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PROFESSIONAL ORIENTED FOREIGN LANGUAGE

Methodological instructions for students of specialty
5B071900 – Radio Engineering, Electronics and Telecommunications
for improvement on students' reading skills of scientific and technical texts

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The present methodological guidelines are intended for students of specialty Radio Engineering, Electronics and Telecommunications.

Special attention is drawn to the translation of authentic professional texts, compilation of terminological vocabulary, as well as doing lexical, grammar exercises.

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Introduction

The present methodological guidelines are intended for students of specialty Radio Engineering, Electronics and Telecommunications. They might be used in class with a teacher as well as a self-study book. It is not necessary to read all the texts in order. If you know what aspects you have difficulty with, go straight to the texts that deal with them, using the Contents to help you find the relevant text. You can use the texts in a number of ways. You can just read the text and translate it with a vocabulary below. On the other hand, if the text is not difficult for you it is not necessary to search for the words in vocabulary but to do the exercises instead, for better understanding of the text. Students have a chance to get acquainted with the history of development of the telephone from its early simplest stage till the modern inventions of nowadays. They will follow all these periods step by step. Finding the names of great inventors and their contribution to science and modernization. All the main themes of this specialty are covered here with the information from up-to-date sources available.

Unit 1. Digitization

Exercise 1. Read and translate the text.

Digitization, less commonly digitalization, is the process of converting information into a digital (i.e. computer-readable) format, in which the information is organized into bits. The result is the representation of an object, image, sound, document or signal (usually an analog signal) by generating a series of numbers that describe a discrete set of its points or samples. The result is called digital representation or, more specifically, a digital image, for the object, and digital form, for the signal. In modern practice, the digitized data is in the form of binary numbers, which facilitate computer processing and other operations, but, strictly speaking, digitizing simply means the conversion of analog source material into a numerical format; the decimal or any other number system that can be used instead.

Digitization is of crucial importance to data processing, storage and transmission, because it "allows information of all kinds in all formats to be carried with the same efficiency and also intermingled". Unlike analog data, which typically suffers some loss of quality each time it is copied or transmitted, digital data can, in theory, be propagated indefinitely with absolutely no degradation. This is why it is a favored way of preserving information for many organizations around the world.

The term digitization is often used when diverse forms of information, such as an object, text, sound, image or voice, are converted into a single binary code. The core of the process is the compromise between the capturing device and the player device so that the rendered result represents the original source with the most possible fidelity, and the advantage of digitization is the speed and accuracy in which this form of information can be transmitted with no degradation compared with analog information.

Digitizing is the primary way of storing images in a form suitable for transmission and computer processing, whether scanned from two-dimensional analog originals or captured using an image sensor-equipped device such as a digital camera, tomographical instrument such as a CAT scanner, or acquiring precise dimensions from a real-world object, such as a car, using a 3D scanning device.

Unpublished text documents on paper, which have some enduring historical or research value are being digitized by libraries and archives, though frequently at a much slower rate than for books. In many cases, archives have replaced microfilming with digitization as a means of preserving and providing access to unique documents.

Nowadays, the growing pace of innovations in electronics drives to new solutions for energy and information transfer to enhance its speed, efficiency and reliability. For most devices, this solution is a transition from analog to digital.

Possibly the most prominent example of such conversion is the modern digital computer. But the wires in all digital systems still remain analog. Digital wire becomes indispensable for providing efficient, robust, adaptable, and cost effective energy supply. Presently, no one knows, however, how it is supposed to work or what technology would be able to create such a device.

Digitization can also be quite expensive. Institutions want the best image quality in digital copies so that when they are converted from one format to another over time only a high-quality copy is maintained. Smaller institutions may not be able to afford such equipment. Manpower at many facilities also limits how much material can be digitized. Archivists and librarians must have an idea of what their patrons wish to see most and try to prioritize and meet those needs digitally.

Vocabulary.

Bits – (in Computing) a unit of information expressed as either a 0 or 1 in binary notation (биттер – bitter – биты).

Decimal – relating to or denoting a system of numbers and arithmetic based on the number ten, tenth parts, and powers of ten; the system of decimal numerical notation (ондық – ondyq – десятичный).

Digitize – convert (pictures or sound) into a digital form that can be processed by a computer (сандық формада түрлендіру – sandyq formada tu'rlendiry' – преобразовывать в цифровой форме).

Digitization – цифрлау – cifrlay' – оцифровка.

Enhance – intensify, increase, or further improve the quality, value, or extent of (күшейту – ku'shei'ty'– усилить).

Propagate – (with reference to motion, light, sound, etc.) transmit or be transmitted in a particular direction or through a medium (тарату – taraty' – распространять).

Tomographical instrument – топографиялық құрал – topografiyalyq qural – томографический инструмент.

Exercise 2. Decide if the sentences are true (T) or false (F).

1. Digitization is less commonly known as digitalization. T/F.
2. Digitization is converting information into a digital format. T/F.
3. Diverse forms of information are converted into a single binary code. T/F.
4. It is the primary way of storing images for computer processing. T/F.

Exercise 3. Complete the sentences with the words: binary, bits, Digital data, Digitization, analog, microfilming.

1. Information is organized into _____.
2. The digitized data is in the form of _____ numbers.
3. _____ can, in theory, be propagated indefinitely with absolutely no degradation.
4. Nowadays we can observe the a transition from _____ to digital.
5. _____ can also be quite expensive.

6. Archives have replaced _____microfilming with digitization as a means of preserving and providing access to unique documents.

Exercise 4. Put the words in the right order.

1.into / organized/ Information is / bits.

2.in / The digitized data is / binary numbers. / the form / of

3. libraries and archives. / on paper / Unpublished text documents / by / are being digitized

4. Digitization / quite expensive. / can / also be

Exercise 5. Answer the questions.

1. What is digitization ?
2. How is it less commonly known?
3. What is the result of digitization?
4. What is the form of the digitized data in modern practice?
5. What are the advantages of digitization?
6. What documents are being digitized by libraries and archives?
7. Why a transition from analog to digital is actual nowadays?
8. What is the most prominent example of such conversion?
9. What can you say about the wires in all digital systems?
10. Digitization is rather expensive, isn't it?

Exercise 6. Translate the following sentences using the key words from the vocabulary above.

1. The number 345 contains three digits.
2. What is the formula for converting pounds into kilos?
3. This statue is a representation of Hercules.
4. I read an interesting bit of information in the newspaper.
5. Now the data is being transferred from magnetic tape to hard disc.

Unit 2. Mobile network

Exercise 1. Read and translate the text.

A cellular network or mobile network is a communication network where the last link is wireless. The network is distributed over land areas called cells, each served by at least one fixed-location transceiver, but more normally three cell sites or base transceiver stations. These base stations provide the cell with the network coverage, which can be used for transmission of voice, data, and other types of content. A cell typically uses a different set of frequencies from neighboring cells, to avoid interference and provide guaranteed service quality within each cell.

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, tablets and laptops equipped with mobile broadband modems, 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.

Major telecommunications providers have deployed voice and data cellular networks over most of the inhabited land area of Earth. This allows mobile phones and mobile computing devices to be connected to the public switched telephone network and public Internet. Private cellular networks can be used for research or for large organizations and fleets, such as dispatch for local public safety agencies or a taxicab company.

In the simple case of the taxi company, each radio had a manually operated channel selector knob to tune to different frequencies. As the drivers moved around, they would change from channel to channel. The drivers knew which frequency covered approximately what area. When they did not receive a signal from the transmitter, they would try other channels until they found one that worked. The taxi drivers would only speak one at a time, when invited by the base station operator. This is, in a sense, time-division multiple access (TDMA).

The first commercial cellular network, the 1G generation, was launched in Japan by Nippon Telegraph and Telephone (NTT) in 1979, initially in the metropolitan area of Tokyo. Within five years, the NTT network had been expanded to cover the whole population of Japan and became the first nationwide 1G network.

Practically every cellular system has some kind of broadcast mechanism. This can be used directly for distributing information to multiple mobiles. Commonly, for example in mobile telephony systems, the most important use of broadcast information is to set up channels for one-to-one communication between the mobile transceiver and the base station. This is called paging. The three different paging procedures generally adopted are sequential, parallel and selective paging.

In a cellular system, as the distributed mobile transceivers move from cell to cell during an ongoing continuous communication, switching from one cell frequency to a different cell frequency is done electronically without interruption and without a base station operator or manual switching. This is called the handover or handoff. Typically, a new channel is automatically selected for the mobile unit on the new base station, which will serve it. The mobile unit then automatically switches from the current channel to the new channel and communication continues.

The exact details of the mobile system's move from one base station to the other varies considerably from system to system.

The most common example of a cellular network is a mobile phone (cell phone) network. A mobile phone is a portable telephone which receives or makes calls through a cell site (base station), or transmitting tower. Radio waves are used to transfer signals to and from the cell phone.

Modern mobile phone networks use cells because radio frequencies are a limited, shared resource. Cell-sites and handsets change frequency under computer control and use low power transmitters so that the usually limited number of radio frequencies can be simultaneously used by many callers with less interference.

A cellular network is used by the mobile phone operator to achieve both coverage and capacity for their subscribers. Large geographic areas are split into smaller cells to avoid line-of-sight signal loss and to support a large number of active phones in that area. All of the cell sites are connected to telephone exchanges (or switches), which in turn connect to the public telephone network.

In cities, each cell site may have a range of up to approximately ½ mile (0.80 km), while in rural areas, the range could be as much as 5 miles (8.0 km). It is possible that in clear open areas, a user may receive signals from a cell site 25 miles (40 km) away.

As the phone user moves from one cell area to another cell while a call is in progress, the mobile station will search for a new channel to attach to in order not to drop the call. Once a new channel is found, the network will command the mobile unit to switch to the new channel and at the same time switch the call onto the new channel.

Vocabulary.

Data cellular networks – ұялы деректер желілері – uyaly derekter jelileri – сотовые сети данных.

Deployed voice – өрістетілетің дауыс – o'ristetiletin' day'ys – развертываемый голос.

Handover – an act or instance of handing something over (беру – bery' – передача).

Handset – the part of a telephone that is held up to speak into and listen to (телефон түтігі – telefon tu'tigi – телефонная трубка).

Paging – хабарландыру – habarlandyry' - оповещение

Portable – able to be easily carried or moved, especially because being of a lighter and smaller version than usual (портативті – portativti – портативный).

Subscriber – жазылушы – jazyly'shy – подписчик.

Transceiver – a device that can both transmit and receive communications, in particular a combined radio transmitter and receiver (қабылдап таратушы – qabyldap taraty'shy – приемопередатчик).

Time-division multiple access – уақытың болумен көп мәрте қатынасу – y'aqyttyn' boly'men ko'p ma'rte qatynasy' – множественный доступ с разделением по времени.

Exercise 2 Find the end of the sentence.

1. A mobile network is	a. time-division multiple access.
2. In a communication network	b. frequencies from neighboring cells.
3. The network is distributed over	c. land areas called cells.
4. A cell uses a different set of	d. the last link is wireless.
5. TDMA is	e. a communication network.

Exercise 3. Underline the correct words.

1. A cellular network/mobile network is a communication network.
2. In a communication network the last link is with wires/wireless.
3. The network is/isn't distributed over land areas called cells.
4. Network coverage is used only/not only for transmission of voice, data and other types of content.

Exercise 4. Answer the questions.

1. What is a communication network?
2. How is the network distributed?
3. What are base transceiver stations?
4. What are their functions?
5. What can you say about major telecommunications providers?
6. What is TDMA?
7. Where is it widely used?
8. What can you say about the first commercial cellular network?
9. What is the most common example of a cellular network?

Unit 3. Internet

Exercise 1. Read and translate the text.

The Internet (contraction of interconnected network) is the global system of interconnected computer networks. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

The origins of the Internet date back to research commissioned by the federal government of the United States in the 1960s to build robust, fault-tolerant communication with computer networks. The primary precursor network, the ARPANET, initially served as a backbone for interconnection of regional

academic and military networks in the 1980s. The funding of the National Science Foundation Network as a new backbone in the 1980s, as well as private funding for other commercial extensions, led to worldwide participation in the development of new networking technologies, and the merger of many networks. The linking of commercial networks and enterprises by the early 1990s marked the beginning of the transition to the modern Internet, and generated a sustained exponential growth as generations of institutional, personal, and mobile computers were connected to the network. Although the Internet was widely used by academia since the 1980s, commercialization incorporated its services and technologies into virtually every aspect of modern life.

Most traditional communications media, including telephony, radio, television, paper mail and newspapers are reshaped, redefined, or even bypassed by the Internet, giving birth to new services such as email, Internet telephony, Internet television, online music, digital newspapers, and video streaming websites. Newspaper, book, and other print publishing are adapting to website technology, or are reshaped into blogging, web feeds and online news aggregators. The Internet has enabled and accelerated new forms of personal interactions through instant messaging, Internet forums, and social networking. Online shopping has grown exponentially both for major retailers and small businesses and entrepreneurs, as it enables firms to extend their "brick and mortar" presence to serve a larger market or even sell goods and services entirely online. Business-to-business and financial services on the Internet affect supply chains across entire industries.

The Internet continues to grow, driven by ever greater amounts of online information and knowledge, commerce, entertainment and social networking.

Exercise 2. Answer the questions.

1. What is Internet?
2. What is WWW?
3. What are the origins of the Internet?
4. Name the most traditional communications.
5. What is the future of the Internet?

Unit 4. The Web

Exercise 1. Read and translate the text.

The Web is therefore a global set of documents, images and other resources, logically interrelated by hyperlinks and referenced with Uniform Resource Identifiers(URIs). URIs symbolically identify services, servers, and other databases, and the documents and resources that they can provide. Hypertext Transfer Protocol (HTTP) is the main access protocol of the World Wide Web. Web services also use HTTP to allow software systems to communicate in order to share and exchange business logic and data.

The Web has enabled individuals and organizations to publish ideas and information to a potentially large audience online at greatly reduced expense and time delay. Publishing a web page, a blog, or building a website involves little initial cost and many cost-free services are available. However, publishing and maintaining large, professional web sites with attractive, diverse and up-to-date information is still a difficult and expensive proposition. Many individuals and some companies and groups use web logs or blogs, which are largely used as easily updatable online diaries. Some commercial organizations encourage staff to communicate advice in their areas of specialization in the hope that visitors will be impressed by the expert knowledge and free information, and be attracted to the corporation as a result.

Advertising on popular web pages can be lucrative, and e-commerce, which is the sale of products and services directly via the Web, continues to grow. Online advertising is a form of marketing and advertising which uses the Internet to deliver promotional marketing messages to consumers. It includes email marketing, search engine marketing (SEM), social media marketing, many types of display advertising(including web banner advertising), and mobile advertising. In 2011, Internet advertising revenues in the United States surpassed those of cable television and nearly exceeded those of broadcast television. Many common online advertising practices are controversial and increasingly subject to regulation.

Email is an important communications service available on the Internet. The concept of sending electronic text messages between parties in a way analogous to mailing letters or memos predates the creation of the Internet. Pictures, documents, and other files are sent as email attachments. Emails can be cc-ed to multiple email addresses.

Exercise 2. Answer the questions.

1. What is the Web?
2. What is URIs?
3. What is HTTP?
4. What can we do using the Web?
5. Why is email an important communication service?

Unit 5. Internet telephony

Exercise 1. Read and translate the text.

Internet telephony is another common communications service made possible by the creation of the Internet. VoIP stands for Voice-over-Internet Protocol, referring to the protocol that underlies all Internet communication. The idea began in the early 1990s with walkie-talkie-like voice applications for personal computers. In recent years many VoIP systems have become as easy to use and as convenient as a normal telephone. The benefit is that, as the Internet carries the voice traffic,

VoIP can be free or cost much less than a traditional telephone call, especially over long distances and especially for those with always-on Internet connections such as cable or ADSL and mobile data. VoIP is maturing into a competitive alternative to traditional telephone service. Interoperability between different providers has improved and the ability to call or receive a call from a traditional telephone is available. Simple, inexpensive VoIP network adapters are available that eliminate the need for a personal computer.

Voice quality can still vary from call to call, but is often equal to and can even exceed that of traditional calls. Remaining problems for VoIP include emergency telephone number dialing and reliability. Currently, a few VoIP providers provide an emergency service, but it is not universally available. Older traditional phones with no "extra features" may be line-powered only and operate during a power failure; VoIP can never do so without a backup power source for the phone equipment and the Internet access devices. VoIP has also become increasingly popular for gaming applications, as a form of communication between players. Popular VoIP clients for gaming include Ventrilo and Teamspeak. Modern video game consoles also offer VoIP chat features.

Exercise 1. Answer the questions.

1. What is Internet telephony?
2. What is VoIP?
3. When did the idea of creating VoIP begin?
4. What is the benefit of using it?
5. What is necessary for reliability of VoIP service?

Unit 6. Data transfer

Exercise 1. Read and translate the text.

File sharing is an example of transferring large amounts of data across the Internet. A computer file can be emailed to customers, colleagues and friends as an attachment. It can be uploaded to a website or File Transfer Protocol (FTP) server for easy download by others. It can be put into a "shared location" or onto a file server for instant use by colleagues. The load of bulk downloads to many users can be eased by the use of "mirror" servers or peer-to-peer networks. In any of these cases, access to the file may be controlled by user authentication, the transit of the file over the Internet may be obscured by encryption, and money may change hands for access to the file. The price can be paid by the remote charging of funds from, for example, a credit card whose details are also passed – usually fully encrypted – across the Internet. The origin and authenticity of the file received may be checked by digital signatures or by MD5 or other message digests. These simple features of the Internet, over a worldwide basis, are changing the production, sale, and distribution of anything that can be reduced to a computer file for transmission. This

includes all manner of print publications, software products, news, music, film, video, photography, graphics and the other arts. This in turn has caused seismic shifts in each of the existing industries that previously controlled the production and distribution of these products.

The Internet allows greater flexibility in working hours and location, especially with the spread of unmetered high-speed connections. The Internet can be accessed almost anywhere by numerous means, including through mobile Internet devices. Mobile phones, datacards, handheld game consoles and cellular routers allow users to connect to the Internet wirelessly. Within the limitations imposed by small screens and other limited facilities of such pocket-sized devices, the services of the Internet, including email and the web, may be available. Service providers may restrict the services offered and mobile data charges may be significantly higher than other access methods.

The low cost and nearly instantaneous sharing of ideas, knowledge, and skills have made collaborative work dramatically easier, with the help of collaborative software. Not only can a group cheaply communicate and share ideas but the wide reach of the Internet allows such groups more easily to form. An example of this is the free software movement, which has produced, among other things, Linux, Mozilla Firefox, and OpenOffice.org (later forked into LibreOffice). Internet chat, whether using an IRC chat room, an instant messaging system, or a social networking website, allows colleagues to stay in touch in a very convenient way while working at their computers during the day. Messages can be exchanged even more quickly and conveniently than via email. These systems may allow files to be exchanged, drawings and images to be shared, or voice and video contact between team members.

The Internet allows computer users to remotely access other computers and information stores easily from any access point. Access may be with computer security, i.e. authentication and encryption technologies, depending on the requirements. This is encouraging new ways of working from home, collaboration and information sharing in many industries. An accountant sitting at home can audit the books of a company based in another country, on a server situated in a third country that is remotely maintained by IT specialists in a fourth. These accounts could have been created by home-working bookkeepers, in other remote locations, based on information emailed to them from offices all over the world. Some of these things were possible before the widespread use of the Internet, but the cost of private leased lines would have made many of them infeasible in practice. An office worker away from their desk, perhaps on the other side of the world on a business trip or a holiday, can access their emails, access their data using cloud computing, or open a remote desktop session into their office PC using a secure virtual private network (VPN) connection on the Internet. This can give the worker complete access to all of their normal files and data, including email and other applications, while away from the office. It has been referred to among system administrators as the Virtual Private Nightmare, because it extends the secure perimeter of a corporate network into remote locations and its employees' homes.

Many people use the World Wide Web to access news, weather and sports reports, to plan and book vacations and to pursue their personal interests. People use chat, messaging and email to make and stay in touch with friends worldwide, sometimes in the same way as some previously had pen pals. Social networking websites such as Facebook, Twitter, and Myspace have created new ways to socialize and interact. Users of these sites are able to add a wide variety of information to pages, to pursue common interests, and to connect with others. It is also possible to find existing acquaintances, to allow communication among existing groups of people. Sites like LinkedIn foster commercial and business connections. YouTube and Flickr specialize in users' videos and photographs. While social networking sites were initially for individuals only, today they are widely used by businesses and other organizations to promote their brands, to market to their customers.

Exercise 2. Answer the questions.

1. What can you say about file sharing?
2. What is FTP?
3. How can we connect to the Internet wirelessly?
4. What are the advantages of collaborative software?
5. What is VPN?
6. How do people use the World Wide Web?
7. What social networking websites do you know?

Unit 7. Fiber optic systems

Exercise 1. Read and translate the text.

Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of light through an optical fiber. The light forms an electromagnetic carrier wave that is modulated to carry information. Fiber is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference are required.

First developed in the 1970s, fiber-optics have revolutionized the telecommunications industry and have played a major role in the advent of the Information Age. Because of its advantages over electrical transmission, optical fibers have largely replaced copper wire communications in core networks in the developed world.

Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication and cable television signals. Due to much lower attenuation and interference, optical fiber has large advantages over existing copper wire in long-distance, high-demand applications. However, infrastructure development within cities was relatively difficult and time-consuming, and fiber-optic systems were complex and expensive to install and

operate. Due to these difficulties, fiber-optic communication systems have primarily been installed in long-distance applications, where they can be used to their full transmission capacity, offsetting the increased cost. The prices of fiber-optic communications have dropped considerably since 2000.

Modern fiber-optic communication systems generally include an optical transmitter to convert an electrical signal into an optical signal to send through the optical fiber, a cable containing bundles of multiple optical fibers that is routed through underground conduits and buildings, multiple kinds of amplifiers, and an optical receiver to recover the signal as an electrical signal. The information transmitted is typically digital information generated by computers, telephone systems and cable television companies.

Exercise 2. Answer the questions.

1. What is fiber-optic communication?
2. When was it first developed?
3. Does it have advantages over electrical transmission?
4. What happened as a result of that?
5. What are applications of optical fiber?
6. Why does it have large advantages over existing copper wire?
7. Were there any difficulties at the beginning?
8. What happened with prices since 2000?
9. Describe modern fiber-optic communication systems.
10. What can you say about the information transmitted?

Unit 8. Transmitters

Exercise 1. Read and translate the text.

The most commonly used optical transmitters are semiconductor devices such as light-emitting diodes (LEDs) and laser diodes. The difference between LEDs and laser diodes is that LEDs produce incoherent light, while laser diodes produce coherent light. For use in optical communications, semiconductor optical transmitters must be designed to be compact, efficient and reliable, while operating in an optimal wavelength range and directly modulated at high frequencies.

In its simplest form, an LED is a forward-biased p-n junction, emitting light through spontaneous emission, a phenomenon referred to as electroluminescence. The emitted light is incoherent with a relatively wide spectral width of 30–60 nm. LED light transmission is also inefficient, with only about 1% of input power, or about 100 microwatts, eventually converted into launched power which has been coupled into the optical fiber. However, due to their relatively simple design, LEDs are very useful for low-cost applications.

A semiconductor laser emits light through stimulated emission rather than spontaneous emission, which results in high output power (~100 mW) as well as

other benefits related to the nature of coherent light. The output of a laser is relatively directional, allowing high coupling efficiency (~50 %) into single-mode fiber. The narrow spectral width also allows for high bit rates since it reduces the effect of chromatic dispersion. Furthermore, semiconductor lasers can be modulated directly at high frequencies because of short recombination time.

Fiber optics have seen recent advances in technology. "Dual-polarization quadrature phase shift keying is a modulation format that effectively sends four times as much information as traditional optical transmissions of the same speed."

Optical fiber cables can be installed in buildings with the same equipment that is used to install copper and coaxial cables, with some modifications due to the small size and limited pull tension and bend radius of optical cables. Optical cables can typically be installed in duct systems in spans of 6000 meters or more depending on the duct's condition, layout of the duct system, and installation technique. Longer cables can be coiled at an intermediate point and pulled farther into the duct system as necessary.

Exercise 2. Answer the questions.

1. What are the most commonly used optical transmitters?
2. What is LED?
3. What is the difference between LEDs and laser diodes?
4. What quality should they have for use in optical communications?
5. What is LED in its simplest form?
6. Why are LEDs very useful for low-cost applications?
7. What can you say about semiconductor laser?
8. Name the advances in fiber optics.
9. Where can optical fiber cables be installed?

Unit 9. Antenna feed

Exercise 1. Read and translate the text.

In telecommunications and electronics, an antenna feed refers to several slightly different parts of an antenna system. The antenna feed is the wire or cabling (transmission line) that connects between the antenna and the radio, specifically called the feed line. The antenna feed is the location on the antenna where the feedline from the receiver or transmitter connects or attaches. The antenna feed is the matching system at the attachment point that converts the feedline impedance to the antenna’s intrinsic impedance, and makes any balanced-to-unbalanced conversion (if necessary).

In a transmitting antenna system the term can refer to any one or all of the components involved conveying the RF electrical current into the radiating part of the antenna, where the current is converted to radiation; in a receiving antenna, the term refers to the parts of the system that convert the electric currents already

collected from incoming radio waves into a specific voltage to current ratio (impedance) needed at the receiver.

Because of the several meanings, “antenna feed system” is used to specifically refer to all of the parts of the antenna feed between the radio and the radiator.

Simple antennas, such as monopole or whip antennas, dipole antennas, and large loop antennas are often directly connected to a feedline cable that matches the impedance of the antenna and the radio.

Compound antennas are made of multiple simple antennas, similar to the way that compound lenses are made of several simple lenses. Examples of compound antennas are array antennas, Yagi-Uda antennas, log periodic antennas, quad antennas, and small loop antennas (when fed by an even-smaller loop).

Often, one of the simple sub-antennas that are part of a compound antenna is a feeder antenna, also called the “driven element”: The driven element converts the RF electrical currents to free space radio waves, or vice versa. It radiates the signal into the space nearby the other elements of the compound antenna, which in turn absorb and re-radiate the signal (such as a parabolic dish). Those elements are called “passive” or “parasitic” elements and they re-radiate the radio waves they absorb in the form of a beam in the desired direction. The passive elements function as reflecting and directing structures in the same way that mirrors and focusing lenses function in compound lenses.

In more complex antenna systems the feed can be more complicated. The term “antenna feed system” usually refers to all of the components between the beam-shaping part of the antenna and the receiver's first amplifier.

For a transmitting antenna, the feed system consists of everything after the last power amplifier, and might include an antenna tuner unit near the amplifier. It almost certainly includes any impedance matching sections adjacent to, or incorporated into the structure of the antenna.

In a radar or satellite communications antenna the feed might consist of a feed horn, orthomode transducer, polarizer, frequency diplexer, waveguide, waveguide switches, rotary joint, etc.

Particularly with a transmitting antenna, the antenna feed is a critical component that must be adjusted to function compatibly with the antenna and transmitter.

Each type of transmission line and each type of antenna has specific characteristic impedance, which is the ratio of voltage to current that is the “favorite” of the antenna, or line, or radio. Typically the impedances of radios and feedlines are constant. Antenna impedances, however, swing by factors well over 1 000 : 1 , with changing frequency, as the antenna passes through an almost evenly-spaced sequence of resonances and “anti-”resonances at different frequencies.

The line impedance must be matched to the impedance of the antenna at one end and the transmitter at the other to efficiently transfer power between the transmitter and its antenna. If the impedances at either end of the line do not match, it will cause a condition called “standing waves" on the feed line, in which the RF

energy is reflected back toward the transmitter, wasting energy and possibly overheating the transmitter.

Vocabulary.

Antenna – (aerial) a rod, wire, or other structure by which signals are transmitted or received as part of a radio or television transmission or receiving system (antenna – антенна).

Antenna feed –антенна арнасы – antenna arnasy’ – антенный канал.

Dipole antennas – an aerial consisting of a horizontal metal rod with a connecting wire at its center (диполь антенналары – dipol antennalary’ – дипольные антенны).

Frequency diplexer – жиілік диплекторы – jiilik diplektory’ – частотный диплексер.

Impedance – the effective resistance of an electric circuit or component to alternating current, arising from the combined effects of ohmic resistance and reactance (толық кедергі – toly’q kedergi – полное сопротивление).

Large loop antennas – үлкен рамалық антенна – u’lken ramalyq antenna – большая рамочная антенна.

Monopole – a radio aerial or pylon consisting of a single pole or rod.

Orthomode transducer – ортомодалық түрлендіргіш – ortomodalyq tu’rlendirgish – ортомодовый преобразователь.

Polarizer – poliarizator – поляризатор.

Rotary joint – қайта біріктіру – qaita biriktiry’ – поворотное соединение.

Whip antennas – an aerial in the form of a long flexible wire or rod with a connection at one end (тесілген антенна – tesilgen antenna – штыревая антенна).

Waveguide – a metal tube or other device confining and conveying microwaves (толқыншы – tolqynshy – волновод).

Waveguide switches – толқын қосқышы – tolqyn qosqyshy – волноводные переключатели.

Exercise 2. Answer the questions.

1. What is the antenna feed?
2. What can you say about transmitting antenna system?
3. What are compound antennas made of?
4. Give examples of compound antennas.
5. How a feeder antenna is also called?
6. What are its functions?
7. When the feed can be more complicated?
8. What is special about transmitting antenna?
9. What type of antenna is in radar or satellite communications?
10. What can you say about specific characteristic impedance?

Exercise 3. Find the nouns among this list of words.

Electronics, antenna, wire, radio, receiver, transmitter, impedance, convert, compound, simple, similar, way, loop, current, beam, passing, function, mirror, power, amplifier, adjacent, voltage, frequency, energy.

Exercise 4. Decide if the following statements are true or false.

1. The antenna feed is the wire. T/F.
2. Simple antennas are monopole and whip antennas. T/F.
3. Compound antennas are made of multiple simple antennas. T/F.
4. Examples of compound antennas are array antennas. T/F.
5. The driven element converts the RF electrical currents. T/F.
6. The passive elements function as reflecting and directing structures. T/F.
7. Each type of antenna has specific characteristic impedance. T/F.
8. The antenna feed is the matching system at the attachment point. T/F.

Unit 10. GPSS

Exercise 1. Read and translate the text.

General Purpose Simulation System (GPSS) is a discrete time simulation general-purpose programming language, where a simulation clock advances in discrete steps. A system is modelled as transactions enter the system and are passed from one service (represented by blocks) to another. It is used primarily as a process flow oriented simulation language; this is particularly well-suited for problems such as a factory.

GPSS was developed by IBM's Geoffrey Gordon at the beginning of the 1960s. He named it Gordon's Programmable Simulation System. The name was changed when IBM decided to release it as a product.

The "General Program" part of the new name was to create a standard in waiting-line simulations.

GPSS resembles a LEGO structure where blocks are chosen by the modeler for specific functions to imitate a particular system.

The language is neither procedural, object-oriented or functional programming. The world is simulated with entities moving through the model. These entities, called Transactions, are envisioned as moving from Block to Block, where a Block is a line of code and represents unit actions that affects the Transaction itself or other entities. Blocks can be facility-oriented (such as machines in a job shop) or transaction-oriented (such parts of work-in-process, signals in electronic components or documents in a bureaucratic procedure). GPSS automatically keep track of statistics which brings in fixed form at the end of a simulation as standard report. GPSS is one of the oldest language candidate of first object-oriented approach because while transactions are truly instances of model objects, blocks are methods in the modern concept of OOP.

Exercise 2. Answer the questions.

1. What is GPSS?
2. How is it usually used?
3. Who developed GPSS?
4. When was it developed?
5. What does it resemble?
6. What are the functions of Blocks in the System?

Unit 11. Telephone

*Exercise 1.*Read and translate the text.

A telephone, or phone, is a telecommunications device that permits two or more users to conduct a conversation when they are too far apart to be heard directly. A telephone converts sound, typically and most efficiently the human voice, into electronic signals that are transmitted via cables and other communication channels to another telephone which reproduces the sound to the receiving user.

In 1876, Scottish emigrant Alexander Graham Bell was the first to be granted a United States patent for a device that produced clearly intelligible replication of the human voice. This instrument was further developed by many others. The telephone was the first device in history that enabled people to talk directly with each other across large distances. Telephones rapidly became indispensable to businesses, government and households and are today some of the most widely used small appliances.

The essential elements of a telephone are a microphone (transmitter) to speak into and an earphone (receiver) which reproduces the voice in a distant location. In addition, most telephones contain a ringer to announce an incoming telephone call, and a dial or keypad to enter a telephone number when initiating a call to another telephone. The receiver and transmitter are usually built into a handset which is held up to the ear and mouth during conversation. The dial may be located either on the handset or on a base unit to which the handset is connected. The transmitter converts the sound waves to electrical signals which are sent through a telephone network to the receiving telephone, which converts the signals into audible sound in the receiver or sometimes a loudspeaker. Telephones are duplex devices, meaning they permit transmission in both directions simultaneously.

The first telephones were directly connected to each other from one customer's office or residence to another customer's location. Being impractical beyond just a few customers, these systems were quickly replaced by manually operated centrally located switchboards. These exchanges were soon connected together, eventually forming an automated, worldwide public switched telephone network. For greater mobility, various radio systems were developed for transmission between mobile stations on ships and automobiles in the mid-20th century. Hand-held mobile phones were introduced for personal service starting in

1973. In later decades their analog cellular system evolved into digital networks with greater capability and lower cost.

Convergence has given most modern cell phones capabilities far beyond simple voice conversation. They may be able to record spoken messages, send and receive text messages, take and display photographs or video, play music or games, surf the Internet, do road navigation or immerse the user in virtual reality. Since 1999, the trend for mobile phones is smartphones that integrate all mobile communication and computing needs.

Exercise 1. Answer the questions.

1. What is a telephone?
2. How does it work?
3. When was it invented and who was its inventor?
4. What was its meaning in history?
5. What are its essential elements?
6. How were the first telephones connected?
7. What were the further developments in connection?
8. What capabilities have modern cell phones?
9. What can you say about smart phones?

Unit 12. Telephone (basic principles)

Exercise 1. Read and translate the text.

A traditional landline telephone system, also known as plain old telephone service (POTS), commonly carries both control and audio signals on the same twisted pair (C in diagram) of insulated wires, the telephone line. The control and signaling equipment consists of three components, the ringer, the hook switch, and a dial. The ringer, or beeper, light or other device (A7), alerts the user to incoming calls. The hook switch signals to the central office that the user has picked up the handset to either answer a call or initiate a call. A dial, if present, is used by the subscriber to transmit a telephone number to the central office when initiating a call. Until the 1960s dials used almost exclusively the rotary technology, which was replaced by dual-tone multi-frequency signaling (DTMF) with pushbutton telephones (A4).

A major expense of wire-line telephone service is the outside wire plant. Telephones transmit both the incoming and outgoing speech signals on a single pair of wires. A twisted pair line rejects electromagnetic interference (EMI) and crosstalk better than a single wire or an untwisted pair. The strong outgoing speech signal from the microphone (transmitter) does not overpower the weaker incoming speaker (receiver) signal with side tone because a hybrid coil (A3) and other components compensate the imbalance. The junction box (B) arrests lightning (B2) and adjusts the line's resistance (B1) to maximize the signal power for the line

length. Telephones have similar adjustments for inside line lengths (A8). The line voltages are negative compared to earth, to reduce galvanic corrosion. Negative voltage attracts positive metal ions toward the wires.

Exercise 1. Answer the questions.

1. What is POTS?
2. Explain its functions.
3. What components does it consist of?
4. What speech signals does the telephone transmit?
5. What is EMI?
6. Why imbalance is impossible?

Unit 13. Telephone (details of operation)

Exercise 1. Read and translate the text.

The landline telephone contains a switch hook (A4) and an alerting device, usually a ringer (A7), that remains connected to the phone line whenever the phone is "on hook" (i.e. the switch (A4) is open), and other components which are connected when the phone is "off hook". The off-hook components include a transmitter (microphone, A2), a receiver (speaker, A1), and other circuits for dialing, filtering (A3), and amplification.

A calling party wishing to speak to another party will pick up the telephone's handset, thereby operating a lever which closes the switch hook (A4), which powers the telephone by connecting the transmitter (microphone), receiver (speaker), and related audio components to the line. The off-hook circuitry has a low resistance (less than 300 ohms) which causes a direct current (DC), which comes down the line (C) from the telephone exchange. The exchange detects this current, attaches a digit receiver circuit to the line, and sends a dial tone to indicate readiness. On a modern push-button telephone, the caller then presses the number keys to send the telephone number of the called party. The keys control a tone generator circuit (not shown) that makes DTMF tones that the exchange receives. A rotary-dial telephone uses pulse dialing, sending electrical pulses, that the exchange can count to get the telephone number (as of 2010 many exchanges were still equipped to handle pulse dialing). If the called party's line is available, the exchange sends an intermittent ringing signal, (about 75 volts alternating current (AC) in North America and UK and 60 volts in Germany) to alert the called party to an incoming call. If the called party's line is in use, the exchange returns a busy signal to the calling party. However, if the called party's line is in use but has call waiting installed, the exchange sends an intermittent audible tone to the called party to indicate an incoming call.

The ringer of a telephone (A7) is connected to the line through a capacitor (A6), which blocks direct current but passes the alternating current of the ringing signal. The telephone draws no current when it is on hook, while a DC

voltage is continually applied to the line. Exchange circuitry (D2) can send an AC current down the line to activate the ringer and announce an incoming call. When there is no automatic exchange, telephones have hand-cranked magnetos to generate a ringing voltage back to the exchange or any other telephone on the same line. When a landline telephone is inactive (on hook), the circuitry at the telephone exchange detects the absence of direct current to indicate that the line is not in use. When a party initiates a call to this line, the exchange sends the ringing signal. When the called party picks up the handset, they actuate a double-circuit switch hook (not shown) which may simultaneously disconnects the alerting device and connects the audio circuitry to the line. This, in turn, draws direct current through the line, confirming that the called phone is now active. The exchange circuitry turns off the ring signal, and both telephones are now active and connected through the exchange. The parties may now converse as long as both phones remain off hook. When a party hangs up, placing the handset back on the cradle or hook, direct current ceases in that line, signaling the exchange to disconnect the call.

Calls to parties beyond the local exchange are carried over trunk lines which establish connections between exchanges. In modern telephone networks, fiber-optic cable and digital technology are often employed in such connections. Satellite technology may be used for communication over very long distances.

In most landline telephones, the transmitter and receiver (microphone and speaker) are located in the handset, although in a speakerphone these components may be located in the base or in a separate enclosure. Powered by the line, the microphone (A2) produces a modulated electric current which varies its frequency and amplitude in response to the sound waves arriving at its diaphragm. The resulting current is transmitted along the telephone line to the local exchange then on to the other phone (via the local exchange or via a larger network), where it passes through the coil of the receiver (A3). The varying current in the coil produces a corresponding movement of the receiver's diaphragm, reproducing the original sound waves present at the transmitter.

Along with the microphone and speaker, additional circuitry is incorporated to prevent the incoming speaker signal and the outgoing microphone signal from interfering with each other. This is accomplished through a hybrid coil (A3). The incoming audio signal passes through a resistor (A8) and the primary winding of the coil (A3) which passes it to the speaker (A1). Since the current path A8 – A3 has a far lower impedance than the microphone (A2), virtually all of the incoming signal passes through it and bypasses the microphone.

At the same time the DC voltage across the line causes a DC current which is split between the resistor-coil (A8-A3) branch and the microphone-coil (A2-A3) branch. The DC current through the resistor-coil branch has no effect on the incoming audio signal. But the DC current passing through the microphone is turned into AC current (in response to voice sounds) which then passes through only the upper branch of the coil's (A3) primary winding, which has far fewer turns than the lower primary winding. This causes a small portion of the microphone

output to be fed back to the speaker, while the rest of the AC current goes out through the phone line.

A lineman's handset is a telephone designed for testing the telephone network, and may be attached directly to aerial lines and other infrastructure components.

Exercise 2. Answer the questions.

1. What does a rotary-dial telephone use?
2. How can we use satellite technology?
3. What do the off-hook components include?
4. How a calling party can speak to another party?
5. What can you say about a lineman's handset?
6. Why is hybrid coil (A3) very important?

Unit 14. History of telephones

Exercise 1. Read and translate the text.

In the United Kingdom the blower is used as a slang term for a telephone. The slang came from the Royal Naval ships prior to telephones. Communication was direct, through a voice pipe. The pipe had a whistle inserted at each end. When a message was to be passed, the caller would remove the whistle at his end, place his mouth into the cavity, sealing it. He would then blow hard. The whistle at the other end would attract the man on watch. He would remove his whistle and call into the pipe. Conversations over, both whistles were replaced.

Before the development of the electric telephone, the term "telephone" was applied to other inventions, and not all early researchers of the electrical device called it "telephone". The Telephone was the invention of a captain John Taylor in 1844. This instrument used four air horns to communicate with vessels in foggy weather. Later, c. 1860, Johann Philipp Reis used the term in reference to his Reis telephone, his device appears to be the first such device based on conversion of sound into electrical impulses, the term telephone was adopted into the vocabulary of many languages. It is derived from the Greek: τῆλε, tēle, "far" and φωνή, phōnē, "voice", together meaning "distant voice".

Credit for the invention of the electric telephone is frequently disputed. As with other influential inventions such as radio, television, the light bulb, and the computer, several inventors pioneered experimental work on voice transmission over a wire and improved on each other's ideas. New controversies over the issue still arise from time to time. Charles Bourseul, Antonio Meucci, Johann Philipp Reis, Alexander Graham Bell, and Elisha Gray, amongst others, have all been credited with the invention of the telephone.

Alexander Graham Bell was the first to be awarded a patent for the electric telephone by the United States Patent and Trademark Office (USPTO) in March

1876. The Bell patents were forensically victorious and commercially decisive. That first patent by Bell was the master patent of the telephone, from which other patents for electric telephone devices and features flowed.

In 1876, shortly after the telephone was invented, Hungarian engineer Tivadar Puskás invented the telephone switch, which allowed for the formation of telephone exchanges, and eventually networks.

Exercise 9. Answer the questions.

1. What is a slang term for a telephone?
2. What is the origin of this word?
3. Was telephone always called this way?
4. What meaning does the term have in Greek?
5. Who was the first to be awarded a patent for the electric telephone?
6. When was he awarded?
7. Who invented the telephone switch?

Unit 15. Early telephones

Exercise 1. Read and translate the text.

Early telephones were technically diverse. Some used a water microphone, some had a metal diaphragm that induced current in an electromagnet wound around a permanent magnet, and some were dynamic – their diaphragm vibrated a coil of wire in the field of a permanent magnet or the coil vibrated the diaphragm. The sound-powered dynamic variants survived in small numbers through the 20th century in military and maritime applications, where its ability to create its own electrical power was crucial. Most, however, used the Edison/Berliner carbon transmitter, which was much louder than the other kinds, even though it required an induction coil which was an impedance matching transformer to make it compatible with the impedance of the line. The Edison patents kept the Bell monopoly viable into the 20th century, by which time the network was more important than the instrument.

Early telephones were locally powered, using either a dynamic transmitter or by the powering of a transmitter with a local battery. One of the jobs of outside plant personnel was to visit each telephone periodically to inspect the battery. During the 20th century, telephones powered from the telephone exchange over the same wires that carried the voice signals became common.

Early telephones used a single wire for the subscriber's line, with ground return used to complete the circuit (as used in telegraphs). The earliest dynamic telephones also had only one port opening for sound, with the user alternately listening and speaking (or rather, shouting) into the same hole. Sometimes the

instruments were operated in pairs at each end, making conversation more convenient but also more expensive.

Exercise 2. Answer the questions.

1. Were early telephones all the same?
2. How different were they?
3. What was the source of power for early telephones?
4. Who inspected the battery of early telephones?
5. What telephones became common during the 20th century?
6. How many wires did early telephones use?
7. What reminded that mechanism of work?

Unit 16. Further development of telephones

Exercise 1. Read and translate the text.

At first, the benefits of a telephone exchange were not exploited. Instead, telephones were leased in pairs to a subscriber, who had to arrange for a telegraph contractor to construct a line between them, for example between a home and a shop. Users who wanted the ability to speak to several different locations would need to obtain and set up three or four pairs of telephones. Western Union, already using telegraph exchanges, quickly extended the principle to its telephones in New York City and San Francisco, and Bell was not slow in appreciating the potential.

Signalling began in an appropriately primitive manner. The user alerted the other end, or the exchange operator, by whistling into the transmitter. Exchange operation soon resulted in telephones being equipped with a bell in a ringer box, first operated over a second wire, and later over the same wire, but with a condenser (capacitor) in series with the bell coil to allow the AC ringer signal through while still blocking DC (keeping the phone "on hook"). Telephones connected to the earliest Strowger switch automatic exchanges had seven wires, one for the knife switch, one for each telegraph key, one for the bell, one for the push-button and two for speaking. Large wall telephones in the early 20th century usually incorporated the bell, and separate bell boxes for desk phones dwindled away in the middle of the century.

Rural and other telephones that were not on a common battery exchange had a magneto hand-cranked generator to produce a high voltage alternating signal to ring the bells of other telephones on the line and to alert the operator. Some local farming communities that were not connected to the main networks set up barbed wire telephone lines that exploited the existing system of field fences to transmit the signal.

In the 1890s a new smaller style of telephone was introduced, packaged in three parts. The transmitter stood on a stand, known as a "candlestick" for its shape. When not in use, the receiver hung on a hook with a switch in it, known as a "switchhook". Previous telephones required the user to operate a separate switch to

connect either the voice or the bell. With the new kind, the user was less likely to leave the phone "off the hook". In phones connected to magneto exchanges, the bell, induction coil, battery and magneto were in a separate bell box or "ringer box". In phones connected to common battery exchanges, the ringer box was installed under a desk, or other out of the way place, since it did not need a battery or magneto.

Cradle designs were also used at this time, having a handle with the receiver and transmitter attached, now called a handset, separate from the cradle base that housed the magneto crank and other parts. They were larger than the "candlestick" and more popular.

Disadvantages of single wire operation such as crosstalk and hum from nearby AC power wires had already led to the use of twisted pairs and, for long distance telephones, four-wire circuits. Users at the beginning of the 20th century did not place long distance calls from their own telephones but made an appointment to use a special soundproofed long distance telephone booth furnished with the latest technology.

What turned out to be the most popular and longest lasting physical style of telephone was introduced in the early 20th century, including Bell's 202-type desk set. A carbon granule transmitter and electromagnetic receiver were united in a single molded plastic handle, which when not in use sat in a cradle in the base unit. The circuit diagram of the model 202 shows the direct connection of the transmitter to the line, while the receiver was induction coupled. In local battery configurations, when the local loop was too long to provide sufficient current from the exchange, the transmitter was powered by a local battery and inductively coupled, while the receiver was included in the local loop. The coupling transformer and the ringer were mounted in a separate enclosure, called the subscriber set. The dial switch in the base interrupted the line current by repeatedly but very briefly disconnecting the line 1 to 10 times for each digit, and the hook switch (in the center of the circuit diagram) disconnected the line and the transmitter battery while the handset was on the cradle.

In the 1930s, telephone sets were developed that combined the bell and induction coil with the desk set, obviating a separate ringer box. The rotary dial becoming commonplace in the 1930s in many areas enabled customer-dialed service, but some magneto systems remained even into the 1960s. After World War II, the telephone networks saw rapid expansion and more efficient telephone sets, such as the model 500 telephone in the United States, were developed that permitted larger local networks centered on central offices. A breakthrough new technology was the introduction of Touch-Tone signaling using push-button telephones by American Telephone & Telegraph Company (AT&T) in 1963.

Vocabulary.

Crosstalk – айқас – aiqas – перекрестные помехи.

Dial switch – коммутатор – kommutator – дисковый переключатель.

Dwindle away – азайып кету – azaiyp kety’ – истощаться.

Exploit – пайдалану – paidalany’ – эксплуатировать.

Hand-cranked – қолмен иіліп – qolmen iilip – ручной коленчатые.

Handset – телефон тұтқасы – telefon tutqasy – телефонная трубка.

Hum – хум – hy'm – гул.

Induction coil – индукциялық катушка – indy'kciialyq katushka – индукционная катушка.

Inductively coupled – индуктивті байланысқан – indy'ktivti bailanysqan – индуктивно-связанная.

Lease – жалдау – jalday' – аренда.

Subscriber – абонент – abonent – подписчик.

Subscriber set – абоненттік жинақ – abonenttik jinaq – абонентский набор.

Twisted pair – бұралған жұп – buralgan jup – витая пара.

Exercise 2. Answer the questions.

1. What does Western Union use?
2. Describe the first stage of signaling.
3. What can you say about rural telephones?
4. What can you say about transmitter 'candlestick'?
5. What was the most popular physical style of telephone?
6. What were the types of telephone developed in the 1930s?

Exercise 3. Decide if the following sentences are true or false.

1. Signaling began in an appropriately primitive manner. T/F.
2. In the 1890s a new smaller style of telephone was introduced. T/F.
3. The rotary dial became commonplace in the 1930s. T/F.
4. The most popular telephone was introduced in the early 20th century. T/F.
5. After World War II, the telephone networks saw rapid expansion. T/F.

Exercise 4 Translate the following sentences using the key vocabulary above.

1. We need to make sure that we exploit our resources as fully as possible.
2. The coal mine is no longer commercially exploitable.
3. She was telling me about her exploits while travelling around Africa.
4. Britain's exploitation of its natural gas reserves began after the war.
5. What is that strange humming sound?
6. The pub was really humming last nigh.
7. There's an annoying hum on this computer.

Unit 17. Digital telephones and voice IP

Exercise 1. Read and translate the text.

The invention of the transistor in 1947 dramatically changed the technology used in telephone systems and in the long-distance transmission networks. With the development of electronic switching systems in the 1960s, telephony gradually evolved towards digital telephony, which improved the capacity, quality, and cost of the network.

The development of digital data communications method, such as the protocols used for the Internet, it became possible to digitize voice and transmit it as real-time data across computer networks, giving rise to the field of Internet Protocol (IP) telephony, also known as voice over Internet Protocol (VoIP), a term that reflects the methodology memorably. VoIP has proven to be a disruptive technology that is rapidly replacing traditional telephone network infrastructure.

From a customer perspective, IP telephony uses a high-bandwidth Internet connection and specialized customer premises equipment to transmit telephone calls via the Internet, or any modern private data network. The customer equipment may be an analog telephone adapter (ATA) which interfaces a conventional analog telephone to the IP networking equipment, or it may be an IP Phone that has the networking and interface technology built into the desk-top set and provides the traditional, familiar parts of a telephone, the handset, the dial or keypad, and a ringer in a package that usually resembles a standard telephone set.

In addition, many computer software vendors and telephony operators provide softphone application software that emulates a telephone by use of an attached microphone and audio headset, or loud speaker.

Despite the new features and conveniences of IP telephones, some may have notable disadvantages compared to traditional telephones. Unless the IP telephone's components are backed up with an uninterruptible power supply or other emergency power source, the phone ceases to function during a power outage as can occur during an emergency or disaster when the phone is most needed. Traditional phones connected to the older PSTN network do not experience that problem since they are powered by the telephone company's battery supply, which will continue to function even if there is a prolonged power outage. Another problem in Internet-based services is the lack of a fixed physical location, impacting the provisioning of emergency services such as police, fire or ambulance, should someone call for them. Unless the registered user updates the IP phone's physical address location after moving to a new residence, emergency services can be, and have been, dispatched to the wrong location.

Power supplying companies can participate at the wholesale electricity market of Kazakhstan if they meet the following conditions: they have license for the right of electricity purchase to supply electricity; they have access to the national and (or) regional electric network; they meet the requirements on

supply/consumption of at least 1 MW of daily average (base) capacity from the wholesale electricity market and have commercial metering systems, telecommunication systems harmonized with the main systems installed by the system operator.

The power generating companies can have access to the national power grid if they meet the following conditions: they have contracts with the system operator for transmission of electricity via national power grid identifying electricity consumers and (or) for technical dispatch of the imported electricity (in case of electricity import or acquisition of such services) identifying electricity consumers; they have contracts with the system operator for balancing of electricity generation/consumption in the unified power system of Kazakhstan identifying electricity consumers and/or power generating companies; they have access to the regional electric networks in cases when power supply companies have entities connected to the regional electric network.

All electricity consumers with the connected capacity of less than 1 MW are the players of the retail electricity market as well as power supplying companies selling electricity to them on the competitive market.

Exercise 2. Answer the questions.

1. What invention changed the technology used in telephone systems?
2. Was that good that telephony gradually evolved towards digitization?
3. What is IP telephony?
4. What are the advantages of using it?
5. What is VoIP?
6. What can you say about the customer equipment?
7. What is soft phone application software?
8. What notable disadvantages do IP telephones have?
9. Are there power supplying companies in Kazakhstan?
10. Under what conditions can they participate at the electricity market?
11. Can power generating companies have access to the national power grid?
12. Under what conditions can this happen?
13. What must be the connected capacity for all electricity consumers?

Exercise 3. Decide if the following sentences are true or false.

1. The transistor was invented in 1947. T/F.
2. Telephony gradually evolved towards digital telephony. T/F.
3. VoIP is the voice over Internet Protocol. T/F.
4. VoIP replaced traditional telephone network infrastructure. T/F.
5. ATA is the analog telephone adapter. T/F.

Exercise 4. Translate the following sentences using the key vocabulary above.

1. We apologize for the interruption to our transmissions this afternoon.
2. Radio Seven transmits on 201 medium wave.

3. Massive investment is needed to modernize the telephone network.
4. We could reduce our costs by developing efficient distribution network.
5. We have about 20 personal computers networked to a powerful file-server.
6. He’s written a piece of software which calculates your tax returns for you.
7. Electrical power is supplied by underground cables.

List of literature

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