with a number of ground stations using the same frequency by transmitting in narrow beams pointed toward each of the stations. Beam widths can be adjusted to cover areas as large as the entire United States or as small as a state like Maryland. Two stations far enough apart can receive different messages transmitted on the same frequency. Satellite antennas have been designed to transmit several beams in different directions, using the same reflector.

A new method for interconnecting many ground stations spread over great distances is scheduled to be tested in 1993, with the launch of Advanced Communications Technology Satellite. It combines the advantages of frequency reuse, spot beams and TDMA. By concentrating

the energy of the satellite's transmitted signal, ACTS can use ground stations that have smaller antennas and reduced power requirements.

The concept of multiple spot beam communications was successfully demonstrated in 1991 with the launch of Italsat, developed by the Italian Research Council. With six spot beams operating at 30 GHZ and 20 GHZ, the satellite interconnects TDMA transmissions between ground stations in all the major economic centers of Italy. It does this by demodulating uplink signals routing them between up- and downlink beams and combining and remodulating them for downlink transmission.

The application of laser technology to satellite communications has been studied for over a decade. Laser beams can be used to transmit signals between a satellite and earth, but the rate of transmission is limited because of absorption and scattering by the atmosphere. Lasers operating in the blue-green wavelength, which penetrates water, have been used for communication between satellites and submarines. [60]

2. Say whether the following statement

Frequency reuse allows satellites to communicate with a number of ground stations.

1) is true 2) there is no information in the text
3) is false

3. Say whether the following statement

Laser beams can't be used to transmit signals between a satellite and the Earth because of absorption.

1) is true 2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) A satellite's power could now be concentrated on small regions of the Earth.

b) The development of modern technologies has widened the range of satellites application.

c) Communication satellites transmit several beams in different directions.

5. Make up a short plan of the Text. Retell the Text according to your plan

UNIT XV

FIBER OPTICS

1. Study and try to memorize the following words and word combinations. Practice saying these words and word combinations

fiber optics	волоконно-оптический кабель; волоконная оптика, стеклянная или полимерная среда для передачи световых пучков, генерируемых светодиодом или лазером
transparent	прозрачный, просвечивающий, светопроницаемый
refractive	преломляющий; преломляемый
loss	потеря, лишение
to curve	гнуть(ся); изгибать(ся)
surface	поверхность
impurity	примесь
surgery	хирургия, оперативное вмешательство
gyroscope	гироскоп, волчок
hazardous	опасный, рискованный
utilization	использование, употребление, утилизация
field	область, сфера, поле деятельности
bundle	узел, связка; пачка; вязанка; пучок

Read and translate the Text

FIBER OPTICS

Fiber optics is a branch of optics dealing with the transmission of light through fibers or thin rods of glass or some other transparent material of high refractive index. If light is admitted at one end of a fiber, it can travel through the fiber with a very low loss, even if the fiber is curved.

The principle on which this transmission of light depends is that of total internal reflection: Light travelling inside the fiber center, or core, strikes the outside surface at an angle of incidence greater than the critical angle, so that all the light is reflected toward the inside of the fiber without loss. Thus light can be transmitted over long distances by being reflected

inward thousands of times. In order to avoid losses through the scattering of light by impurities on the surface of the fiber, the optical fiber core is clad with a glass layer of much lower refractive index; the reflections occur at the interface of the glass fiber and the cladding.

The simplest application of optical fibers is the transmission of light to locations otherwise hard to reach, for example, the bore of a dentist's drill. Also, bundles of several thousand very thin fibers assembled precisely side by side and optically polished at their ends, can be used to transmit images. Each point of the image projected on one face of the bundle is reproduced at the other end of the bundle, reconstituting the image, which can be observed through a magnifier. Image transmission by optical fibers is widely used in medical instruments for viewing inside the human body and for laser surgery, in facsimile systems, in phototypesetting, in computer graphics, and in many other applications.

Optical fibers are also being used in a wide variety of sensing devices, ranging from thermometers to gyroscopes. The potential of their applications in this field is nearly unlimited, because the light sent through them is sensitive to many environmental changes, including pressure, sound waves, and strain, as well as heat and motion. The fibers can be especially useful where electrical effects could make ordinary wiring useless, less accurate, or even hazardous. Fibers have also been developed to carry high-power laser beams for cutting and drilling.

One growing application of optical fibers is in communication. Because the information-carrying capacity of a signal increases with frequency, the use of laser light offers many advantages. Fiber-optic laser systems are being used in communications networks. Many long-haul fiber communications networks for both transcontinental connections and, through undersea cables, international connections are in operation. One advantage of optical fiber systems is the long distances that can be maintained before signal repeaters are needed to regenerate signals. These are currently separated by about 100 km compared to about 1.5 km for electrical systems. Newly developed optical fiber amplifiers can extend this distance even farther.

Local area networks are another growing application for fiber optics. Unlike long-haul communications, these systems connect many local subscribers to expensive centralized equipment such as computers and printers. This system expands the utilization of equipment and can easily accommodate new users on a network. Development of new electro-optic

and integrated-optic components will further expand the capability of fiber systems. [5]

2. Say if the following statements are true or false. Use the phrases of agreement or disagreement. Correct the false statements

I think...
I guess…
I believe...
I'm sure...
Yes, I agree with it.
Absolutely. It's obvious.
I'm afraid I can't agree.
I'm sorry, but that's not quite right.
To my mind it's wrong.
I don't'think that...
It's impossible that...
I'll never believe that...
I can't agree that...

1. Fiber optics deals with the transmission of sound through wires.
2. The optical fiber is cleaned from a glass layer in order to avoid losses.
3. Light can be transmitted over long distances by being reflected thousands of times.
4. The potential of sensing devices applications is limited.
5. Long-haul communications connect many local subscribers to expensive centralized equipment such as computers and printers.

3. Match the words with their definitions

1. fiber optics	a) practical purpose for which a machine can be used
2. transparent	b) something that makes one person or thing more likely to succeed than others
3. reflection	c) the process of using thin threads of glass to carry information
4. long-haul	d) to make something bigger or longer

5. angle	e) allowing light to pass through it
6. to extend	d) an image that you see when you look in a mirror or other shiny surface
7. application	g) the space between two straight crossed lines
8. advantage	h) travelling a long distance, especially by air

4. Use the words in the box to complete the sentences

sensitive capability frequency transmission regenerating

1. Fiber optics deals with the ….. of light through fibers.
2. The light sent through optical fibers is ….. to environmental changes.
3. Signal capacity of carrying information increases with ….. .
4. Signal repeaters are used for ….. signals.
5. Development of integrated-optic components will expand the ….. of fiber systems.

5. Answer the following questions using information from the text

1. What does fiber optics deal with?
2. What is the principle of light transmission?
3. Where do reflections take place?
4. Where is image transmission used?
5. What are the advantages of fiber optic systems?

6. Put the verbs in the brackets into the correct tense-forms

1. All the light (to reflect) towards the inside of the fiber without loss.
2. The reflections (to occur) at the interface of the glass fiber and the cladding.
3. Image transmission by optical fibers (to use) in medical instruments.
4. Fibers (to develop) to carry high-power laser beams for cutting and drilling.

5. Fiber-optic laser systems (to use) in communications networks at the moment.

7. Define the part of speech of the underlined words: the Gerund or the Participle. Explain your decision. Translate these sentences into Russian

1. Light travelling inside the fiber center, or core, strikes the outside surface.
2. Light can be transmitted over long distances by being reflected inward thousands of times.
3. Each point of the image projected on one face of the bundle is reproduced at the other end of the bundle, reconstituting the image.
4. Image transmission by optical fibers is widely used in medical instruments for viewing inside the human body.
5. One growing application of optical fibers is in communication.

8. Speak about pros and cons of fiber optics if any. Give your reasons. Work in pairs

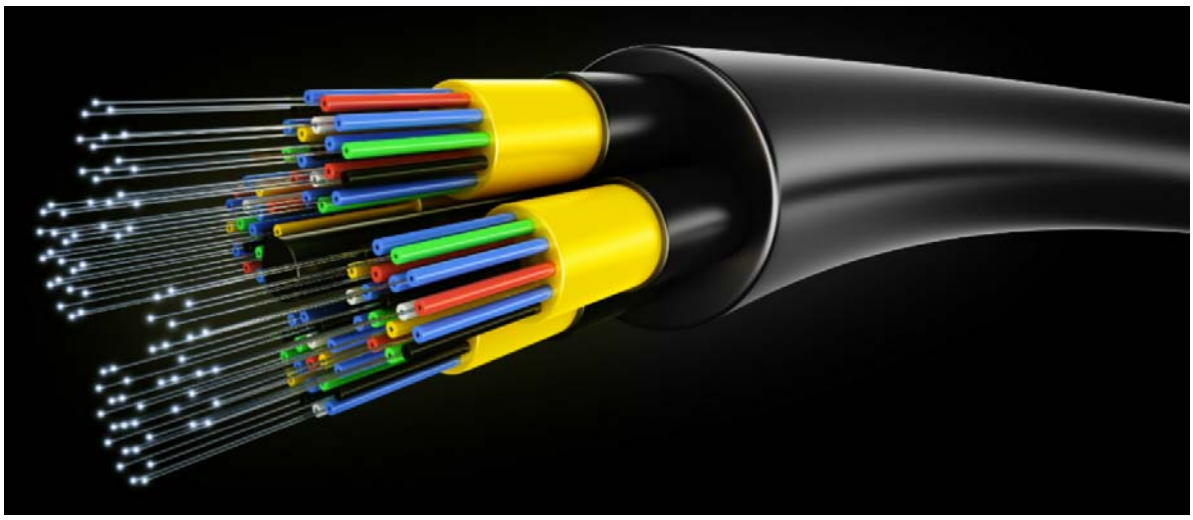
9. Make up a short plan of the Text. Retell the Text according to your plan

10. Interesting facts….

1. Fiber optics is resistant to electromagnetic interference and they don't cause other interferences because they emit no radiation themselves.

2. Because of its limited tolerance to electromagnetic currents metal wiring has a limited lifecycle. The cables deteriorate over time until the point at which they need to be replaced. The lifecycle of fiber optics is endless and the optics can be upgraded without ever having to modify the cable.

3. Sandia National Laboratories in Albuquerque, New Mexico is the home of the largest, privately-owned fiber optic network in the world. The network connects 265 buildings and 13,000 computer network ports. [61]



Supplementary reading

Fiber Optic Communication Systems

1. Read the Text and do the tasks that follow it

In optical fiber communication systems, the information is coded in the form of optical pulses (a 1 or a 0) which propagate along optical fiber links. In a point-to-point long-distance optical fiber communication link, these optical pulses would have to propagate over very long distances, such as hundreds to thousands of kilometers. We know that as optical pulses carrying information propagate through an optical fiber, they get attenuated and lose power and get broadened in time due to dispersion. For retrieving information, the optical pulses need to be detected and converted to electrical signals for further processing. Optical detectors need to receive a minimum optical power to be able to decipher the sent bit, whether it is a 1 or a 0. Also, if the pulse dispersion is large, the adjacent pulses may start to overlap, resulting in nonresolvable pulses and leading to errors in detection.

To propagate over long distances, an actual system uses *regenerators*, which are placed periodically along the link and compensate for the accumulated loss and dispersion. In the case of electronic regenerators, the incoming optical pulses are first converted into electrical pulses, which are then processed in the electronic domain to retime and reshape the pulses. This process also removes any noise that may have

accumulated in the pulses. The resulting electrical pulses are then amplified and used to drive a laser diode, resulting in a fresh optical pulse stream. In this way the pulse stream leaving the regenerator is almost as good as it was when it started from the transmission end. When loss and dispersion accumulate due to further propagation, another regenerator compensates, and in this way the information-carrying pulse stream is able to propagate over very long distances without much accumulation of errors. If an optical communication system employs wavelength-division multiplexing with multiple signal wavelengths carrying information, at each regenerator site we would first need to demultiplex (separate) the various channels, use as many regenerators as the number of wavelengths, and after regenerating the channels would need to be multiplexed (combined) into a single output for further transmission. Such electronic regenerators would be very expensive solutions for WDM systems. [62]

2. Say whether the following statement

Optical pulses don't lose their power in time.

1) is true
2) there is no information in the text
3) is false

3. Say whether the following statement

Noise may accumulate in the pulses.

1) is true
2) there is no information in the text
3) is false

4. What is the main idea of the Text

a) The optical pulses must be converted into electrical signals.
b) Electrical regenerators are very expensive.
c) Fiber optic communication system is used to propagate over long distances.

5. Make up a short plan of the Text. Retell the Text according to your plan

CONCLUSION

Учебное пособие составлено в соответствии с государственным образовательным стандартом и отвечает требованиям программы по иностранным языкам для неязыковых вузов.

Пособие направлено на обучение работе с литературой по специальности, адекватному переводу технических текстов, а также на развитие навыков и умений устной и письменной речи. Разделы пособия апробированы в учебном процессе среди студентов 2 курса, обучающихся по специальности 11.03.02 Инфокоммуникационные технологии и системы связи Уфимского государственного авиационного технического университета. Положительные оценки пособия преподавателями и итоги контрольных срезов среди студентов позволяют сделать вывод о том, что лексический, грамматический и методический аппарат пособия способствует эффективному освоению учебного материала и создает условия для оптимизации процесса обучения. Автор надеется, что данное пособие будет интересным и полезным для студентов и поможет им достигнуть успеха в освоении данной дисциплины.

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