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ИНСТИТУТ МЕЖДУНАРОДНЫХ ОТНОШЕНИЙ, ИСТОРИИ И ВОСТОКОВЕДЕНИЯ
Кафедра иностранных языков для физико-математического направления и информационных технологий

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COMMUNICATION TECHNOLOGIES

Учебное пособие по английскому языку
для студентов Института Физики,
обучающихся по направлению «Радиофизика – 03.03.03»

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Пособие может быть использовано как для аудиторной работы, так и для самостоятельной работы студентов.

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Предисловие

Настоящее учебное пособие является продолжением к изданию «Radiophysics and Electronics» и предназначено для использования на занятиях со студентами 2 курса Института физики Казанского (Приволжского) федерального университета, обучающихся по направлению 03.03.03 «Радиофизика».

Целью настоящего пособия является развитие, углубление и расширение навыков экстенсивного чтения по специальности и умения использовать устную речь в процессе освоения лексико-грамматических тем при обучении английскому языку. Предложенный студентам материал актуален, так как, с одной стороны, способствует развитию навыков правильного произношения и перевода профессиональной лексики, с другой – дополняет сведения об основных достижениях современной радиоэлектроники. Задания к текстам имеют ярко выраженный коммуникативный характер, в связи с этим студенты имеют возможность овладеть необходимым уровнем коммуникативной компетенции в области профессиональной и научной деятельности, необходимой для ведения собственной научно-исследовательской деятельности и представления результатов научных изысканий мировому сообществу.

Наряду с образовательной и развивающими целями, настоящий курс ставит и воспитательную цель: повысить уровень общей культуры студентов, привить навыки самостоятельной работы, развить уровень самодисциплины. Задачей курса является подготовка студентов-бакалавров к использованию английского языка в будущей профессиональной деятельности. Учебное пособие разработано с учетом требований федерального государственного образовательного стандарта высшего профессионального образования второго поколения. Текстовый материал для данного пособия подбирался в соответствии с принципами достоверности, научности, систематичности и последовательности. Большинство текстов пособия взято из аутентичных

английских и американских научных источников. В отдельных случаях тексты подвергались адаптации и сокращению.

Пособие состоит из 14 разделов, каждый из которых содержит тематические тексты и практические задания, направленные на усвоение знаний о разных уровнях языка: фонетическом, лексическом, морфолого-синтаксическом. Каждый раздел содержит минимальный глоссарий, необходимый для адекватной интерпретации текста. Каждый блок заданий логически связан с текстом и отличаются вариативностью. Кроме основных текстов в пособие включены различные по сложности дополнительные тексты и разработаны задания к ним, такой подход к организации материала позволяет вести дифференцированную подготовку студентов в зависимости от уровня подготовки на начальном этапе обучения профессиональной терминологии. Приложение включает в себя словарь сокращений и условных обозначений и другую необходимую информацию.

Contents

UNIT 1

THE HISTORY OF COMMUNICATION SYSTEMS DEVELOPMENT

1. Practice reading the following words.

alphabet	[ˈælfəbɪt]	microphone	[ˈmaɪkrəfəʊn]
code	[kəʊd]	modulation	[mɔdjʊˈleɪʃn]
conductor	[kənˈdʌktə]	papyrus	[pəˈpaɪərəs]
communication	[kəmjuːnɪˈkeɪʃn]	radar	[ˈreɪdə]

2. Read the following words and try to remember them.

VOCABULARY

to transmit	[trænzˈmɪt]	передавать
wireless	[ˈwaɪəlɪs]	беспроводной
feasibility	[fiːzəˈbɪlɪtɪ]	целесообразность
intelligible	[ɪnˈtelɪʤəbl]	вразумительный
coil	[kɔɪl]	катушка
receiver	[rɪˈsiːvə]	приёмник
maritime	[ˈmærɪtaɪm]	морской
broadcasting	[ˈbrɔːdkɑːstɪŋ]	вещание, трансляция

3. What are the names of scientists who made a great contribution to the development of communication systems? Read the text to find out more information and answer the questions below.

THE HISTORY OF COMMUNICATION SYSTEMS DEVELOPMENT

A long time ago men found it necessary to communicate at a distance. When the alphabet was invented, they began to use papyrus, and something like the modern letter appeared. The first to send letters were the ancient Egyptians. A runner delivered them. But the best postal system of ancient times was organized by the Romans.

From then on until the eighteenth century there were practically no advances in the means of communication. Even when Queen Victoria began to rule England in 1837, her means of communication with distant parts of her empire were no faster than those of Julius Caesar.

The first practical electromagnetic telegraph was invented by the Russian scientist Pavel Shilling in 1828, an in 1832 he established telegraph communication of this type between the Winter Palace and the Ministry of Transport in St. Petersburg. Shilling's work was continued in Russia by B. Yakobi, who made several improvements in the electromagnetic telegraph and linked St. Petersburg with Tsarskoye Selo. This 25 kilometer-line was the longest in the world at that time. Yakobi invented the telegraph sending key, adopted by the American Samuel Morse. Morse, however, invented the telegraph code of dots and dashes, which is used all over the world to this day.

The first transatlantic telegraph cable from Europe to America was laid in 1858 due to the great British scientist Professor William Thomson. He also invented the mirror galvanometer, the very sensitive instrument used at first to receive signals transmitted over very long cables. Three letters could be transmitted per minute over the first transatlantic cable. The present speed of operation of telegraph cables reaches 2,500 letters per minute.

The telephone is a much younger invention than the telegraph. The French mechanic Charles Boursel first suggested the idea of transmitting speech electrically. The first telephone that found application was invented by the

American Graham Bell in 1876. Russian inventors made several important improvements in the telephone. In 1879 the Russian engineer Mikhalsky made a microphone with powdered carbon, a prototype of the present-day microphone. Next year another Russian inventor, Golubitsky made a far sensitive receiver than the receiver of Bell. In 1880 a Russian military communications expert G. Ignatyev invented a device that made it possible to use the same wire simultaneously for a telephone conversation and for telegraph communication. Today the method of frequency modulation makes it possible to transmit several hundred telephone conversations over the same wire simultaneously.

The telegraph and the telephone were both hailed as the "final" solution to the communications problem. But they were soon followed by an even more wonderful invention, which made possible communication without wires. Numerous scientists from different countries contributed to the appearance of wireless communication. Heinrich Hertz, constructed a primitive radio system capable of transmitting and receiving space waves through free space. In 1893, Nikola Tesla, in America, first demonstrated the feasibility of wireless communications. He proved that intelligible messages could be transmitted without wires and established a system which was composed of a transmitting coil (or conductor) and a receiving coil. At last, in 1895, the Russian scientist A.S. Popov demonstrated his first radio receiver. In March 1897 G. Marconi, an Italian inventor, transmitted wireless telegraphy signals over a distance of two miles and later he established the first transatlantic radio communication between Canada and England. For this achievement, he was awarded the Nobel Prize.

Early uses of communication were maritime for sending telegraphic messages using Morse code between ships and land. Radio was used to pass on orders and communications between armies and navies in World War I. Broadcasting became possible in the 1920s with the introduction of radio receivers in Europe and the U.S.A. Another use of radio was the development of detecting and locating aircraft and ships by the use of radar.

Today radio takes many forms, including wireless networks and mobile

communications of all types, as well as radio broadcasting.

1. What were the first letters like?
2. Who delivered them?
3. What was the length of the first distant telegraph?
4. What is Samuel Morse famous for?
5. How old is the telephone communication?
6. How does the method of frequency modulation facilitate the telephone communication?
7. Who were the founders of wireless communication?
8. What are the forms of radio communication nowadays?

4. Match the words similar in meaning.

1. Distant	a) connect
2. Establish	b) far
3. Link	c) at the same time
4. Application	d) found
5. Simultaneously	e) use

5. Match the words opposite in meaning.

1. Ancient	a) complicated
2. Sensitive	b) destroy
3. Construct	c) modern
4. Primitive	d) rare
5. Numerous	e) rough

6. Translate the following word combinations into Russian.

1. Communication system;
2. Practical electromagnetic telegraph;
3. The Ministry of Transport;

4. Transatlantic telegraph cable;
5. Theoretical basis;
6. A primitive radio system;
7. Radio signals;
8. Transatlantic radio communication;
9. he Nobel Prize;
10. Morse code.

7. Find English equivalents to the following word combinations in the text.

1. Нечто подобное;
2. Средства связи;
3. Телеграфный ключ;
4. Точки и тире;
5. Зеркальный гальванометр;
6. Порошковый углерод;
7. Гораздо более чувствительный приёмник;
8. Метод частотной модуляции;
9. Беспроводная связь;
10. Передающая / принимающая катушка.

8. Mark the following sentences True or False.

1. Romans were the first to organize the delivering of letters.
2. Queen Victoria was ruling England in the 18^{th} century.
3. The first electromagnetic telegraph appeared in Russia.
4. There are two symbols in Morse code.
5. Nowadays people can transmit 2 500 words per minute using telegraph cables.
6. The first wireless communication was realized between the USA and England.

9. Complete the gaps with the correct word.

1. It is known that W. Thomson invented the …. .

a) induction coil; b) tuning circuit; c) sending key; d) mirror galvanometer.

2. The method of … modulation gives the possibility to transmit a lot of telephone conversations over the same wire simultaneously.

a) accuracy; b) currency; c) frequency; d) reliability.

3. The first postal system with papyrus letters was organized by the ….

a) Romans; b) British; c) Egyptians; d) Russian.

4. It was … who invented transmitting and receiving coils and described the possibility of wireless communication.

a) G. Marconi; b) A. Popov; c) H. Hertz; d) N. Tesla.

5. The aim of any form of … is to provide complete understanding of a message.

a) communication; b) computation; c) calculation; d) completion.

10. Match the following terms with their definitions.

1. Modulation	a) the number of vibrations per second.
2. Frequency	b) anything gathered into a series of rings or a spiral.
3. A coil	c) a device that converts incoming electric signals into audible or visual signals.
4. A switch	d) a device that generates radio waves, modulate their amplitude or frequency and transmit them by means of antenna.
5. A receiver	e) a device used to open or close an electric circuit.
6. A transmitter	f) a variation in the amplitude, frequency or phase of a wave in accordance with some signal.

11. Divide the text "The history of communication systems development" into logical parts and give subtitles to each part. Retell the text.

12. Read the text about Alexander Popov and answer the questions.

1. What happened on May 7, 1895?
2. What was the name of the first apparatus for radio communication?
3. What does the word "radio" mean in Latin?
4. When did Popov die?
5. How is the Popov's invention used nowadays?

ALEXANDER POPOV

(1859-1906)

Alexander Popov is one of the greatest Russian scientists. He was born in 1859 in a small town. He liked to learn very much. In 1882 he graduated from the university in St. Petersburg. First he worked as a physics teacher, then he was the director of the Electrotechnical Institute. A. Popov was the honourable member of the Russian Technical Society.

Radio was invented in Russia according to the Popov's work. It was he who built the world's first receiver in 1895. There were no transmitters then. That's why his receiver could only pick up signals produced by lightning discharges during a thunderstorm. A. Popov demonstrated a device called a storm-indicator at a meeting of scientists in St. Petersburg on May 7, 1895. This day is marked now as a Radio day.

Soon A. Popov found a way of transmitting Morse code signals. In 1896 he sent the world's first wireless telegram over a distance of 250 meters, and four years later the range of transmission was increased to 50 kilometers. Since then, the method of transmission and reception has been constantly improved. Nowadays radio communication has no limits.

The very first apparatus for radio communication was called wireless telegraph or wireless telephone. Later a shorter word radio (from Latin "radius" – the ray)

was taken. The word is used because electromagnetic or radio waves travel from a radio station along radii, just as rays of light at the speed of 300000 km/sec. Radio is a special kind of long-distance electrical communications. It makes possible to send different signals such as dots and dashes of the Morse code (radio-telegraphy), speech and music (radio telephony), images of objects and films (television). Radio helps us to maintain contact with ships, with spacecraft, etc.

Daily radio programs include lectures, reports, and concerts. Radio is a powerful means of spreading knowledge.

Pick up – принимать, storm-indicator - "грозоотметчик",

radii = radius – радиус.

13. Write the translation of the text.

THE MAGNITUDE OF INVENTION

The electric telegraph was the beginning of the whole vast tele-communications industry, the forerunner of the telephone, radio, television, communications satellites - in fact, a direct ancestor of everything now united under the convenient heading of "electronics".

As early as 1747 electrical impulses had been transmitted along a wire laid across Westminster Bridge, and detected at the other end by the crude but effective method of having someone hold on to the wire. Strangely enough, the man who put most effort into developing the telegraph was a successful American painter and sculptor, Samuel Morse. On April 1, 1845, the world's first telegraph line between Balti-more and Washington has been opened for public use, and after that the telegraph spread rapidly across Europe and America.

Joining the continents proved a much more difficult job, but in 1856 the Atlantic Telegraph Company was organized to attempt the most demanding technical feat of the age and, in 1859, the Atlantic cable was completed. Wheatstone had coined the word telephone in 1821,

when he was only 19. Many others contributed ideas, but it was the energy and persistence of Alexander Graham Bell which made the telephone a practical instrument. Bell first realized how a telephone could be made to work in June 1875. After that progress was very rapid. The first permanent telephone line was opened in April 1876 in Boston.

Had coined the word – создал (придумал) слово, forerunner – предвестник, ancestor – предок, crude – грубый.

UNIT 2

ELECTROMAGNETIC WAVES BASICS

1. Practice reading the following words.

frequency	[ˈfri:kwənsɪ]	measure	[ˈmeʒə]
inseparable	[ɪnˈsepərəbl]	obvious	[ˈɔbvɪəs]
interference	[ˌɪntəˈfɪərəns]	ultra-violet	[ˌʌltrə'vaɪələt]

2. Read the following words and try to remember them.

VOCABULARY

axis	[ˈæksɪs]	ось
beyond	[bɪˈjɔnd]	за пределами
distort	[dɪsˈtɔ:t]	искажать
plane	[pleɪn]	плоскость
spread	[spred]	распространяться
velocity	[vɪˈlɔsɪtɪ]	скорость
voltage	['vəultɪʤ]	электрическое напряжение
wiring	[ˈwaɪərɪŋ]	(электрическая) проводка

3. Read the text and answer the questions below.

1. What is the nature of radio signals?
2. What are the constituent elements of electromagnetic waves?
3. What does the electric field result from?
4. What was Hertz famous for?
5. What properties of the electromagnetic wave are mentioned in the text?

ELECTROMAGNETIC WAVES BASICS

Radio signals are a form of electromagnetic wave, and as they are the way in which radio signals travel. Electromagnetic waves are the same type of radiation as light, ultra-violet and infra-red rays, differing from them in their wavelength and

frequency. Electromagnetic waves have both electric and magnetic components that are inseparable. The planes of these fields are at right angles to one another and to the direction of motion of the wave.

The electric field results from the voltage changes occurring in the RF antenna which is radiating the signal, and the magnetic changes result from the current flow. It is also found that the lines of force in the electric field run along the same axis as the RF antenna, but spreading out as they move away from it. This electric field is measured in terms of the change of potential over a given distance, e.g. volts per meter, and this is known as the field strength. Similarly when an RF antenna receives a signal the magnetic changes cause a current flow, and the electric field changes cause the voltage changes on the antenna.

There are a number of properties of a wave. The first is its wavelength. This is the distance between a point on one wave to the identical point on the next. One of the most obvious points to choose is the peak as this can be easily identified although any point is acceptable.

The second property of the electromagnetic wave is its frequency. This is the number of times a particular point on the wave moves up and down in a given time (normally a second). The unit of frequency is the Hertz and it is equal to one cycle per second. This unit is named after the German scientist who discovered radio waves. The frequencies used in radio are usually very high. Accordingly the prefixes kilo, Mega, and Giga are often seen. 1 kHz is 1000 Hz, 1 MHz is a million Hertz, and 1 GHz is a thousand million Hertz i.e. 1000 MHz. Originally the unit of frequency was not given a name and cycles per second (c/s) were used. Some older books may show these units together with their prefixes: kc/s; Mc/s etc. for higher frequencies.

4. Match the words similar in meaning.

1. Differ	a) mutate
2. Change	b) select
3. Spread	c) same

4. Choose	d) stand out
5. Identical	e) possible
6. Acceptable	f) propagate

5. Match the words opposite in meaning.

1. Travel	a) repellent
2. Easy	b) stay
3. Magnetic	c) approach
4. Move away	d) transmit
5. Receive	e) difficult

6. Translate the following word combinations into Russian.

1. Differing from them;
2. The planes of these fields;
3. Move away from it;
4. Be known as;
5. The voltage changes on the antenna;
6. One cycle per second;
7. Measured in terms.

7. Find English equivalents to the following word combinations in the text.

1. Электрические и магнитные компоненты;
2. Электрическое поле образуется в результате;
3. Силовые линии;
4. Магнитные изменения вызывают изменение тока;
5. Расстояние между точкой … и такой же точкой;
6. Одной из наиболее очевидных точек;
7. Движется вверх и вниз;
8. Единица измерения частоты;

9. Для более высоких частот.

8. Complete the sentences using the text.

1. This is the number of times a particular point on the wave …
2. Electromagnetic waves have both electric and magnetic …
3. It is also found that the lines of force in the electric field run along the same axis as the RF antenna, but spreading …
4. The frequencies used in radio …
5. This is the distance between a point on one wave to …
6. There are a number of …
7. Originally the unit of frequency was not given a name and …
8. The planes of these fields are at right angles to one another and …

9. Mark the following sentences True or False.

1. When an RF antenna receives a signal the electric changes cause a current flow, and the magnetic field changes cause the voltage changes on the antenna.
2. Signals propagate in electromagnetic waves.
3. The properties of the electromagnetic wave are the wavelength and frequency.
4. Electrical and magnetic components can exist separately.
5. Some older books show units of frequency without prefixes.

10. Reorder the words to make a sentence.

1. electric, in, change, measured, of, This, over, distance, of, the, field, is, terms, potential, a, given.

2. the, and, prefixes, seen, kilo, and, Giga, are, Accordingly, often, Mega.

3. form, wave, signals, of, electromagnetic, are, a, Radio.

4. of, most, to, One, choose, obvious, peak, is, the, the, points.

5. scientist, is, after, unit, German, This, discovered, the, radio, who, waves, named.

11. Insert prepositions and translate the sentences.

1. This is the distance … a point … one wave … the identical point … the next.
2. The electric field results … the voltage changes occurring … the RF antenna which is radiating the signal, and the magnetic changes result … the current flow.
3. Electromagnetic waves are the same type … radiation as light, ultra-violet and infra-red rays, differing … them … their wavelength and frequency.
4. This is the number … times a particular point … the wave moves up and down … a given time
5. The planes … these fields are … right angles … one another and … the direction … motion … the wave.

12. Divide the text "Electromagnetic waves basics" into logical parts and give subtitles to each part. Retell the text.

***13. Read and translate the text* "Communicating through the Earth".**

COMMUNICATING THROUGH THE EARTH

How do we communicate with people beyond the horizon? What can be made to follow the curve of earth's surface? Of course, we can send electrical signals through wires around any curves. In the nineteenth century, copper wires were strung across the continents and ocean floors and the world was united through telegraphy. That takes a lot of copper, though, and a lot of maintenance. We could send light-wave signals and do away with wires, but light waves move in a straight line and won't curve around the earth's bulge. We would have to set up relay stations or place mirrors in orbit to make that work.

Radio waves, like light waves but a million times longer, do better. They travel in straight lines, too, but the upper atmosphere contains regions rich in charged particles (the ionosphere) that tend to reflect the radio waves. It is as though there were natural mirrors in the sky. That makes it possible to send radio signals long distances. However, the ionosphere is affected by the solar wind. When the sun produces flares, an electrical storm can take place that will disrupt

radio communications. But short radio waves (microwaves) can go right through the ionosphere and be amplified and sent on by communications satellites. As communications satellites improve, signals will be sent from place to place on earth with so little trouble that it would seem unreasonable to ask for anything better.

String - связывать, натягивать, were strung – опоясывали, curve – кривая, bulge – выпуклость, flare – вспышка, disrupt – разрывать, разрушать.

UNIT 3

QUARTZ CRYSTALS

1. Practice reading the following words.

application	[ˌæplɪˊkeɪʃ(ə)n]	microprocessor	[ˌmaɪkrə(ʊ)ˊprəʊsesə]
convert	[ˊkɒnvɜ:t]	ordinary	[ˊɔ:d(ə)nrɪ]
exhibit	[ɪgˊzɪbɪt]	resonator	[ˊrezəneɪtə]
frequency	[ˊfri:kwənsɪ]	voltage	[ˊvəʊltɪdʒ]

2. Read the following words and try to remember them.

VOCABULARY

oscillator	[ˊɒsɪleɪtə]	осциллятор
performance	[pəˊfɔ:məns]	функционирование, эксплуатационные показатели
Q factor	[kju:] [ˊfæktə]	добротность
shear	[ʃɪə]	срез, сдвиг
to tune	[tju:n]	настраивать
tuned circuit	[tju:ndˊsɜ:kɪt]	настроенная цепь

3. Read the text “Quartz crystals” and answer the questions below.

1. What are the applications of quartz crystals?
2. Why are they also used as resonators?
3. How are the most of quartz crystals manufactured nowadays?
4. What is the value of Q for quartz crystals?
5. What are the advantages of quartz crystals?

QUARTZ CRYSTALS

Quartz crystals are widely used in today's electronics circuits as high quality tuned circuits or resonators. Despite their high performance quartz crystals are cheap to produce and they find many uses in applications from oscillator clock circuits in microprocessor boards, the timing element in digital watches as well as their more traditional applications in radio frequency applications where they may be used as the resonators in highly stable quartz crystal oscillators of high performance crystal filters.

As the name implies quartz crystal resonators are made from quartz, a naturally occurring form of silicon, although most of that used for electronics applications is manufactured synthetically these days. The components rely on the remarkable properties of quartz for their operation. When placed into an electronic circuit a crystal acts as a tuned circuit. However it has an exceptionally high Q. Ordinary tuned circuits may exhibit values of a few hundred if carefully designed and constructed, but quartz crystals exhibit values of up to 100 000. Apart from their Q, crystals also have a number of other advantages. Their stability is remarkably good with respect to temperature and time. In fact most crystals will have these figures specified and they might typically be ±5 ppm (parts per million) per year for the ageing and ±30 ppm over a temperature range of 0 to 60 degrees Celsius.

A quartz crystal resonator depends on the piezo-electric effect to work. This effect converts a mechanical stress in a crystal to a voltage and vice versa. In this way the piezo-electric effect converts the electrical impulses to mechanical stress which is subject to the very high Q mechanical resonances of the crystal, and this is in turn linked back into the electrical circuit.

4. Match the words similar in meaning.

1. Wide	a) supplement
2. Produce	b) lean

3. Application	c) manipulation
4. Rely	d) broad
5. Operation	e) significance
6. Value	f) manufacture

5. Match the words opposite in meaning.

1. High	a) analog
2. Cheap	b) unrelated
3. Digital	c) low
4. Linked	d) natural
5. Synthetic	e) expensive

6. Translate the following word combinations into Russian.

1. Quartz crystals;
2. Today's electronics circuits;
3. Microprocessor boards;
4. Digital watches;
5. Traditional applications;
6. Crystal filters;
7. Piezo-electric effect;
8. Mechanical stress in a crystal;
9. Vice versa;
10. Electrical impulse.

7. Find English equivalents to the following word combinations in the text.

1. Широко используются;
2. Дешевы в изготовлении;
3. С тактового генератора;
4. В качестве резонаторов;

5. Изготавливаются из кварца;
6. Полагаться на замечательные свойства;
7. Преобразует электрические импульсы.

8. Complete the sentences with one word in each gap.

1. Quartz crystals are widely used in today's _____ circuits as high quality tuned circuits or resonators
2. As the name implies quartz crystal _____ are made from quartz, a naturally occurring form of silicon, although most of that used for electronics applications is manufactured synthetically these days
3. When placed into an electronic circuit a _____ acts as a tuned circuit.
4. Apart from their Q, crystals also have a _____ of other advantages.
5. A quartz crystal resonator depends on the _____-_____ effect to work.

9. Mark the following sentences True or False.

1. Quartz crystals are rarely used in modern electronics circuits.
2. Quartz crystals are cheap to produce.
3. Quartz crystal resonators are made from quartz.
4. Nowadays only quartz mined in nature are used.
5. Crystals have few advantages.
6. Piezo-electric effect converts the electrical impulses into mechanical stress.

10. Insert prepositions and translate the sentences.

1. Quartz crystals are widely used … today's electronics circuits as high quality tuned circuits or resonators.
2. Despite their high performance quartz crystals are cheap … produce and they find many uses … applications … oscillator clock circuits …

microprocessor boards, the timing element … digital watches as well as their more traditional applications … radio frequency applications where they may be used as the resonators … highly stable quartz crystal oscillators … high performance crystal filters.

3. As the name implies quartz crystal resonators are made … quartz, a naturally occurring form … silicon, although most … that used … electronics applications is manufactured synthetically these days.
4. Apart … their Q, crystals also have a number … other advantages.
5. A quartz crystal resonator depends … the piezo-electric effect … work.

11. Give the summary of the text "Quartz crystals".

12. Render the text "The investigation of scientists in the field of radioelectronics".

THE INVESTIGATION OF SCIENTISTS IN THE FIELD OF RADIOELECTRONICS

The path to Popov's great discovery was marked by the investigations of many scientists in different countries. Popov's scientific accomplishment was the culmination of the efforts of several generations of scientists, whose works make up the early history of radio which began with the investigations of Faraday.

Faraday's discovery of electromagnetic rotation and electromagnetic induction laid the foundation of present–day electrical engineering.

His natural -scientific conceptions created a revolution in the understanding of electrical phenomena, and are extremely important because they directed all attention to the medium surrounding the electrified body. Faraday's theory of magnetic and electric lines of force proved to be exceedingly fruitful and served as a starting point for J.C. Maxwell to deduce mathematically (and Hertz to detect experimentally) - the existence of free electric waves.

Later it was found that as early as 1832 Faraday himself was close to what triumphed in science more than half a century later.

Faraday's scientific views were developed by his successor Maxwell, who worked in many fields of physics, mechanics, and even astronomy. However, his chief works are investigations in electromagnetism and in the kinetic theory of gases. Continuing Faraday's work, Maxwell subjected his ideas to mathematical treatment and arrived at far-reaching conclusions when he advanced the electromagnetic theory of light, one of the greatest achievements of science of the 19^{th} century. Maxwell considered light to be an electromagnetic phenomenon; he predicted mathematically that electric waves ought to propagate at a velocity equal to the ratio of electromagnetic and electrostatic units, as we know, this value coincide with the velocity of light (approximately 300.000km per second).

Propagate – распространяться, medium - среда,
successor – последователь, coincide – совпадать.

UNIT 4

GLOBAL POSITIONING SYSTEM (GPS)

1. Practice reading the following words.

transmit	[trænz´mıt]	satellite	[´sæt(ı)laıt]
atomic	[ə´tɒmık]	design	[dı'zaın]
calculate	['kælkjuleıt]	view	[vju:]
control	[kən'trəul]	service	['sɜ:vıs]

2. Read the following words and try to remember them.

VOCABULARY

to charge	[ʧɑ:ʤ]	заряжать
circuitry	[´sɜ:kıtrı]	диаграмма, схема
to drift	[drıft]	смещаться, отклоняться
to ensure	[ın´ʃʊə]	гарантировать, обеспечивать
error	['erə]	ошибка
essentially	[ı´senʃ(ə)lı]	по существу
failure	[´feıljə]	повреждение, отказ
finite	['faınaıt]	конечный
fix	[fıks]	местоположение
global positioning system	[´gləʊb(ə)l pə´zıʃ(ə)nıŋ ´sıstım]	глобальная (спутниковая) система определения местоположения
to measure	['meʒə]	измерять
to obtain	[əb'teın]	получать
to provide	[prə'vaıd]	давать; обеспечивать
receiver	[rı´si:və]	радиоприемное устройство, ресивер

to recover	[rɪ´kʌvə]	восстанавливать
to require	[rɪ´kwaɪə]	требовать, нуждаться
simplification	[ˌsɪmplɪfɪ´keɪʃ(ə)n]	упрощение
spare	[speə]	запасной, резервный
surface	['sɜːfɪs]	поверхность
triangulation	[ˌtraɪængjʊ´leɪʃ(ə)n]	триангуляция (процесс разделения двумерной плоскости на треугольники)

3. Read the text and answer the following questions.

1. How does GPS operate?
2. How is the receiver able to calculate the distance?
3. What type of clock do satellites contain?
4. What is the power source for satellites?

GLOBAL POSITIONING SYSTEM (GPS).

GPS operates by being able to measure the distances from the satellites that are in orbit around the Earth. By knowing the distance from a number of satellites, it is possible to calculate the position on the Earth's surface and the height above it by a process of triangulation. This is a great simplification, but this is essentially how it works.

The satellites all send timing information so the receiver knows when the message was sent. As radio signals travel at the speed of light they take a very short but finite time to travel the distance from the satellite to the receiver. The satellites also transmit information about their positions. In this way the receiver is able to calculate the distance from the satellite to the receiver. To obtain a full fix, four satellites are required, and when the receiver is in the clear, more than four satellites are in view all the time.

GPS satellites. The satellites are orbiting above the Earth. Their orbits are tightly controlled because errors in their orbit will translate to errors in the final

positions. The time signals are also tightly controlled. The satellites contain an atomic clock so that the time signals they transmit are very accurate. Even so these clocks will drift slightly and to overcome this, signals from Earth stations are used to correct this.

The GPS satellites themselves have a design life of ten years, but to ensure that there are no holes in service in the case of unexpected failures, spares are held in orbit and these can be brought into service at short notice.

The satellites provide their own power through their solar panels. These extend to about 17 feet, and provide the 700 watts needed to power the satellite and its batteries when it is in sunlight. Naturally, the satellite needs to remain operation when it is on the dark side of the Earth when the solar panels do not provide any power. This means that when in sunlight the solar panels need to provide additional power to charge batteries, beyond just powering the basic satellite circuitry.

4. Match the words similar in meaning.

1. To measure	a) to send
2. To receive	b) densely
3. To obtain	c) to calculate
4. Tightly	d) right
5. To transmit	e) to accept
6. correct	f) to get

5. Translate the following word combinations into Russian.

1. Timing information
2. Tightly controlled
3. To contain an atomic clock
4. To provide additional power
5. The basic satellite circuitry

6. Unexpected failures
7. to transmit information about their positions

6. Find English equivalents to the following word combinations in the text.

1. Рассчитать положение;
2. По существу;
3. Конечное время;
4. Временные сигналы жестко контролируются;
5. Эти часы будут слегка отклоняться;
6. Оставаться в эксплуатации;
7. Дополнительная мощность;

7. Complete the sentences using the text.

1. This is a great simplification, but…
2. The satellites also transmit…
3. Their orbits are tightly…
4. The satellites contain an atomic clock…
5. The GPS satellites themselves have a design life…
6. This means that when in sunlight the solar panels…

8. Reorder the words to make a sentence.

1. The satellites/ timing information/ when the message / was sent/ all send /so the receiver knows/ was sent.
2. The satellites / information/ also/ their positions /about / about/ transmit.
3. Their orbits are/ because errors in their orbit / in the final positions/tightly controlled/ will translate to errors/.
4. The satellites contain/ so/ very accurate/ an atomic clock/ that the time signals/ are/ they transmit.
5. The satellites/ solar panels /through their /provide/ their own power/.

9. ***Insert prepositions and translate the sentences.***

1. … knowing the distance … a number … satellites, it is possible to calculate the position … the Earth's surface and the height … it … a process of triangulation.
2. … this way the receiver is able to calculate the distance … the satellite to the receiver.
3. The satellites are orbiting … the Earth.
4. Naturally the satellite needs to remain operation when it is … the dark side … the Earth when the solar panels do not provide any power.
5. To obtain a full fix, four satellites are required, and when the receiver is … the clear, more than four satellites are … view all the time.

10. Match the sentence halves.

1. By knowing the distance from a number of satellites, it is possible to calculate the position…	a) a very short but finite time to travel the distance from the satellite to the receiver.
2. As radio signals travel at the speed of light they take …	b) to provide additional power to charge batteries, beyond just powering the basic satellite circuitry.
3. The time signals…	c) on the Earth's surface and the height above it by a process of triangulation.
4. Even so these clocks will drift slightly and…	d) through their solar panels
5. The satellites provide their own power …	e) are also tightly controlled.
6. This means that when in sunlight the solar panels need…	f) to overcome this, signals from Earth stations are used to correct this.

11. Divide the text "Global Positioning System" into logical parts and give subtitles to each part. Retell the text.

12. Render the text "Iridium satellite system''.

IRIDIUM SATTELITE SYSTEM

The Iridium satellite system consists of a constellation of 66 satellites which are arranged in six planes. There are eleven satellites in each orbit which is a near circular orbit inclined, each one being inclined at 86.4°. These orbits provide full global coverage, including the polar areas which are not covered by satellites in geostationary orbits.

The Iridium satellite system uses a frequency band in L band 1616 - 1626.5 MHz for communication with the users. The phone systems communicate directly with the satellite which then routes the data accordingly. The data may then be routed to other satellites or to the ground.

The data may be routed directly to the ground network from the satellite. In addition to the direct links to the ground, each Iridium satellite is linked to four other satellites in the constellation. It links to two other satellites in the same orbit and it also links to two other satellites in adjacent orbits. These links provide a network in space which allows data to be routed between satellites without having to return to the ground from each satellite. Messages may even be routed across several satellites before reaching the ground. This provides a number of advantages:

It provides a robust network that can still operate even if a ground station becomes non-operational. It enables a network to be run with stations placed in available regions - a particular advantage as it is not possible to set up stations in all areas for geographic reasons (polar, oceanic, etc.) or for political reasons. It allows the network to be run with fewer ground stations - this allows costs to be reduced as manned ground stations can be expensive.

In order to support many users, it is necessary for the Iridium satellite system to operate a scheme where the different users can be managed so that they may

gain access to the satellite system without interfering with each other. Iridium satellite technology uses both FDMA (frequency division multiple access - where users are allocated different frequencies) and TDMA (time division multiple access - where users are allocated different time slots in a transmission).

Constellation – созвездие, adjacent orbits – смежные орбиты,

robust network – надёжная сеть.

13. Choose five new words or phrases from the text. Check their meaning and pronunciation, and try to learn them.

UNIT 5

SOURCES OF ITERFERENCE

1. Practice reading the following words.

cellular	[ˈseljʊlə]	satellite	[ˈsætəlaɪt]
length	[ˈleŋθ]	transponder	[tranˈspɒndə]

2. Read the following words and try to remember them.

VOCABULARY

artificial	[ɑːtɪˈfɪʃəl]	искусственный
broadcaster	[ˈbrɔːdkɑːstə]_	вещательная станция
cellular	[ˈseljʊlə]_	сотовый
to enforce	[ɪnˈfɔːs]	принуждать
extraneous	[ɪkˈstreɪnɪəs]	посторонний
frequency	[ˈfriːkwənsɪ]	частота
horizon	[həˈraɪzn]	горизонт
interference	[ɪntəˈfɪərəns]	интерференция
to originate	[əˈrɪdʒɪneɪt]	возникать
restriction	[rɪˈstrɪkʃən]_	ограничение
transmitter	[tranzˈmɪtə]	передатчик
valley	[ˈvælɪ]	долина
wavelength	[ˈweɪvleŋθ]_	длина волны

3. Read the text and answer the questions below.

1. What is radio frequency ‘noise’?
2. What are the two types of interference sources?
3. What is an example of natural sources of interference?
4. Why are the radio telescopes mostly situated in valleys?
5. What telescopes are built on mountain tops?

SOURCES OF INTERFERENCE

Radio frequency “noise” complicates the task of the radio astronomer, at times making it difficult to distinguish emissions from an object under study from extraneous emissions produced by other nearby sources. Interference comes from both natural and artificial sources, the latter ones becoming a bigger problem every day. By international agreement (the World Administrative Radio Conference), certain frequencies have been allocated strictly for radio astronomy. However, there is disagreement about how far beyond the restricted limits is acceptable “spillover” (for example, radio broadcasters may think 10 mm over their wavelength limit is acceptable, while radio astronomers may think .001 mm is too much). In some countries, the restrictions are not enforced, so may as well not exist. Natural sources of interference include:

- Radio emissions from the Sun;
- Lightning;
- Emissions from charged particles (ions) in the upper atmosphere.

Among the growing list of human-made sources of interference are:

- Power-generating and transforming facilities;
- Airborne radar;
- Ground-based radio and television transmitters (which are getting more powerful all the time);
- Earth-orbiting satellite transmitters and transponders, including Global Positioning Satellites (GPS);

- Cellular phones.

Human-generated interference that originates on the ground (such as radio and television transmissions) travels along the ground and over the horizon. It used to be that such interference tended to be weak at ground level, increasing in strength with height above ground. For this reason, most radio telescopes have been situated in valleys or other low places, unlike optical telescopes which are often built on mountain tops. (The exceptions are radio telescopes built for studying sub-millimeter wavelengths,). However, more and more, interference at ground level is becoming a problem even for low-lying radio telescopes.

4. Translate the following word combinations into Russian.

1. Radio frequency;
2. Difficult to distinguish;
3. To distinguish emissions;
4. Srictly allocated;
5. Certain frequencies;
6. Human made;
7. Optical telescope.

5. Find English equivalents to the following word combinations in the text.

1. Бортовой радар;
2. Основной уровень;
3. Сотовый телефон;
4. Радиоизлучение;
5. Всемирная радио-конференция.

6. Match the following terms with their definitions.

1. Spillover	a) the distance between one peak of a wave to the next corresponding peak, or between any two adjacent corresponding points, defined as the speed of a wave divided by its frequency.
2. Radio interference	b) an astronomical telescope designed to collect and record light from cosmic sources.
3. GPS	c) any undesired signal that tends to interfere with the reception of radio waves.
4. Optical telescope	d) the act or process of propagation.
5. Wavelength	e) an electronic system that uses satellites to determine the position of a vehicle, person, etc.

7. Insert the necessary word in the gap.

1. Earth-… satellite.

2. Global … Satellites.

3. The … Administrative Radio Conference.

4. … emissions from the Sun.

5. … radio and television transmitters (which are getting more powerful all the time).

8. Complete the sentences using the text.

1. Natural sources of interference include…

2. Certain frequencies have been allocated for…

3. There are emissions from charged particles …

4. Human-generated interference originates …

5. Most radio telescopes have been situated in …

9. Mark the following sentences True or False.

1. Interference at ground is becoming less.

2. Cellular phones are one of the reason of interference on ground.

3. ‘Noise’ complicates the task of radio astronomer.

4. The restrictions on acceptable ‘spillover’ are enforced everywhere.

5. Interference comes from both natural and artificial sources.

10. Retell the text “Sources of Interference”. Try to use the words and word combinations from exercises 2 and 4.

11. Read and translate the following text. Use a dictionary to help you.

NEUTRINOS TRAVEL

What can go through the earth itself? Light certainly cannot. Radio waves cannot. We cannot even string wires through the earth to carry electrical signals. One thing that does travel through the body of the earth is an earthquake wave, but it takes a very hard blow to set the earth to vibrating perceptibly.

On the other hand, certain massless subatomic particles called neutrinos travel at the speed of light and go through matter as though it were not there. A beam of neutrinos could travel through trillions of miles of solid lead and come out the other end just about unaffected. Neutrinos reach us from every direction and almost every neutrino that does so passes right through the earth in less than a 20th of a second (and through us if we are in their paths).

This does not mean that neutrinos cannot be detected. Out of many trillions, one neutrino may occasionally combine with an atomic nucleus and induce a detectable change.

Scientists can produce neutrino beams without much trouble. Some day it might be possible to send them out in Morse code or in more complicated modulation. The day may come when improved neutrino telescopes, using water rather than cleaning fluid, will be placed all over the earth. Eventually television sets might be built that would incorporate the equivalent of neutrino telescopes and convert the signals directly into sight and sound. If this

could be done, communications satellites would be unnecessary and so would relay stations of any sort. Any two points on earth's surface (or in mines, or under the sea) would be connected by a mathematically straight line along which neutrinos would move at the speed of light. There is no way of communicating more quickly.

But it takes a very hard blow to set the earth to vibrating perceptibly — но для того, чтобы привести землю в состояние сильной вибрации, необходим очень сильный удар, *massless* – невесомый, *relay station* – ретрансляционная станция, *disrupt* - разрушать, разрывать, срывать.

UNIT 6

RADIO TELESCOPE

1. Practice reading the following words.

atmosphere	[ˈætməsfɪə]	parabola	[pəˈræbələ]
radiation	[ˌreɪdiˈeɪʃən]	sophisticated	[səˈfɪstɪkeɪtɪd]
reflection	[rɪˈflekʃən]	simultaneously	[ˌsɪməlˈteɪniəslɪ]

2. Read the following words and try to remember them.

VOCABULARY

conductor	[kənˈdʌk.tə]	проводник
induce	[ɪn'dju:s]	1) вызывать; 2) *эл.* индуцировать
invisible Universe	[ɪnˈvɪzɪbl̩ ˈju:nɪvɜ:s]	невидимая Вселенная
to penetrate	[ˈpenɪtreɪt]	проникать (внутрь)
to range from … to …	[reɪndʒ]	колебаться от ... до ... находиться в пределах от ... до ...
visible range	**[**ˈvɪzəbl reɪndʒ**]**	видимый диапазон

3. Read the text and answer the questions below.

1. What part of the sky can be investigated through radio telescope antennas?
2. What is the shape of a radio telescope antenna?
3. How can we know which frequencies are present in the RF radiations?
4. What is radio interferometry?
5. Why do NASA have four stations to support orbiting satellites?

RADIO TELESCOPE

RF waves that can penetrate Earth’s atmosphere range from wavelengths of a few millimeters to nearly 100 meters. Although these wavelengths have no

discernable effect on the human eye or photographic plates, they do induce a very weak electric current in a conductor such as an antenna. Most radio telescope antennas are parabolic (dish-shaped) reflectors that can be pointed toward any part of the sky. They gather up the radiation and reflect it to a central focus, where the radiation is concentrated. The weak current at the focus can then be amplified by a radio receiver so it is strong enough to measure and record.

Overview: Discovering an Invisible Universe JPL D-13835 6 Electronic filters in the receiver can be tuned to amplify one range (or "band") of frequencies at a time. Or, using sophisticated data processing techniques, thousands of separate narrow frequency bands can be detected. Thus, we can find out what frequencies are present in the RF radiation and what their relative strengths are. As we will see later, the frequencies and their relative powers and polarization give us many clues about the RF sources we are studying. The intensity (or strength) of RF energy reaching Earth is small compared with the radiation received in the visible range. Thus, a radio telescope must have a large "collecting area," or antenna, in order to be useful. Using two or more radio telescopes together (called arraying) and combining the signals they simultaneously receive from the same source allows astronomers to discern more detail and thus more accurately pinpoint the source of the radiation. This ability depends on a technique called radio interferometry. When signals from two or more telescopes are properly combined, the telescopes can effectively act as small pieces of a single huge telescope. A large array of telescopes designed specifically to operate as an array is the Very Large Array (VLA) near Socorro, New Mexico. Other radio observatories in geographically distant locations are designed as Very Long Baseline Interferometric (VLBI) stations and are arrayed in varying configurations to create very long baseline arrays (VLBA). NASA now has four VLBI tracking stations to support orbiting satellites that will extend the interferometry baselines beyond the diameter of Earth.

4. Match the words similar in meaning.

1. Penetrate	a) different
2. Discernable	b) steam
3. Current	c) immense
4. Frequency	d) observable
5. Source	e) fountain
6. Huge	f) transfix
7. Varying	g) periodicity

5. Match the words opposite in meaning.

1. Discernable	a) insulator
2. Huge	b) outcome
3. Varying	c) small
4. Conductor	d) exit
5. Penetrate	e) similar
6. Source	f) implicit

6. Translate the following word combinations into Russian.

1. To have no discernable effect on
2. To give many clues about
3. To discern more detail
4. In order to be useful
5. To gather up

7. Reorder the words to make a sentence.

1. They, radiation, up, the, radiation, and, it, to, a central focus gather, reflect.
2. This, interferometry, depends on, ability, radio, a technique, called.

3. RF, a few, waves, can, nearly, penetrate, atmosphere, range, from, wavelengths, of, millimeters, to, 100, meters, Earth's.
4. Most, antennas, parabolic, are, reflectors, radio, telescope.
5. NASA, VLBI, tracking, now, four, to, support, has, satellites, orbiting, stations.

8. Match the following terms with their definitions.

1.Wavelength	a) is a number of cycles per unit time.
2.Radiation	b) is an optical instrument that aids in the observation of remote objects by collecting electromagnetic radiation.
3.Frequency	c) is the spatial period of the wave - the distance over which the wave's shape repeats, and the inverse of the spatial frequency.
4.Polarization	d) is a property of waves that can oscillate with more than one orientation.
5.Telescope	e) is the emission or transmission of energy in the form of waves or particles through space or through a material medium.

9. Insert prepositions and translate the sentences.

1. RF waves that can penetrate Earth's atmosphere range … wavelengths of a few millimeters … nearly 100 meters.
2. They gather … the radiation and reflect it … a central focus, where the radiation is concentrated.
3. This ability depends … a technique called radio interferometry.
4. When signals … two or more telescopes are properly combined, telescopes can effectively act … small pieces … a single huge telescope.
5. The weak current … the focus can then be amplified … a radio receiver … it is strong enough ... measure and record.

10. Insert the necessary word in the gap:

Discernable, observatories, frequency, interferometry, current, reflectors

1. Thousands of separate narrow _____ bands can be detected.
2. Most radio telescope antennas are parabolic _____ that can be pointed toward any part of the sky.
3. These wavelengths have no _____ effect on the human eye.
4. Other radio _____ in geographically distant locations are designed as Very Long Baseline Interferometric stations.
5. The weak _____ at the focus can then be amplified by a radio receiver.
6. This ability depends on a technique called radio_____.

11. Divide the text into logical parts and give subtitles to each part

12. Give the summary of the text.

13. Translate the following text in writing. Use a dictionary to help you.

Radio astronomy was born on the heels of World War II, using the recently developed radio technology to look at radio emissions from the sky. The first radio telescopes were very simple, using an array of wires as the antenna. In the 1950s, the now familiar collecting dish was introduced and has been widely used ever since.

Radio waves are not susceptible to atmospheric disturbances like optical waves are, and so the development of radio telescopes over the past 40 years has seen a continued improvement in both the detection of faint sources as well as in resolution. Despite the fact that radio waves can have wavelengths which are meters long, the resolution achieved has been to the sub-arc second level through the use of many radio telescopes working together in an interferometer array, the largest of which stretches from Hawaii to the United States Virgin Islands (known as the Very Long Baseline Array).

http://www.encyclopedia.com/science-and-technology/astronomy-and-space-exploration/astronomy-general/telescope

UNIT 7

POLARIZATION OF ELECTROMAGNETIC WAVES

1. Practice reading the following words.

although	[ɔːl'ðəu]	elliptically	[ɪ'lɪptɪkəlɪ]
generate	['ʤen(ə)reɪt]	circular	['sɜːkjələ]
vertical	['vɜːtɪk(ə)l]	determine	[dɪ'tɜːmɪn]
vibrate	[vaɪ'breɪt]	ionosphere	[aɪ'ɔnəsfɪə]
visualize	['vɪʒuəlaɪz]	polarization	[ˌpəuləraɪ'zeɪʃ(ə)n]

2. Read the following words and try to remember them.

VOCABULARY

convention	[kənˈvenʃn]	1) соглашение 2) условные обозначения
corkscrew	[ˈkɔːkskruː]	штопор
fading	[feɪdɪŋ]	затухание
helix	[ˈhiːlɪks]	спираль
linear polarization	[ˈlɪniə pəʊləraɪˈzeɪʃn]	линейная поляризация
marginal	[ˈmɑːdʒɪnəl]	крайний, предельный
performance	[pəˈfɔːməns]	функционирование
plane	[pleɪn]	плоскость
to propagate	[ˈprɒpəgeɪt]	распространять
to rotate	[rəʊˈteɪt]	вращать
terrestrial	[təˈrestriəl]	земной
tip	[tɪp]	конец; верхушка
to trace	[treɪs]	чертить
to vibrate	[vaɪˈbreɪt]	колебаться; вибрировать

3. Read the text and answer the following questions.

1. What kinds of polarization do you know?
2. For what purpose is the plane of the electric field used?
3. What category do vertical and horizontal polarization fall into?
4. What kind of polarization is the most commonly used?
5. How is circular polarization visualized?
6. In what case is it possible to obtain elliptical polarization?
7. What can the polarization change?
8. Why is the choice of polarization of electromagnetic waves so important?
9. What forms of polarization are mentioned in the text?

POLARIZATION OF ELECTROMAGNETIC WAVES

The polarization of electromagnetic waves often has a significant effect on the way in which radio wave propagate. While it is important to match the polarization of the transmitting and receiving antennas, the choice of polarization is also important for the signal propagation.

The polarization of an electromagnetic wave indicates the plane in which it is vibrating. As electromagnetic waves consist of an electric and a magnetic field vibrating at right angles to each other it is necessary to adopt a convention to determine the polarization of the signal. For this purpose the plane of the electric field is used.

Vertical and horizontal polarizations are the most straightforward forms and they fall into a category known as linear polarization. Here the wave can be thought of as vibrating in one plane, i.e. up and down, or side to side. This form of polarization is the most commonly used, and the most straightforward.

However this is not the only form as it is possible to generate waveforms that have circular polarization. Circular polarization can be visualized by imagining a signal propagating from an antenna that is rotating. The tip of the electric field vector can be seen to trace out a helix or corkscrew as it travels away from the antenna. Circular polarization can be either right or left handed dependent upon the direction of rotation as seen from the transmitting antenna.

It is also possible to obtain elliptical polarization. This occurs when there is a combination of both linear and circular polarization. Again this can be visualised by imagining the tip of the electric field tracing out an elliptically shaped corkscrew.

For many terrestrial applications it is found that once a signal has been transmitted then its polarization will remain broadly the same. However reflections from objects in the path can change the polarization. As the received signal is the sum of the direct signal plus a number of reflected signals the overall polarization of the signal can change slightly although it usually remains broadly the same. When reflections take place from the ionosphere, then greater changes may occur.

4. Match the words similar in meaning.

1. Generate	a) to define
2. Circular	b) revolving
3. Remain	c) orbicular
4. Determine	d) to stay
5. Rotating	e) to produce

5. Match the words opposite in meaning.

1. Necessary	a) undesirable
2. Visualized	b) symmetric
3. Elliptical	c) unseen
4. Asymmetric	d) unimportant
5. Significant	e) circular

6. Find English equivalents to the following word combinations in the text.

1. Передающая и приемная антенна;
2. Распространение сигнала;
3. Электромагнитная волна;

4. Вертикальные и горизонтальные поляризации;
5. Линейная поляризация;
6. Генерировать форму волны;
7. Кончик вектора электрического поля;
8. Эллиптическая поляризация;
9. Комбинация линейной и круговой поляризаций;
10. Число отраженных сигналов

7. Mark the following sentences True or False.

1. Vertical and horizontal polarizations are the most straightforward forms.
2. Elliptical polarization can be visualized by imagining a signal propagating from an antenna that is rotating.
3. The polarization of an electromagnetic wave indicates the plane in which it is vibrating.
4. The tip of the magnetic field vector can be seen to trace out a helix or corkscrew as it travels away from the station.
5. Circular polarization can be either south or north handed dependent upon the direction of rotation as seen from the transmitting antenna.

8. Reorder the words to make a sentence.

1. is used/ For this purpose/ of the electric / the plane/ field.
2. It is also/ polarization/ to obtain/ elliptical/ possible.
3. The polarization/ vibrating/ of an electromagnetic/ the plane/ indicates/ in which/ it is/ wave.
4. The tip of the electric/ corkscrew/ to trace out/ from the antenna/ can be seen/ as it travels away/ shaped/ a helix or/ field vector.
5. This form of/ straightforward/ is the most/ polarization/ used and the/ commonly/ most.

9. Divide the text into logical parts and give the title to each part. Retell the text using the titles.

10. Read the following text and answer the questions.

RADIO BROADCASTING ANTENNAS

There are many kinds of broadcasting antennas: single latticework metal towers, double or triple towers spaced apart from each other, or two high masts holding up a wire antenna between them. It is hard to realize that a radio-transmitting antenna, standing silent and motionless in the field beside the transmitter house, is sending many kilowatts of electrical energy out into space. Exactly how it happens can be explained completely only by higher mathematics. However, a simple description of what occurs is possible. The transmitter which is connected to the antenna causes a heavy current to surge back and forth from one end of the tower to the other at the transmitting frequency. The surging current varies in strength according to the output from the modulator.

The magnetic effects resulting from the current in the antenna cannot move through space rapidly enough to keep up with such rapid oscillations. Simultaneously the same thing occurs with respect to the electric effects from the rapid pilling-up of electric charge first at one end, then at the other end of the antenna. These two effects, the magnetic and the electric, combine and supplement each other produce the radio wave that can travel tremendous distances.

From the transmitting antenna the radio waves carrying the program move out in all directions at the speed of light. They travel fast enough to circle the globe at the Equator seven times in one second. They fill the air, they go through houses, and they can even turn corners and drop down into valleys on the far sides of hills. However, they cannot go very far beneath the surface of the ground or penetrate into the sea.

Latticework tower - решетчатая башня,
Mast – мачта,
to surge back and forth – колебаться,
pilling-up – «отшнуровывание»,
to keep up with – не отставать,

with respect to – что касается,

supplement – дополнение.

1. What kinds of broadcasting antennas are there?
2. How does a radio-transmitting antenna operate?
3. What do the magnetic and electric effects produce?
4. What is the rate of radio waves?
5. What places can radio waves penetrate into?

11.Choose five new words or phrases from the text and try to learn them.

UNIT 8

FREQUENCY DIVISION MULTIPLEXING

1. Practice reading the following words.

multiplexing	[ˈmʌltɪpleksɪŋ]	either	[ˈaɪðər]
data	['deɪtə]	thereof	[ˌðeəˈrɒf]
channel	[ˈtʃænl]	known	[noʊn]
extensively	[ɪkˈstensɪvlɪ]	enough	[ɪˈnʌf]
tier	[tɪə]	path	[pɑːθ]

2. Read the following words and try to remember them.

VOCABULARY

challenge	['ʧælɪnʤ]	сложная задача, проблема
at a rate of	[reɪt]	со скоростью
circuit-switch	[ˈsɜːkɪt swɪtʃ]	коммутатор каналов
to comprise	[kəmˈpraɪz]	включать в себя
to consider	[kənˈsɪdə]	рассматривать
copper	[ˈkɒpə]	медный
destination	[ˌdestɪˈneɪʃən]	пункт назначения
digital	[ˈdɪdʒɪtəl]	цифровой
exchange plant	[ɪksˈtʃeɪndʒ ˈplɑːnt]	местное оборудование
frequency	[ˈfriːkwənsɪ]	частота
network	[ˈnetwɜːrk]	сеть
packet-switching	[ˈpækɪtswɪtʃɪŋ]	коммутация пакетов
to portray	[pɔːˈtreɪ]	описывать
proper	[ˈprɒpə]	надлежащий

to replace	[rɪˈpleɪs]	заменять
to sample	[ˈsɑːmpl]	замерять
stream	[striːm]	поток
switching	[swɪtʃɪŋ]	переключение
talking path		речевой тракт
transmission	[trænzˈmɪʃən]	передача

3. Do you know anything about frequency division multiplexing? Read the text below to find out more information about FDM.

FREQUENCY DIVISION MULTIPLEXING (FDM)

In the long-distance network, and more in the local exchange plant, digital transmission is used. A digital signal is comprised of a stream of 1 s and 0 s that portray the analog voice signal by means of a code.

Analog signals can be combined (i.e., multiplexed) with a carrier frequency. When there is more than one channel, this is called frequency division multiplexing (FDM). FDM was used extensively in the past but now has generally been replaced with the digital equivalent: time division multiplexing (TDM). The most popular TDM system is known as tier 1 (Tl). In a Tl system, an analog voice channel is sampled 8,000 times per second, and each sample is encoded into a 7-bit byte. Twenty-four such channels are mixed on these two copper pairs and transmitted at a bit rate of 1.544 megabits per second. T1 remains an important method of transmitting voice and data in the PSTN.

Thus, a talking path (i.e., a switched circuit) in the PSTN can be either analog or digital or a combination thereof. In fact, a digital signal can be transmitted over a packet-switched network as easily as a circuit-switched network. Now if we consider the next step, we see that digitized voice is not very different from data, and if data can be transmitted over a packet network, then so

can digitized voice. This, of course, is not known as voice over the Internet. The challenge, of course, is to get the transmitted signal to the destination fast enough. After all, this may well be a time-sensitive voice conversation. A second challenge is to get each packet, which is a small piece of a voice conversation, to the destination in the proper order. Progress is being made, and we can well believe that packet switching will play an important role in the PSTN of tomorrow.

PSTN (Public Switched Telephone Network) – телефонная коммутируемая сеть общего пользования

T1 - выделенная линия со скоростью передачи данных 1, 544 Мбит в сек.

4. Read the text again and answer the questions.

1. What kinds of transmission are used in local exchange plants and in long distance networks?
2. What is the most popular TDM system? Describe it.
3. What kinds of a talking path are there in the PSTN?
4. How can a digital signal be transmitted?
5. What are the two challenges mentioned in the text?

5. Match the words opposite in meaning.

1. Local	a) slow
2. Digital	b) less
3. Fast	c) global
4. More	d) same
5. Different	e) analog

6. ***Translate the following word combinations into Russian.***

1. A digital signal

2. A long-distance network

3. By means of a code

4. Time division multiplexing

5. To use extensively

6. A packet network

7. To get the transmitted signal to the destination

8. Voice conversation

9. A circuit-switched network

7. Find English equivalents to the following word combinations in the text.

1. Цифровая передача
2. Несущая частота
3. Голосовой сигнал
4. Мультиплексация с частотным делением
5. Играть важную роль
7. Следующий шаг

8. Match the following words with their definitions.

1. Network	a. the numbers of time that something happens
2. Digital	b. radio station
3. Frequency	c. a system of things that are connected with each other
4. Channel	d. a system that allows people using computers around the world to send and receive information
5. Internet	e. using a system in which information is in the form of changing electronic signals
6. Code	f. to send out radio or television signals
7. Transmit	g. a system of words, letters, or signs that are used for

sending secret messages

9. Complete the sentences using the words from the text.

1. Analog signals can ... combined with a carrier frequency.
2. In the long-distance network, and more in the local … plant, digital transmission is used.
3. The most popular ... system is known as tier 1 (Tl).
4. T1 remains an important method of ... voice and data.
5. FDM was used extensively in the past but now has generally ... replaced with the digital equivalent: time division multiplexing (TDM).

10.Mark the following sentences True or False.

1. In a Tl system, an analog voice channel is sampled 8,000 times per second, and each sample is encoded into an 8-bit byte.
2. Twenty-four such channels are mixed on these two copper pairs and transmitted at a bit rate of 1.544 kilobits per second.
3. FDM has generally been replaced with the digital equivalent: time division multiplexing.
4. T1 remains an important method of transmitting voice and data in the FDM.
5. A talking path in the PSTN can be either analog or digital or a combination thereof.

11. Match a line in A with a line in B.

A	**B**
1.This text is about …	a) several pieces of equipment that are connected to each other and work together
2. A digital signal is comprised...	b) with a carrier frequency
3. The digital equivalent FDM -	c) the complete circle that an electric

	current flows around
4. System -	d) frequency division multiplexing
5. Circuit -	e) time division multiplexing
6. Analog signals can be combined...	f) of a stream of 1 s and 0 s that portray the analog voice signal by means of a code.

12. Divide the text "Frequency division multiplexing" into logical parts and give subtitles to each part.

13. Write the summary of the text.

14. Read and translate the following text. Use a dictionary to help you.

FIBERS

In the digital world all forms of information are translated into bits, the standard international language of today's computers, and represented as pulses of light. Information in this form can be processed easily and sent anywhere in seconds in a single multi-purpose network. Optical fibers are ideal for digital working and open the door to a host of services not possible on an analogue system.

Each strand of fiber consists of an inner core to channel the light and an outer cladding to keep it in by reflecting it back along the core. To make the glass for the fibers, the ingredients are deposited as gases on the inside of a hollow silica tube at temperatures of around 2000°C. The tube is collapsed under intense heat to form a solid glass rod about 1 cm in diameter which already has the structure of the fiber which will be drawn from it. The rod is then loaded into a furnace, drawn into fiber and coated with resin to protect it and increase its flexibility. Tiny crystals the size of grain of salt are used to produce the light which carries information along the fibers. This passes through a lens into the fiber. At the other end a receiver reverses the process and turns each light pulse into an electrical sign. Optical fibers will have countless applications in

tomorrow's "information society". Optical fibers, hair-thin strands of pure glass carrying information as pulses of light, have been described as "probably the biggest breakthrough in telecommunications since the invention of the telephone".

Outer cladding — наружное покрытие

15. Choose five new words or phrases from the text. Check their meaning and pronunciation, and try to learn them.

UNIT 9

BROADCASTING

1. Practice reading the following words.

amplitude	[ˈæmplɪtjuːd]	kilohertz	[ˈkɪləhɜːts]
appreciate	[əˈpriːʃieɪt]	modulate	[ˈmɒdjʊleɪt]
transmit	[trænzˈmɪt]	mobile	['məubaɪl]
deviate	[ˈdiːvieɪt]	audio	['ɔːdɪəu]

2. Read the following international words and think about their meaning.

Amplitude; transmission; modulation; line; information; voltage; radio; kilohertz; signal; mobile; communication; signal.

3. Read the following words and try to remember them.

VOCABULARY

broadcast	[ˈbrɔːdkɑːst]	радио, радиовещание
FM - frequency modulation	[ˌefˈem ˈfriːkwənsɪ mɒdjuˈleɪʃn]	частотная модуляция
shortcoming	[ˌʃɔːtˈkʌmɪŋ]	недостаток; дефект
wideband	[ˈwaɪdbænd]	широкополосный
medium	[ˈmiːdiəm]	носитель, среда
retain	[rɪˈteɪn]	держать; удерживать
carrier	[ˈkæriə]	1) носитель; 2) несущая (частота)
subtle	[ˈsʌtl]	тонкий, изысканный
variation	[veəriˈeɪʃn]	изменение, колебание
narrow band	[ˈnærəʊ ˈbænd]	узкая полоса частот
UHF (ultrahigh frequency)	[ˈʌltrəhaɪ ˈfriːkwənsɪ]	ультравысокая частота

deviate	[ˈdi:vieɪt]	отклоняться
VHF (very high frequency)	[ˈverɪhaɪ ˈfri:kwənsɪ]	сверхвысокая частота

4. Give the definition of the word 'broadcasting'. Read the text and answer the questions below.

1. When were the first commercial stations set up in the USA?
2. What is the function of amplitude modulation?
3. What is one of the important factors of FM?
4. What is a typical signal deviation?
5 What is the standard for broadcasting?

BROADCASTING

When broadcasting first started in the 1920s amplitude modulation was used because it was the obvious and the easiest way to transmit sound. Although the first commercial stations were set up in the USA around 1939, it was not until the 1950s that FM started to become really accepted. It was in 1954 that the BBC announced their intention to start FM broadcasting. Now VHF FM is the accepted medium for high quality transmissions, and stations that use AM on the medium and long wave bands have to work hard to retain listeners who prefer the higher quality of VHF FM.

Amplitude modulation, which is the simplest and most obvious form of modulation, varies the amplitude of the carrier so that it carries the sound information. Frequency modulation is slightly more subtle and as the name indicates, it varies the frequency of the carrier in line with the variations in the modulating audio signal. This as the modulating waveform increases in voltage, so the carrier will swing in one direction and as it decreases it will move in the other direction.

One of the important factors of FM is the degree by which the carrier changes. This deviation is usually expressed in kilohertz variation either side of the center (no modulation) frequency. Typically, a signal may have a deviation of +/- 3

kHz if it varies up and down by 3 kHz. There are two main categories on FM. The first is called narrow band FM, and this is where the deviation is relatively small, possibly 5 kHz. This type of transmission is used mainly by VHF / UHF point-to-point mobile communications. To appreciate the full benefits of FM, wideband FM is used having a greater level of deviation. The standard for broadcasting is +/- 75 kHz. To fully accommodate these transmissions a bandwidth of 200 kHz is used.

5. Match the words similar in meaning.

1. Medium	a) range
2. Deviation	b) carrier
3. Signal	c) broadcasting
4. Amplitude	d) variation
5. Transmission	e) call

6. ***Match the words opposite in meaning.***

1. Start	a) big
2. First	b) refuse
3. Full	c) final
4. Accept	d) empty
5. Small	e) finish

7. Find English equivalents to the following word combinations in the text.

1) Высокое качество;
2) амплитудная модуляция;
3) может иметь отклонение;
4) основные категории;
5) другое направление;
6) важные факторы;
7) модуляция частоты;

8) стандартная частота вещания;

9) первая коммерческая станция;

10) относительно небольшой;

11) по обе стороны от центра.

8. Match English and Russian equivalents.

1. One of the important factors	a) звуковой сигнал
2. Two main categories	b) используется в основном
3. To transmit sound	c) может иметь отклонение
4. Announced their intention	d) мобильная связь
5. Is used mainly	e) две главные категории
6. May have a deviation	f) передавать звук
7. Audio signal	g) один из важных факторов
8. Mobile communications	h) объявили о своем намерении

9. Reorder the words to make a sentence.

1**.** that, was, the BBC, 1954, in, their intention, it, announced, FM broadcasting, to start.

2. FM, two, there, main, are, on, categories.

3. 75 kHz, standard, the, is, +/-, for broadcasting.

4. FM, of, carrier, changes, of, one, is, the, the degree, factors, by, which, the important.

5. is, used, these, kHz, transmissions, a, To, accommodate, 200, bandwidth, fully, of.

10. Insert the necessary word in the gap.

1. When … first started in the … amplitude modulation was … because it was the obvious and the easiest way to … sound.

2. This as the modulating… increases in … so the carrier will … in one direction and as it … it will move in the other direction.

3. … of the important factors of … is the degree by which the … changes.

4. It was in … that the … announced their intention to …FM broadcasting.

5. To … the full benefits of …, wideband FM is … having a greater level of ….

11. Make up the outline of the text "Broadcasting". Retell the text.

12. Translate the text "The Transmission of Visual Images". Use a dictionary to help you.

THE TRANSMISSION OF VISUAL IMAGES

Television, the transmission of visual images from studio to receiving screen, presents problems compared with which those of broadcasting appear very simple. Broadcasting is concerned with transmission of a single stream of sound. Television has to transmit almost simultaneously the infinite number of differences of light and shade, which go to make up a picture. And it has not only to transmit these variations, but alter them in order to give the illusion of movement.

In the cinema two dozen different pictures are transmitted per second, so that the eye, unable to work at this speed, is deceived by visual retentivity into thinking that it is watching continuous movement. The television apparatus combines this illusion with another: that many hundred spots very close together are a single picture. It is in the speed required that television differs from the mere transmission of pictures.

Television adopts the plan of turning a picture into a large number of little spots each of a different shade and so close together that until examined very closely they appear to be completely joined. If you look at a newspaper photograph, you will see these thousands of little dots, the size and number depending upon the "coarseness" of the screen which has been used to make the block. Now it might be possible to take a little picture and turn it into, say, 500 dots that would give a reasonably clear image of the size of a postage stamp, and each dot on a different wavelength. It is possible but hardly practicable, for it would entail 500 different transmitting and receiving sets, not to mention devices for projecting the dots in their right place at the right moment.

13. Read and render the text "Broadcast VHF FM".

Broadcast VHF FM

An amplitude modulation was used because it was the obvious and the easiest way to transmit sound. Its shortcomings became more obvious and the quest for higher quality transmissions lead to the introduction of wideband frequency modulation. The first commercial stations were set up in the USA around 1939. It was in 1954 that the BBC announced their intention to start FM broadcasting. Now VHF FM is the accepted medium for high quality transmissions.

Amplitude modulation - varies the amplitude of the carrier so that it carries the sound information. Frequency modulation - the name indicates it varies the frequency of the carrier in line with the variations in the modulating audio signal. This as the modulating waveform increases in voltage, so the carrier will swing in one direction and as it decreases, it will move in the other direction.

One of the important factors of FM is the degree by which the carrier changes. This deviation is usually expressed in kilohertz variation either side of the center (no modulation) frequency. Typically, a signal may have a deviation of +/- 3kHz if it varies up and down by 3 kHz. There are two main categories on FM. The first is called narrow band FM, and this is where the deviation is relatively small, possibly 5 kHz. This type of transmission is used mainly by VHF / UHF point-to-point mobile communications. To appreciate the full benefits of FM, wideband FM is used having a greater level of deviation. The standard for broadcasting is +/- 75 kHz.

The advantage of FM is that as the modulation is carried solely as frequency variations, much noise, can be discarded in the receiver. Accordingly it is possible to achieve much better noise performance using FM.

UNIT 10

TELECOMMUNICATIONS NETWORKS

1. Practice reading the following words.

infrastructure	[ˈɪnfrəstrʌktʃə]	multiplexing	[ˈmʌltiˌpleksɪŋ]
synchronous	[ˈsɪŋkrənəs]	interface	[ˈɪntəfeɪs]
hierarchy	[ˈhaɪərɑːki]	configuration	[kənˌfɪgju'reɪʃ(ə)n]

2. Read the following words and try to remember them.

VOCABULARY

to arrange	[əˈreɪndʒ]	располагать
capacity	[kəˈpæsəti]	мощность
copper	[ˈkɒpə]	медь
digital	[ˈdɪdʒɪtəl]	цифровой
fiber	[ˈfaɪbər]	волокна
to govern	[ˈgʌvn]	регулировать
to imply	[ɪmˈplaɪ]	означать
magnitude	[ˈmægnɪtjuːd]	величина
maintenance	[ˈmeɪntənəns]	техническое обслуживание
route	[ruːt]	маршрут
scarcity	[ˈskeəsɪtɪ]	дефицит
scheme	[skiːm]	схема
self-healing	[self ˈhiːlɪŋ]	самовосстанавливающийся
strand	[strænd]	нить
to string	[strʌŋ]	протягивать; подвешивать

3. Read the text and answer the questions below.

1. What is the popular transmission medium in the telecommunications networks nowadays?
2. What codes have been used in telecommunications networks?
3. What standard is used for optical telecommunications transport?
4. What do the Sonet standards govern?
5. What is ADSL?

TELECOMMUNICATIONS NETWORKS

Transmission in the telecommunications networks of today is, more and more, digital in nature and the transmission medium of choice is fiber. 'Digital', however, does no more than imply a string of 1s and 0s racing through the network. But how are these 1s and 0s to be arranged? At what speed are they to travel? What route should they take? Answers to questions such as these have taken many forms and have made for the most complicated aspect of the telecommunications business. There has never been a scarcity of coding schemes in the industry. Starting with Morse code, going to the Baudot code, then the ASII code, we have seen each providing for better transmission and higher quality. In this section we will discuss the most popular and important codes.

Sonet is a standard for optical telecommunications transport. The Sonet standard is expected to provide the transport infrastructure for worldwide telecommunications for at least the next two or three decades. It defines a technology for carrying many signals of different capacities through a synchronous optical hierarchy. The standard specifies a byte-interleaved multiplexing scheme.

The Sonet standards govern not only rates, but also interface parameters; formats; multiplexing methods; and operations, administration, maintenance for high-speed transmission. We most often hear of Sonet rings in which fiber strands are strung around a metropolitan area in a ring configuration. The system is designed so that transmission can take place in either direction; should there be a fault at any one location, transmission will immediately take place in the opposite direction. That is, the system is self-healing.

Asymmetric digital subscriber line (ADSL) is, essentially, a modem that employs a sophisticated coding scheme. This coding scheme permits transmission over copper pairs at rates as high as 6 Mbps for distances of 9,000 to 12,000 feet. Speeds of this magnitude bring to mind television signals. ADSL succeeds because it takes advantage of the fact that most of its target applications (video-on-demand, home-shopping, Internet access) function perfectly well hence the word asymmetric.

4. Match the words similar in meaning.

1. Transmission	a) intricate
2. Complicated	b) manage
3. Section	c) afford
4. Govern	d) broadcast
5. Provide	e) part

5. Match the words opposite in meaning.

1. Different	a) worse
2. Scarcity	b) simple
3. Better	c) symmetrical
4. Sophisticated	d) similar
5. Asymmetric	e) excess

6. Find English equivalents to the following word combinations in the text.

1. На сегодняшний день;
2. Материал для передачи;
3. Обеспечивать более высокое качество;
4. Высокоскоростная передача;
5. Оптоволоконные нити;
6. Кольцевая конфигурация;

7. Происходить в противоположном направлении;
8. По сути;
9. Схема кодирования;
10. Медная пара.

7. Mark the following sentences True or False.

1. There has always been a scarcity of coding schemes in the industry.
2. The transmission medium of choice today is copper.
3. ADSL is a standard for optical telecommunications transport.
4. The Sonet standards govern multiplexing methods.
5. Asymmetric digital subscriber line is, essentially, a modem.
6. The Sonet standard specifies a byte-interleaved multiplexing scheme.

8. Translate the following word combinations into Russian.

1. Racing through the network
2. Most complicated aspect
3. Scarcity of coding schemes
4. Higher quality
5. Defines a technology
6. To be arranged
7. Signals of different capacities
8. Take place in either direction
9. Asymmetric digital subscriber line

9. Reorder the words to make a sentence.

1. to, they, speed, what, At, are, travel?
2. is, a, transport, Sonet, for, optical, standard, telecommunications.
3. has, industry, of, coding, never, a, scarcity, There, schemes, in, been, the.

4. The, multiplexing, standard, a, byte-interleaved, specifies, scheme.

5. system, That, self-healing, is, the, is.

6. What, they, should, route, take?

7. will, We, discuss, the, most, popular, and, important, codes.

10. Give the title to each paragraph of the text.

11. Retell the text using the titles.

12. Give the summary of the following text.

SUBMARINE FIBER NETWORKS

Submerged in the world's oceans are well over a million kilometers of submarine cable – enough to circle the globe 30 times – forming a network of arteries that carry huge volumes of traffic between continents. Although satellite communications can provide traffic to many locations, it plays a complementary role to cable technology, which has the volume capacity necessary for the bulk of international communication (speech, fax, data and internet protocol).

Electro-optic repeaters and fiber optics were introduced in the 1980s, before which coaxial cables were used. The introduction in the 1990s of optical amplifiers that could process multiple wavelengths opened the door to wavelength division multiplexing (WDM). At the same time, deregulation created a much more competitive environment where the demand for capacity has increased faster than ever. Today a single fiber can provide 640 Gb/s – more than 1000 times the capacity of the last coaxial cables and roughly equivalent to 8 million uncompressed (64 kb/s) speech circuits. Each cable can contain several fibers.

One might imagine that a submarine cable system should be much like a land cable system except for the rather obvious requirement that it be waterproof. In practice, there are many differences, most of them due to the depth and size of our oceans. Ocean depths may approach 8 km with pressures of 800 atmospheres at the extreme. Cables and optical repeaters must be robust enough to survive the marine installation. Conditions at sea are such that one cannot guarantee gentle treatment. Once a system is installed, however, deep water is a benign environment.

bulk – большое количество, robust – крепкий,

waterproof – водонепроницаемый, gentle treatment – лёгкое вмешательство, benign – благоприятный, благотворный.

13. Read the following text and answer the questions.

1. What is the advantage of amplitude modulation?
2. What is the simplest method, which can be used to demodulate AM?
3. Why is a capacitor used at the output?
4. What type of detector is called a linear envelope detector?
5. When is the signal reduced in strength?

RADIO RECEIVER AMPLITUDE MODULATION DEMOLULATION

One of the advantages of amplitude modulation (AM) is that it is cheap and easy to build a demodulator circuit for a radio receiver. The simplicity AM radio receivers AM is one of the reasons why AM has remained in service for broadcasting for so long. One of the key factors of this is the simplicity of the receiver AM demodulator. A number of methods can be used to demodulate AM, but the simplest is a diode detector. It operates by detecting the envelope of the incoming signal. It achieves this by simply rectifying the signal. Current is allowed to flow through the diode in only one direction, giving either the positive or the negative half of the envelope at the output. If the detector is to be used only for detection it does not matter which half of the envelope is used, either will work equally well. Only when the detector is also used to supply the automatic gain control (AGC) circuitry will the polarity of the diode matter. The AM detector or demodulator includes a capacitor at the output. Its purpose is to remove any radio frequency components of the signal at the output. The value is chosen so that it does not affect the audio base-band signal. There is also a leakage path to enable the capacitor to discharge, but this may be provided by the circuit into which the demodulator is connected.

This type of detector or demodulator is called a linear envelope detector because the output is proportional to the input envelope. Under normal

circumstances signals received via the ionosphere reach the receiver via a number of different paths. The overall signal is a combination of the signals received via each path and as a result, they will combine with each other, sometimes constructively to increase the overall signal level and sometimes destructively to reduce it. It is found that when the path lengths are considerably different this combination process can mean that small portions of the signal are reduced in strength.

Base-band – немодулированная передача,

envelope - огибающая (сигнала),

Sideband - боковая полоса (частот),

receiver - радиоприемник,

Automatic gain control - автоматическая регулировка усиления,

Leakage - утечка,

susceptible - восприимчивый, чувствительный,

Overall - суммарный,

carrier - несущая (частота),

Occurrence - событие; случай.

UNIT 11

MODERN LIGHT-VAWE COMMUNICATIONS TECHNOLOGY

1. Practice reading the following words.

data	['deɪtə]	efficient	[ɪ'fɪʃ(ə)nt]
digital	['dɪʤɪt(ə)l]	transmission	[trænz'mɪʃ(ə)n]

2. Read the following words and try to remember them.

VOCABULARY

to accommodate	[ə'kɔmədeɪt]	вмещать
alternately	[ɔ:l'tɜ:nətlɪ]	поочерёдно; попеременно
capacity	[kə'pæsətɪ]	мощность, нагрузка; производительность
counterpart	['kauntəpɑ:t]	аналог; дубликат, копия
efficiency	[ɪ'fɪʃ(ə)n(t)sɪ]	1) коэффициент полезного действия, отдача 2) эффективность
glass fiber	['glɑ:s 'faɪbə]	стекловолокно
to handle	['hændl]	обрабатывать
to install	[ɪn'stɔ:l]	устанавливать
light-wave communications systems	['laɪt 'weɪv]	системы связи с использованием световых волн
to maintain	[meɪn'teɪn]	обслуживать (поддерживать в рабочем состоянии)
pulse	[pʌls]	импульс, толчок
renowned	[rɪ'naund]	известный

savings	['seɪvɪŋz]	сэкономленные средства
sophisticated	[sə'fɪstɪkeɪtɪd]	сложный, современный, передовой
tremendous	[trɪ'mendəs]	огромный, гигантский, громадный
versatile	['vɜːsətaɪl]	универсальный, многоцелевой, гибкий

3. Read the text and answer the following questions.

1. What kinds of signals can be transmitted over the network?
2. What are the advantages of light-wave communications systems?
3. What types of information can light-wave communications systems transmit?
4. How fast can information be transmitted through a single, hair-thin glass fiber? Give an example from the text.
5. How many telephone conversations can a single system accommodate?

MODERN LIGHT-VAWE COMMUNICATIONS TECHNOLOGY

Recently, the concept of using light pulses instead of electrical signals to transmit information was only that — a concept. Today, light-wave communications systems are among the most sophisticated transmission systems in the telecommunications network. They are at once efficient, versatile and relatively inexpensive to install and maintain.

The efficiency of light-wave systems is perhaps their most renowned quality. They carry enormous amounts of information over long distances at very high speeds. Consider, for example, the speed and capacity of the Bell System's long distance light-wave system. Light pulsing through a single, hair-thin glass fiber in this system can transmit *the entire contents of Webster's unabridged dictionary* — more than 2700 pages — over thousands of miles in only six seconds.

No less impressive than this tremendous speed and capacity is the versatility of light-wave systems. Because they are digital systems, they can transmit easily any of these types of information: voice signals, high-speed data signals, and television signals. Without undermining quality or efficiency, a single system can accommodate thousands of telephone conversations, and alternately handle data or video signals.

Finally, light-wave systems are inexpensive to install and operate compared to their wire-and-cable counterparts. Moreover, they allow considerable savings.

The entire contents of Webster's unabridged dictionary – полное содержание неадаптированного словаря Вебстера

4. Match the words similar in meaning.

1. Efficient	a) huge
2. Maintain	b) velocity
3. Enormous	c) maybe
4. Speed	d) support
5. Perhaps	e) suitable

5. Match the words opposite in meaning.

1. Sophisticated	a) cheap
2. Renowned	b) low
3. Light	c) simple
4. High	d) unknown
5. Expensive	e) darkness

6. Find English equivalents to the following word combinations in the text.

1. Телекоммуникационная сеть

2. Передавать огромные объёмы информации
3. Система световодов
4. Стекловолокно толщиной с человеческий волос
5. Цифровые системы

7. Translate the following word combinations into Russian.

1. To use light pulses
2. To transmit information
3. Versatility of light-wave systems
4. To accommodate thousands of telephone conversations
5. To install and maintain

8. Insert prepositions and translate the sentences.

1. Light-wave communications systems are relatively inexpensive … install and maintain.
2. The concept … using light pulses instead … electrical signals … transmit information was only a concept.
3. They carry enormous amounts … information … long distances … very high speeds.
4. They can transmit easily any type … information.

9. Divide the text into logical parts and give titles to each part. Write the summary of the text.

10. Retell the text

11. Translate the following text in writing.

COMMUNICATIONS AND FIBERS

Optical fibers, hair-thin strands of pure glass carrying information as pulses of light, have been described as "probably the biggest breakthrough in telecommunications since the invention of the telephone". All kinds of communications can be carried along the same optical fiber cable — speech,

text, photos, drawings, music, computer data, etc. — at higher speeds than have been previously possible.

The fibers, made from glass so pure that a block of it 20 km thick would theoretically be as transparent as a window pane, have many advantages over metal wires. Small, light and easy to handle, they are made from an abundant raw material, sand. They can carry the same number of telephone calls as metal cables ten times as thick - dozens of fibers, carrying around, 100,000 telephone calls, could all pass through the eye of a needle, at the same time — and they are immune to electrical interference which affects the quality of calls. An optical fiber cable the thickness of a finger could bring a hundred TV channels to a receiver.

The tiny strands are playing a key role in the digital revolution which is sweeping through modern telecommunications. The telecommunications network developed for the telephone used a system, which turned the air pressure waves created by speech into continuous and variable "analogues" of electrical waves and turned them back to speech at the receiver. Expensive conversion equipment or separate networks were needed to handle text, TV or computer data.

Strand – прядь, стренга (кабеля),

breakthrough - крупное открытие,

window pane - оконное стекло,

abundant - обильный, богатый,

immune – невосприимчивый,

transparent – прозрачный.

UNIT 12

CELLULAR CONCEPTS AND BASICS

1. Practice reading the following words.

associate	[ə'səusɪeɪt] , [-ʃieɪt]	efficient	[ɪ'fiʃ(ə)nt]
cellular	['seljulə]	frequency	['friːkwən(t)sɪ]
equipment	[ɪ'kwɪpmənt]	scheme	[skiːm]

2. Read the following words and try to remember them.

VOCABULARY

to attenuate	[ə'tenjuɪt]	ослаблять
available	[ə'veɪləbl]	доступный, имеющийся в наличии
coverage area	['kʌv(ə)rɪʤ 'eərɪə]	зона покрытия, обслуживания
cut-off	['kʌtɔf]	отсечка, граничная частота
to diminish	[dɪ'mɪnɪʃ]	уменьшать
to employ	[ɪm'plɔɪ]	применять, использовать
hexagonal	[hek'sæg(ə)n(ə)l]	шестиугольный, нестандартный; имеющий неправильную форму, несимметричный
mutual interference	['mjuːʧuəl ˌɪntə'fiər(ə)n(t)s]	взаимные помехи
to overlap	[ˌəuvə'læp]	перекрывать; частично совпадать
range	[reɪnʤ]	диапазон
receiver	[rɪ'siːvə]	1) радиоприемник; 2)телефонная трубка

reverse direction	[rɪ'vɜːs dɪ'rekʃ(ə)n]	обратное направление, противоположное направление
to split up		разделять
terrain	[tə'reɪn]	местность, территория
waiting list	['weɪtɪŋlɪst]	список ожидающих

3. Read the text and answer the questions below.

CELLULAR CONCEPTS AND BASICS

Cellular systems are widely used today and cellular technology needs to offer very efficient use of the available frequency spectrum. With billions of mobile phones in use around the globe today, it is necessary to re-use the available frequencies many times over without mutual interference of one cell phone to another.

Early schemes for radio telephones schemes used a single central transmitter to cover a wide area. These radio telephone systems suffered from the limited number of channels that were available. Often the waiting lists for connection were many times greater than the number of people that were actually connected. In view of these limitations this form of radio communications technology did not take off in a big way. Equipment was large and these radio communications systems were not convenient to use or carry around.

The method that is employed is to enable the frequencies to be re-used. Any radio transmitter will only have a certain coverage area. Beyond this the signal level will fall to a limited below which it cannot be used and will not cause significant interference to users associated with a different radio transmitter. This means that it is possible to re-use a channel once outside the range of the radio transmitter. The same is also true in the reverse direction for the receiver, where it will only be able to receive signals over a given range. In this way it is possible to arrange split up an area into several smaller regions, each covered by a different

transmitter/receiver station. These regions are conveniently known as cells, and give rise to the name of a "cellular" technology used today. They have irregular boundaries because of the terrain over which they travel. Hills, buildings and other objects all cause the signal to be attenuated and diminish differently in each direction.

1. What does cellular technology need to offer?
2. What is the concept of frequency re-use?
3. What did radio telephone systems suffer from?
4. What does the signal level do beyond coverage area?
5. What are the problems with the signal coverage over certain areas?

4. Match the words similar in meaning.

1. Convenient	a) project
2. Method	b) boundary
3. Scheme	c) use
4. Limit	d) diapason
5. Employ	e) system
6. Range	f) suitable

5. Mark the following sentences True or False.

1. Cellular systems are widely used today.

2. Early schemes for radio telephones schemes used several transmitters to cover a wide area.

3. Equipment was large and these radio communications systems were not convenient to use or carry around.

4. Cellular technology doesn’t need to offer very efficient use of the available frequency spectrum.

5. The radio telephone systems suffered from the great number of channels that were available.

6. Reorder the words to make a sentence.

1. Early schemes/ for radio telephones/ used a single/ a wide area / central transmitter/ to cover/ schemes.

2. The method/ is to enable/ the frequencies / to be re-used /that is employed.

3. The same/ the receiver// in the reverse / direction /for /the receiver/is also true.

4. Any radio/ will only have / coverage area / transmitter / a certain.

5. It is possible/ smaller regions/ to arrange / into /split up/an area/ several.

7. Insert prepositions and translate the sentences.

1. Early schemes … radio telephones schemes used a single central transmitter … cover a wide area.

2. … billions … mobile phones … use around the globe today, it is necessary … re-use the available frequencies many times over … mutual interference … one cell phone … another.

3. These radiotelephone systems suffered … the limited number … channels that were available.

4. The same is also true … the reverse direction … the receiver, where it will only be able … receive signals over a given range.

8. Make up the outline of the text. Write the summary of the text.

9. Retell the text "Cellular concepts and basics".

10. Read the text and answer the questions.

WIRELESS

The first commercially available radio and telephone system, known as improved mobile telephone service (IMTS), was put into service in 1946. With IMTS, a tall transmitter tower was erected near the center of a metropolitan area. Several assigned channels were transmitted and received from the antenna atop this tower. Any vehicle within range could attempt to seize one of those channels and complete a call. Unfortunately, the number of channels made available did not come even close to satisfying the need. To make matters worse, as the metropolitan area grew, more power was applied to the transmitter or receiver, the reach was made greater, and still more subscribers were unable to get dial tone.

The solution to this problem was cellular radio. Metropolitan areas were divided into cells of no more than a few miles in diameter, each cell operating on a set of frequencies (send and receive) that differed from the frequencies of the adjacent cells. Because the power of the transmitter in a particular cell was kept at a level just high enough to serve that cell, these same sets of frequencies could be used at several places within the metropolitan area. Beginning in 1983, two companies, one called a wireline company and the other called a nonwireline carrier, were given a franchise to operate in each major territory.

Two characteristics of cellular systems were important to their usefulness. First, the systems controlled handoff. As subscribers drove out of one cell and into another, their automobile radios, in conjunction with sophisticated electronic equipment at the cell sites (also known as base stations) and the telephone switching offices (also known as mobile telephone switching office (MTSO), transferred from one frequency set to another with no audible pause. Second, systems were also designed to locate particular subscribers by paging them in each of the cells. When the vehicle in which a paged subscriber was riding was located, the equipment assigned sets of frequencies to it, and conversation could begin.

Communication between the cell site and the MTSO utilized more conventional techniques, such as microwave, copper pairs or fiber optics.

Answer the following questions:

1. When was the first commercially available radio and telephone system put into service?
2. What problem did cellular radio solve?
3. Which characteristics of cellular systems were important?
4. What technologies were used between the cell site and the telephone switching offices?

11. Read the text and answer the questions.

MOBILE PHONE

Mobile phones contain a large amount of circuitry, each of which is carefully designed to optimise its performance. The cell phone comprises analogue electronics as well as digital circuits ranging from processors to display and keypad electronics. A mobile phone typically consists of a single board, but within this there are a number of distinct functional areas, designed to become a complete mobile phone:

Radio frequency - receiver and transmitter;

Digital signal processing;

Analogue / digital conversion;

Control processor;

SIM or USIM card;

Power control and battery.

They need to offer high levels of performance, while being able to fit into a very small space, and in addition to it, the electronics circuitry needs to consume very little power so that the life between charges can be maintained.

The mobile phone or cell phone as it is often called is equally important to the network in the operation of the complete cellular telecommunications network.

1. What are the main components of a mobile phone?
2. What types of electronics are used in cell phones?
3. What features do cell phones have in order to satisfy modern requirements?
4. What energy does a cell phone utilize?

12. Translate the following text in writing. Use a dictionary to help you.

CODE DIVISION MULTIPLE ACCESS

Code division multiple access (CDMA) is a wireless communications technology that uses the principle of spread spectrum communication. The intent of CDMA technology is to provide increased bandwidth in a limited frequency system, but has also other advantages including extended range and more secure communications. In a CDMA system, a narrowband message signal is multiplied by a spreading signal, which is a pseudo-noise code sequence that has a rate much greater than the data range of the message. CDMA uses these code sequences as a means of distinguishing between individual conversations. All users in the CDMA system use the same carrier frequency and may transmit simultaneously.

CDMA is a driving technology behind the rapidly advancing personal communications industry. Because of its greater bandwidth, efficiency, and multiple access capabilities, CDMA is becoming a leading technology for relieving the spectrum congestion caused by the explosion in popularity of cellular mobile phones, fixed wireless telephones, and wireless data terminals. Since becoming an officially recognized digital cellular protocol, CDMA is being rapidly implemented in the wireless communications networks of many large communications corporations.

The main advantages of CDMA are as follows:

- increased capacity;
- improved voice quality, eliminating the audible effects for multipath fading;
- enhanced privacy and security;
- improved coverage characteristics which reduce the number of cell sites;
- simplified system planning reducing operating costs.

intent – намерение, цель;

congestion – перегрузка;

to relieve – уменьшать;

enhance – увеличивать.

13. Choose five new words or phrases from the text. Check their meaning and pronunciation, and try to learn them.

14. Develop the following statement:

We cannot imagine our modern life without mobile communication. What is telephone for you?

Write about advantages that cellular phones have.

Unit 13

BLUETOOTH TECHNOLOGY

1. Practice reading the following words.

audio	['ɔːdɪəu]	peripheral	[pə'rɪf(ə)r(ə)l]
technology	[tek'nɔlədʒɪ]	special	['speʃ(ə)l]
variety	[və'raɪətɪ]	function	['fʌŋkʃ(ə)n]
originate	[ə'rɪdʒ(ə)neɪt]	licence	['laɪsəns]

2. Read the following words and try to remember them.

VOCABULARY

ad hoc	[ˌæd'hɔk]	для этого случая
a host of		много, масса
application	[ˌæplɪ'keɪʃ(ə)n]	приложение; применение
cordless headset	[kɔːdləs 'hedset]	беспроводная гарнитура
to endeavour	[ɪn'devə]	пытаться, стараться
enhancement	[ɪn'hɑːn(t)smənt]	усовершенствование
to establish	[ɪs'tæblɪʃ]	создавать
to evangelise	[ɪ'vændʒ(ə)laɪz]	продвигать (что-л.)
frequency band	['friːkwən(t)sɪ 'bænd]	полоса частот
interoperation	[ˌɪntərɔp(ə)'reɪʃ(ə)n]	совместимость
to occur	[ə'kɜː]	происходить, случаться
range	['reɪndʒ]	диапазон
rather than	['rɑːðə]	а не; вместо того, чтобы
rapidly	['ræpɪdlɪ]	быстро
remote	[rɪ'məut]	дистанционный

specification	[ˌspesəfɪ'keɪʃ(ə)n]	техническая характеристика
trademark	['treɪdmɑːk]	товарный знак
wireless technology	['waɪələs tek'nɔlədʒɪ]	беспроводная технология

3. Read the text and answer the following questions.

1. What is Bluetooth widely used for?
2. When did Ericsson come up with a concept to use a wireless connection?
3. How many companies formed Special Internet Group?
4. What fact shows that the Bluetooth SIG grew very rapidly?
5. What functions does the Bluetooth SIG perform?
6. Why was the Bluetooth standard named after the Danish king Harald Blatand?
7. What was the aim of Bluetooth technology?
8. What frequency band does Bluetooth use for its radio signals?

BLUETOOTH TECHNOLOGY

Bluetooth is widely used as a short range data communications platform for connecting many devices from mobile phones to headphones, and computer mice to computers for many applications including music and audio streaming. Discover how it works in our tutorial. Bluetooth technology has now established itself in the market place enabling a variety of devices to be connected together using wireless technology.

Bluetooth technology has come into its own connecting remote headsets to mobile phones, but it is also used in a huge number of other applications as well.

In fact the development of Bluetooth technology has progressed so that it is now an integral part of many household items. Cell phones and many other devices use Bluetooth for short range connectivity. In this

sort of application, Bluetooth has been a significant success.

The Bluetooth history dates back to 1994 when Ericsson came up with a concept to use a wireless connection to connect items such as an earphone and a cordless headset and the mobile phone. The idea behind Bluetooth (it was not yet called Bluetooth) was developed further as the possibilities of interconnections with a variety of other peripherals such as computers printers, phones and more were realized.

It was decided that in order to enable the development of Bluetooth technology to move forward and be accepted, it needed to be opened up as an industry standard. Accordingly, in Feb 1998, five companies (Ericsson, Nokia, IBM, Toshiba and Intel) formed the Bluetooth SIG - Special Interest Group. The history of Bluetooth shows the Bluetooth SIG grew very rapidly, because by the end of 1998 it welcomed its 400th member. The Bluetooth SIG also worked rapidly on the development of Bluetooth technology. Three months after the formation of the special interest group - it was not yet known as the Bluetooth SIG, the name Bluetooth was adopted.

The following year the first full release of the standard occurred in July 1999. The Bluetooth SIG performs a number of functions:

- Publish and update the Bluetooth specifications
- Administer the qualification programme
- Protect Bluetooth trademarks
- Evangelise Bluetooth technology

The Bluetooth SIG global headquarters is in Kirkland, Washington, USA and there are local offices in Hong Kong, Beijing, China; Seoul, Korea; Minato-Ku, Tokyo; Taiwan; and Malmo, Sweden.

The name of the Bluetooth standard originates from the Danish king Harald Blatand who was king of Denmark between 940 and 981 AD. His name translates as "Blue Tooth" and this was used as his nickname. A brave warrior, his main achievement was that of uniting Denmark under the banner of Christianity, and

then uniting it with Norway that he had conquered. The Bluetooth standard was named after him because Bluetooth endeavours to unite personal computing and telecommunications devices.

The first release of Bluetooth was for a wireless data system that could carry data at speeds up to 721 Kbps with the addition of up to three voice channels. The aim of Bluetooth technology was to enable users to replace cables between devices such as printers, fax machines, desktop computers and peripherals, and a host of other digital devices. One major use was for wirelessly connecting headsets for to mobile phones, allowing people to use small headsets rather than having to speak directly into the phone.

Another application of Bluetooth technology was to provide a connection between an ad hoc wireless network and existing wired data networks.

The technology was intended to be placed in a low cost module that could be easily incorporated into electronics devices of all sorts. Bluetooth uses the licence free Industrial, Scientific and Medical (ISM) frequency band for its radio signals and enables communications to be established between devices up to a maximum distance of around 100 meters, although much shorter distances were more normal.

Bluetooth is well established, but despite this further enhancements are being introduced. Faster data transfer rates, and greater flexibility. In addition to this efforts have been made to ensure that interoperation has been improved so that devices from different manufacturers can talk together more easily.

4. Match the words similar in meaning.

1. Publish	a) machine
2. Device	b) important
3. Progress	c) take place
4. Significant	d) distant
5. Remote	e) issue
6. Occur	f) develop

5. Match the words opposite in meaning.

1. Forward	a) slowly
2. Rapidly	b) high
3. Enable	c) backward
4. Low	d) stiffness
5. Flexibility	e) longer
6. Shorter	f) disable

6. Translate the following word combinations into Russian.

1. Local offices
2. Brave warrior
3. Integral part
4. Variety of devices
5. Wireless connection
6. Further enhancement
7. Easily incorporated
8. Data networks
9. To come into own

7. Find the English equivalents to the following word combinations in the text.

1. Подключать удалённую гарнитуру
2. Передавать данные
3. Промышленный стандарт
4. Главные достижения
5. Разные производители
6. Частотный диапазон
7. Скорость передачи данных
8. Предметы домашнего обихода

8. Complete the sentences using the text.

1. _____, but it is also used in a huge number of other applications as well.

2. The history of Bluetooth shows the Bluetooth_____of 1998 it welcomed its 400th member.

3. The first release of Bluetooth was for a wireless data system _____with the addition of up to three voice channels.

4. Another application of Bluetooth technology was to provide a connection between _____.

5. Bluetooth is well established, but despite this _____introduced.

9. Reorder the words to make a sentence.

1. The following/ the first/ standard/ of the/ year/ full release/ occurred/ in/ full/ 1999/ July.
2. The history/ its 400th/ of/ 1998/ shows/ very rapidly/ because/ grew/ the/ by/ the Bluetooth SIG/ welcomed/ member/ Bluetooth/ of/ end/ it.
3. The technology/ low cost/ easily/ into/ incorporated/ to be placed/ that/ could be/ was intended/ devices/ in a/ module/ electronics/ of all sorts.
4. Faster/ transfer/ flexibility/ and/ greater/ data/ rates.

10. Divide the text "Bluetooth Technology" into logical parts and give subtitles to each part.

11. Retell the text.

12. Read the following text and make the list of facts and fiction about Bluetooth.

BLUETOOTH FACT OR FICTION

Like many technologies on the market today, Bluetooth experienced its share of weirdness and wrong information. Are you ready to play Bluetooth: Fact or Fiction? Let's go!

Bluetooth technology was named after a 10th century Danish King.

Fact! The name Bluetooth comes from the 10th century Danish King Harald Blåtand or Harold Bluetooth in English. King Blåtand helped unite warring factions in parts of what are now Norway, Sweden and Denmark. Similarly, Bluetooth technology was created as an open standard to allow connectivity and collaboration between disparate products and industries.

Bluetooth was initially conceived as a replacement for RS-232 standard cables.

Fact! But its value, and huge success, came from creating a Personal Area Network (PAN) of devices, from light bulbs to headsets and everything in between.

Bluetooth was created by Hedy Lamarr, a famous actress and inventor.

Fiction (based on fact)! Hedy Lamarr developed spread spectrum and frequency hopping technology, which is incorporated in modern Bluetooth technology and essential for Adaptive Frequency Hopping, which is what makes Bluetooth a good-neighbor technology and limits interference.

A2DP, GATT, HID and BIP are all important Bluetooth profiles.

Fact! A2DP (Advanced Audio Distribution Profile) makes streaming stereo music possible. GATT (Generic Attribute Profile) allows developers to build unique profiles specific for their applications (Bluetooth fork, anyone?). HID (Human Interface Device Profile) makes your Bluetooth enabled mice and keyboards work effortlessly. BIP (Basic Imaging Profile) allows you to send images between devices (other phones, printers, even picture frames).

Bluetooth causes headaches.

Fiction! There is no clear evidence that radio frequency (RF) waves cause any harmful health effects. Bluetooth headsets have an SAR (Specific Absorption Rate) value of around .001 watts/kg (less than 1/1000th the SAR limit for cell phones set by the FDA and FCC).

https://www.bluetooth.com/what-is-bluetooth-technology/bluetooth-fact-or-fiction

UNIT 14

WI-FI

1. Read the following words and try to remember them.

VOCABULARY

baseline	[ˈbeɪslaɪn]	базовый
estimate	[ˈestɪmət]	оценка
to harness	[ˈhɑːnəs]	использование
to outnumber	[ˌaʊtˈnʌmbər]	превосходить
report	[rɪˈpɔːt]	доклад
respondent	[rɪˈspɒndənt]	ответчик
surge	[sɜːdʒ]	всплеск
survey	[ˈsɜːveɪ]	опрос
vendor	[ˈvendə]	поставщик

2. *Read the text and answer the questions below*

1. What is this text about?
2. What does Wi-Fi mean?
3. What do you think about future developments of Wi-Fi?
4. What did the survey highlight?

Wi-Fi

More than half of operators plan to deploy carrier-grade Wi-Fi.

The Wireless Broadband Alliance (WBA), the industry association focused on driving next generation Wi-Fi and its role in Public Wi-Fi services, Internet of Things (IoT), Big Data, Converged Services, Smart Cities and 5G, today published its annual report on the state of the Wi-Fi ecosystem, compiled by global research company Maravedis-Rethink.

The report reveals that 57% of Operators have firm timelines in place for the deployment of Carrier-Grade network architecture. In addition, the research showed that by 2020 80% of respondents plan to have deployments in the areas if

IoT/M2M and more than half already have plans for Converged Services and Smart Cities.

This year's survey also highlighted that, as confidence grows in Carrier-grade WI-Fi, the shift away from Best Effort networks will continue to gather speed. At current growth, the report estimates that Carrier-grade hotspots will outnumber best effort in the installed base by the end of 2017 and by 2020 only a small legacy base of best effort hotspots will remain – less than 10% of the total – with all new deployments being Carrier-grade or better. Such findings indicate how rapidly the Wi-Fi services landscape is changing, driven by the new business imperatives, which are the baseline for further innovation and deployments.

"Increased Operator confidence in Carrier grade Wi-Fi technology has led to a surge in the growth of deployments over the past 12 months and set a trend that will to continue. Within 5 years there will be as much as a 70% rise in the number of Carrier-grade public Wi-Fi hotspots deployed, vastly outnumbering current best effort," said Srikanth Shenwai, CEO of the WBA. "These shifts mean that the themes of the WBA's Vision 2020 are equally applicable to all the ecosystem's stakeholders; Accelerating development of relevant technologies to keep pace with the rapidly changing landscape. Diversifying in time with the changing face of the Wi-Fi ecosystem, and increasing investment in development, testing and deployments to continue the push towards Wi-Fi ubiquity, unlicensed wireless, IoT, 5G and beyond."

The survey has demonstrated a growing momentum within the ecosystem away from talking about the benefits of Carrier-grade to actually realizing its potential in high-growth areas such as IoT and Smart Cities via deployment. Next Generation Hotspot and pass point technology have been fundamental enablers in the transition to Carrier-grade WI-Fi and as investment increases so the potential returns will grow as new revenue streams develop.

The report also discovered the growing use of Wi-Fi as a strategic platform by an increasing variety of service providers including pure-plays, aggregators, MNOs, MSOs and vertical market operators. In 2015, almost one-quarter of the

business value of Wi-Fi relates to reduced costs and overall ARPU improvement, but by 2019, these companies expect to be harnessing Wi-Fi, often in combination with their own networks, to generate incremental revenues directly. The biggest opportunities are seen in smart cities, Wi-Fi First and multiple bundles including everywhere access to content and applications.

The survey carried out during Q3 2015, had a total of 212 respondents: 38% of those being operators. Other significant respondent groups were Wi-Fi equipment and device vendors, with 28% and consultants/integrators, 17%. The majority of responses came from North America (40%) and Europe (26%), followed by Asia-Pacific (16%).

3. ***Translate the following word combinations into Russian.***

1. Significant respondent groups
2. Increasing variety of service
3. Growing momentum
4. Diversifying in time
5. Carrier grade Wi-Fi technology
6. Surge in the growth of deployments

4. Find English equivalents to the following word combinations in the text.

Новое поколение; сетевая архитектура; набирать обороты; умный город; рост доверия; горячие точки; дальнейшие инновации; рост внедрений; раскрыть свой потенциал; стратегическая платформа; в общей сложности; снижение затрат; в равной степени применимы.

5. Match the following terms with their definitions.

1. Firm	a) is a person who is employed to operate or control a machine.

2. Service	b) an organization which sells or produces something or which provides a service, which people pay for.
3. Operator	c) a system or group of connected parts.
4. Finding	d) how fast something moves or happens.
5. Network	e) You can sometimes refer to an organization or private company as a particular service when it provides something for the public or acts on behalf of the government.
6. Speed	f) the information they get or the conclusions they come to as the result of an investigation or some research.
7. Plan	g) an arrangement for what you intend to do or how you intend to do something

6. Complete the sentences using the text.

1. The report reveals that 57% of Operators have firm timelines in place for the … of Carrier-Grade network architecture.
2. The survey carried out during Q3 2015, had a total of 212 respondents: 38% of … being operators.
3. The biggest opportunities … in smart cities, Wi-Fi First and multiplay bundles including everywhere access to content and applications.
4. Such findings … how rapidly the Wi-Fi services landscape is changing, driven by the new business imperatives,
5. They are the baseline … further innovation and deployments.

7. Mark the following sentences True or False.

1. Decreased Operator confidence in Carrier grade Wi-Fi technology has led to a surge in the growth of deployments over the past 12	

months and set a trend that will to continue.	
2. The report also discovered the growing use of Wi-Fi as a strategic platform by an increasing variety of service providers including pure-plays, aggregators, MNOs, MSOs and vertical market operators.	
3. The survey carried out during Q3 2015, had a total of 212 respondents: 38% of those being operators.	
4. The report reveals that 75% of Operators have firm timelines in place for the deployment of Carrier-Grade network architecture.	
5. How rapidly the Wi-Fi services landscape is changing, driven by the new business imperatives, which are the baseline for further innovation and deployments.	

8. Insert prepositions and translate the sentences.

1. Diversifying … time … the changing face … the Wi-Fi ecosystem.
2. The survey carried out during Q3 2015, had a total of 212 respondents: 38% o… those being operators. Increased operator confidence … Carrier grade Wi-Fi technology has led … a surge … the growth … deployments over the past 12 months. 3). More than half … operators plan to deploy carrier-grade Wi-Fi.
3. Such findings indicate how rapidly the Wi-Fi services landscape is changing, driven … the new business imperatives, which are the baseline … further innovation … deployments.
4. Accelerating development … relevant technologies to keep pace … the rapidly changing landscape.

9. Make up the outline of the text. Write the summary of the text.

10. Read the texts about the history and evolution of WI-FI. Write a summary of the texts.

THE HISTORY OF WI-FI

If you are under 21, you probably cannot conceive of an unconnected world. For many, mobile devices are literally an extension of their arm. How did we get to

this world – 7.1 billion people and 7.2 billion mobile devices, where communication, pop culture, business, news, and personal social lives are completely intertwined – and completely ubiquitous? The history of Wi-Fi is really the history of modern communication. Following are some, although clearly not all, of the highlights that led us to modern Wi-Fi.

1896. World population is ~1.6 billion people. AT&T has about 500,000 telephones in the Bell System. Guglielmo Marconi develops the first wireless telegraph system, establishing the foundation for all future radio technology.

1947. World population is now ~2.6 billion. Most homes do not yet have television, but the first ever mass audience of ~ 3.9 million people crowd into taverns to watch the first televised World Series. The merger of computers and communications is born with the invention of the transistor. Bell Labs scientists John Bardeen, Walter Brattain and William Shockley win the 1956 Nobel Prize for this epic invention.

1962. 9 out of 10 US households now have a TV – 52 million sets. Telstar, The first communication satellite, is launched into orbit.

1969. Over 125 million people tune in to watch the Apollo 11 Moon Landing – mostly in black and white. Arpanet, the first workable prototype of the Internet, is launched. It uses packet switching to allow multiple computers to communicate on a single network.

1985: Over 340,000 US citizens carry cell phones. The FCC releases 3 "garbage bands" for use without a government license: 900MHz, 2.4GHz and 5.8GHz, radiofrequencies then allocated to non-communication purposes like microwave ovens. The IEEE ((Institute of Electrical and Electronics Engineers) and WECA, (Wireless Ethernet Compatibility Alliance) form soon thereafter. A set of media access control (MAC) and physical layer (PHY) specifications for implementing wireless local area network (WLAN) called 802.11 (Max 2 Mbps) is developed..

1990. 12.5 million cell phone subscribers worldwide. Computer scientist Tim Berners-Lee, with the help of Robert Cailliau, completes the first successful

communication between a computer and a server, a critical step in the development of the World Wide Web.

1997 – 2000. World population has reached ~6 billion people. 140.2 million personal computers are sold worldwide; more than half of US households now have a PC. A committee, made up of engineers from NCR Corporation, Bell Labs, and IEEE agree on an industrywide wireless standard; a data transfer rate of two megabits per second, using either of two spread spectrum technologies, frequency hopping or direct sequence transmission. 802.11a and 802.11b, (Max 11 Mbps) are released, and a big explosion in wireless capabilities occurs. In 1999, "IEEE 802.11b Direct Sequence" is renamed "Wi-Fi" by cobrand-consulting firm Interbrand Corporation. Lucent develops a Wi-Fi adapter for under $100, and Apple introduces Wi-Fi on the iBook, under the brand name AirPort.

2003 – 2007. The number of mobile-phone users in the U.S. surpasses the number of conventional land-based phone lines. Steve Jobs unveils the very first iPhone, a Wi-Fi dependent computer that happened to make phone calls. 802.11g 802.11e and 802.11n are released (with 802.11n topping out at Max 600 Mbps).

2009 – 2015: Starbucks announces free Wi-Fi at all their shops. Mobile digital media time in the US is now significantly higher at 51% compared to desktop (42%). Social media plays a major role in The Arab Spring. Barrack Obama@POTUS sends his first Tweet. And the number of mobile devices now outnumbers humans. 802.11v, 802.11k, 802.11u, 802.11acI, and 802.11acII are all released. (With 802.11acII topping out at Max 6.93 Gbps).

So here we are. From the invention of radio frequencies, to a Wi-Fi protocol speed now 3548 times faster than when it was first invented. The history of Wi-Fi really is the history of all modern communication.

http://www.ucopia.com/news/history-of-wi-fi

THE EVOLUATION OF Wi-Fi

Since its inception, Wi-Fi has played an integral role in keeping us connected at home and in public. We have come to expect a standard degree of

connectivity wherever we go, and regularly rely on Wi-Fi to maintain our productivity, our organization, our health, and even our protection. But how many of us know the full history behind Wi-Fi technology? How exactly does it work? And just how far it has come in 20 years? Here we have explored the evolution of Wi-Fi, from where it began, what it has helped us achieve, and what future it promises us as we become increasingly interconnected.

What is Wi-Fi, and How Does it Work?

At a base level, Wi-Fi is a way of getting broadband internet to a device using wireless transmitters and radio signals. Once a transmitter receives data from the internet, it converts the data into a radio signal that can be received and read by Wi-Fi enabled devices. Information is then exchanged between the transmitter and the device.

Where it All Began

Wi-Fi was first released for consumers in 1997, when a committee called 802.11 was created. This lead to the creation of IEEE802.11, which refers to a set of standards that define communication for wireless local area networks (WLANs). Following this, a basic specification for Wi-Fi was established, allowing two megabytes per second of data transfer wirelessly between devices. This sparked a development in prototype equipment (routers) to comply with IEEE802.11, and in 1999, Wi-Fi was introduced for home use.

Wi-Fi Frequencies

Wi-Fi uses electromagnetic waves to communicate data that run at two main frequencies: 2.4 GHz (802.11b) and 5 GHz (802.11a). For many years, 2.4 GHz was a popular choice for Wi-Fi users, as it worked with most mainstream devices and was less expensive than 11a.

Getting Stronger

In 2003, faster speeds and distance coverage of the earlier Wi-Fi versions combined to make the 802.11g standard. Routers were getting better too, with higher power and further coverage than ever before. Wi-Fi was beginning to catch

up – competing with the speed of the fastest wired connections.

Overcrowded

The 2.4 Ghz extended range meant that an increasing number of devices (from baby monitors to Bluetooth) were using the same frequency, causing it to become overcrowded and slower. Consequently, 5 GHz became the more attractive option.

Wi-Fi Today and the Internet of Things

The use of Wi-Fi today is summed up nicely by Rethink Wireless: "Wi-Fi performance continues to improve and it's one of the most ubiquitous wireless communications technologies in use today. It is easy to install, simple to use and economical too. Wi-Fi Access Points are now set up at home and in public hotspots, giving convenient internet access to everything from laptops to smartphones. Encryption technologies make Wi-Fi secure, keeping out unwanted intruders from these wireless communications."

However, Wi-Fi is more about simply getting online to check email or browse social feeds. It has also enabled a mind-blowing number of consumer electronics and computing devices to become interconnected and exchange information – a phenomenon known as Internet of Things. It's clear that WiFi is no longer a one-way street – it has become an essential part of our personal and professional day-to-day, and is constantly improving our efficiency, our communication, and is persistently encourages the technology industry to push the boundaries of what's possible.

All in all, the capabilities of Wi-Fi are endless, and with the way things are going, we are incredibly excited to see what the future holds.

http://purple.ai/history-wifi/

11. Choose five new words or phrases from each text. Check their meaning and pronunciation, and try to learn them.

SUPPLEMENTARY READING

Text 1. Antenna cable analyzer makes measurements easy

Measuring antenna cables is never easy. A variety of parameters needs to be measured and access is often limited. However, the need to good accurate antenna cable measurements is necessary when installing and maintaining a variety of equipment from mobile base stations to broadcast transmitters, PMR stations and a variety of receiving applications.

The key is measuring antenna cables is to be able to perform one-port measurements quickly and correctly the first time. That is exactly what network operators, infrastructure manufacturers and their service providers can do with the new handheld R&S Cable Rider ZPH cable and antenna analyzer from Rohde & Schwarz. With its fast measurement speed, intuitive operation and long battery life, it is ideal for use in the field.

Mobile World Congress, Barcelona 2017 — The handheld R&S Cable Rider ZPH cable and antenna analyzer helps infrastructure manufacturers and network operators efficiently install and maintain the steadily increasing number of mobile communications antenna systems. Where the R&S Cable Rider ZPH really stands out is its speed. With a measurement speed of 0.3 milliseconds per data point, it is significantly faster than other instruments. Featuring the fastest boot and warm-up time on the market, the analyzer allows users to start taking fast measurements just over a minute after switching on the R&S Cable Rider ZPH. Moreover, there is no requirement for calibration due to temperature and frequency changes, which saves time.

Another timesaving feature is the use of the wizard function that guides users through measurements in easy-to-follow steps. All settings and measurement steps can be preconfigured. Field technicians only need to execute the test sequences as shown on the display. The wizard helps inexperienced field technicians to avoid operating mistakes when performing antenna and cable

measurements. Since there is no need to change settings manually for different measurements, the analyzer reduces test time during installation and maintenance.

The R&S Cable Rider ZPH is ideal for use in the field. Thanks to its light weight of only 2.5 kilograms and a battery life of nine hours, users can handle a full day's work without interruption. Users will not be delayed due to the battery running down in the middle of a measurement. Furthermore, the analyzer has a large color touchscreen with familiar smartphone-like operation. For example, markers can be placed by double tapping signals on the display. The analyzer can also be operated via the extra-large, widely spaced keys that allow easy handling even when the user wears heavy-duty work gloves.

The R&S Cable Rider ZPH base unit covers a frequency range from 2 MHz to 3 GHz. Extending the frequency range to 4 GHz is straightforward with the R&S ZPH-B4 option, which is enabled via a key code.

http://www.radio-electronics.com/news/antennas-propagation/antenna-cable-analyzer-makes-measurements-easy-8135

Text 2. Signal propagation for satellites

- the effects of the atmosphere on satellite signals

Satellites are widely used these days for everything from navigation, in the case of GPS, satellite television broadcasting, communications, mobile phone technology, Internet broadband weather monitoring and much more.

Satellites normally use frequencies that are in excess of 500 MHz where the signals are not unduly affected by the ionosphere or troposphere. However, some effects can be noticed and are important, especially when planning, installing or setting up a satellite system.

Ground to satellite paths

When signals travel from the ground up to the satellite they pass through four main regions. These are the troposphere, above which is region that is often termed inner free space which is above the troposphere and below the ionosphere. The next region is the ionosphere, and finally there is the outer free space.

There are a number of different of effects that are introduced by these regions. Transmission in free space has unity refractive index and is loss-less (apart from the spreading effect that reduces the signal power over a fixed area with distance away from the source, but no power is actually lost).

The troposphere and ionosphere have refractive indices that differ from unity. The troposphere is greater than unity and the ionosphere is less than unity and as a result refraction and absorption occur. The inner free space region also has little effect.

Faraday rotation

A further effect that is introduced by the ionosphere is known as Faraday rotation which results from the fact that the ionosphere is a magneto-ionic region. The Faraday rotation of a signal causes different elements of a signal to travel in different ways, particularly rotating the plane of polarisation. This can create some problems with reception. A linearly polarised signal can be considered as two contra-rotating circularly polarised signals. The phase velocities of these two signals vary in a magnetic medium such as the ionosphere and as a result the polarisation of the signal changes. The degree of change is dependent upon the state of the ionosphere and it follows the same pattern as that experienced for HF ionospheric communications changing over the course of the day, with the seasons and over the sunspot cycle.

Ionospheric scintillations

Another of the effects introduced by the ionosphere is termed "ionospheric scintillations." These scintillations manifest themselves as a variety of variations of amplitude, phase, and polarisation angle. They can also change the angle of arrival of the signals. These variations change over a period of between one to fifteen seconds, and they can affect signals well into the microwave region.

The variations are caused primarily by the variations in electron density arising in the E region, often as a result of sporadic E but also in the F layer where a spreading effect is the cause. The level of scintillation is dependent upon a number of factors including the location of the earth station and the state of the

ionosphere, as a result of the location, the sunspot cycle, the level of geomagnetic activity, latitude, and local time of day.

The scintillations are more intense in equatorial regions, falling with increasing latitude away from the equator but then rising at high latitudes, i.e. in the auroral zone or the region where auroras take place. The effects are also found to decrease with increasing frequency, and generally not noticeable above frequencies of 1 - 2 GHz. As such they are not applicable to many direct broadcast television signals, although they may affect GPS, and some communications satellites.

Tropospheric effects

There are a number of effects that the troposphere introduces including signal bending as a result of refraction, scintillation, and attenuation.

The signal refraction in the troposphere is in the opposite sense to that in the ionosphere. This is because the refractive index in the troposphere is greater than unity, and it is also frequency independent. The signal refraction gives them a greater range than would be expected as a result of the direct geometric line of sight. Tropospheric ducting and extended range effects that are experienced by terrestrial VHF and UHF communications may also be experienced when low angles of elevation are used.

Scintillations induced by the troposphere are often greater than those seen as a result of the ionosphere. They occur as a result of the turbulence in the atmosphere where areas of differing refractive index move around as a result of the wind or convection currents. The degree to which the scintillations occur is dependent upon the angle of inclination, and above angles of around 15 degrees the effect can normally be ignored. At angles between 5 and 10 degrees the changes can often be around 6 dB at frequencies of around 5 GHz.

Doppler shift

Frequency changes as a result of the Doppler shift principle may be in evidence with signals from some satellites. Satellites in Low Earth Orbits move very quickly, and as a result a Doppler frequency shift is apparent in many cases.

With the satellite moving towards the earth station the frequency appears higher than nominal, and then as it moves away the apparent frequency falls. The degree of shift is dependent upon a number of factors including the speed of the satellite (more correctly its speed relative to the earth station) and the frequencies in use. Shifts of the order of 10 kHz may be experienced. As most satellites operate in a cross mode configuration, the Doppler shift is not just applicable to the band on which the signal is received, but to the cumulative effect of the uplink and downlink transmissions. In many instances the effects will subtract because of the way the satellite mixing process is configured.

Summary

Although satellites generally operate at frequencies that may be thought to be immune from tropospheric and ionospheric disturbance, these regions still have a significant effect and this needs to be taken into account when designing satellite systems.

http://www.radio-electronics.com/info/propagation/satellite/satellite_propagation.php

Text 3. Thread: Wireless Networking for the IoT Age

Greg Fyke of Silicon Labs looks at Thread, a new IoT protocol that provides native IP addressability, mesh networking & low power consumption.

Today's connected homes use a variety of wireless communication standards to connect equipment such as computers, mobile devices, media players and printers. Until now, Wi-Fi has been the workhorse of home networking, particularly when it comes to moving digital multimedia content. Homeowners are now taking the next step, seeking further improvements in comfort, quality of life and energy efficiency by connecting devices such as heating controllers, light sensors, switches and security detectors throughout the home to the Internet. The Internet of Things, IoT, is coming to the connected home.

Like many other IoT devices, the networked sensors and actuators now being proposed for connected home applications are extremely energy sensitive.

Typically they must operate for multiple years using a small battery and are subject to tight constraints on computing power, memory and physical size. The choice of wireless communication standard can determine whether all of the performance and connectivity requirements will be met.

Connectivity Candidates

Today's established wireless communication technologies impose a number of compromises when used to connect "things" in the home to each other and to the Internet. Although Wi-Fi supports very high throughput for transporting audio, video and data throughout the home, power consumption is usually too high for use by small battery-powered devices. On the other hand, native support for Internet Protocol (IP) allows simple and straightforward connection to the Internet. In contrast, Bluetooth® Smart has very low power requirements but was conceived for point-to-point communication and bulk data transfers between smartphones and accessories. The latest Bluetooth Core Specification 4.2 provides a basis for native IP connectivity in the future by adding support for IPv6 and 6LoWPAN.

Low-power mesh networking technologies that utilise the IEEE 802.15.4 radio platform are designed for low-bandwidth control and automation applications. ZigBee PRO has been the dominant protocol for more than a decade, and is well suited to connecting hundreds of sensors and actuators throughout the home. ZigBee PRO networks can communicate at data rates up to 250 kbps, and power demand is low enough to allow multi-year battery life. However, ZigBee PRO does not provide native IP support.

A new IP-based mesh networking option is now available: the Thread protocol has been developed to meet the specific needs of connected home applications and overcome the limitations of current wireless networking standards. The specification was published in April 2015 by the Thread group, which comprises leading global semiconductor, consumer and connected-home brands.

Like ZigBee PRO, Thread utilises the IEEE 802.15.4 radio platform. Unlike ZigBee PRO, however, it provides native IP addressability. In addition, Thread

protocol's low power consumption and support for robust, self-healing mesh networking configurations are features that neither Wi-Fi nor Bluetooth Smart can rival.

http://www.radio-electronics.com/articles/wireless-technology/thread-wireless-networking-for-the-iot-160

Text 4. Using IoT to put safety first in the utilities industry

Cresatech, a specialist in continuous and real-time M2M communication technology, has announced it is partnering with Telit, a global enabler of the Internet of Things (IoT) to enable the real-time monitoring of critical electricity distribution infrastructure.

Copper theft has plagued utility providers over recent years, and often goes unnoticed until things go wrong. For example, until now, those operating in the electricity sector would have been blind to copper theft until a fault occurred, leaving both its employees and the wider public exposed to the potentially deadly combination of live electricity and unearthed equipment. By using Cresatech's CuTS monitoring solution utility providers know immediately where safety has been compromised and take the important corrective action, restoring normal service and mitigating risk.

Powered by Telit's IoT modules and IoT Portal, Cresatech's CuTS solution uses edge computing connectivity to provide a real-time status dashboard and generate alerts when substation earthing is damaged or stolen. Using secure wireless communication, Cresatech's solution integrates seamlessly into Telit's IoT Portal bringing its monitoring sensors online and providing utility service providers up-to-the-minute detailed information on the status of their infrastructure. This helps utility providers maintain complete control of their infrastructure, minimizing outages, improving utility performance and customer satisfaction.

Additionally, in a world increasingly under threat of cyber-attack, it is essential for utility providers to know that the high levels of security protect any

element of online connectivity. Through its work with large corporations, including manufacturing plants where digital security is critical, Telit has a proven track record that ensures a secure platform. This allows utility providers to use Cresatech's solution with complete confidence over cyber security.

Cresatech CEO Simon Nash commented, "Our solution hinges on being able to provide our customers with secure constant connectivity to enable real-time monitoring. Working in the utilities industry we are working with some of the world's largest and most essential companies and by partnering with Telit, we are able to ensure a quality, secure product that meets the needs of our customers."

Sammy Yahiaoui, Telit Vice President of EMEA IoT Services Sales commented, "Cresatech is able to monitor, collect and communicate real-time data securely from exposed service sites and infrastructures in complex operational environments with Telit's end-to-end IoT solutions. The companies together are helping customers to achieve operational, process and safety requirements that reduce cost and mitigate hazardous risks."

http://www.radio-electronics.com/news/wireless-technology/using-iot-to-put-safety-first-8217

Text 5. Primary reference time clock protects against GNSS vulnerabilities

Microsemi has announced the availability of its TimeSource Enhanced Primary Reference Time Clock (TimeSource Enhanced PRTC), a new system enabling telecommunications and mobile operators to meet the new G.8272.1 recommendation from the International Telecommunication Union (ITU), while also protecting against serious threats associated with global navigation satellite system (GNSS) vulnerabilities.

The TimeSource Enhanced PRTC "generates time" by producing its own independent time scale aligned with GNSS, while its phase, time and frequency signal outputs remain autonomous. This provides customers within the communications, power, public safety, data center and government network markets with a secure infrastructure, reducing dependency on GNSS and enabling

network operators to retake control of the timing source used for network synchronization. The new system is also designed to meet the stringent new ITU-T Recommendation G.8272.1, which requires accuracy to within 30 nanoseconds (ns) or better when verified against a time standard such as UTC.

"Worldwide telecommunications, power utilities and other infrastructure customers are in critical need of protection against GNSS vulnerability, and Microsemi's new TimeSource Enhanced PRTC provides a powerful, high performance solution to address this need," said Randy Brudzinski, vice president and business unit manager of Microsemi's Frequency and Time division. "In addition, maintaining less than 30 ns performance is important to mobile operators who require a high level of accuracy to support LTE/4G and the upcoming deployment of 5G."

Massive deployment of GNSS as a timing source for synchronizing telecommunications networks (both wired and wireless) has created security risks to a point where governments, major telecommunications/mobile operators and enterprises are now urgently looking to protect their networks against both regional GNSS issues as well as the potential of a global GNSS outage. Microsemi's TimeSource Enhanced PRTC works with the company's cesium clocks to ensure time is generated in an autonomous manner. Specifically, the TimeSource Enhanced PRTC's "source of time" aligns accurately with GNSS time without being dependent upon it—avoiding any vulnerability to threats caused by jamming and spoofing.

According to Research and Markets' report from market research firm Markets and Markets titled, "Anti-Jamming Market for GPS by Technique (Nulling System, Beam Steering System, Civilian System), Receiver Type (Military & Government Grade, Commercial Transportation Grade), Application, End User, and Geography - Global Forecast to 2022," the anti-jamming market for GPS is expected to reach $4.8 billion and more than 309,000 units by 2022, at a compound annual growth rate (CAGR) of 7 percent and 10 percent, respectively, between 2016-2022. Demand for secured weapons guided systems and increasing

vulnerability of GPS signals due to development of low-cost GPS jammers are the major growth drivers of the market.

http://www.radio-electronics.com/news/satellite-technology/primary-reference-time-clock-protects-against-7725

Text 6. Video sound collaboration system launched for huddle rooms

As businesses and organizations continue to use remote communications technology to bridge distances and share ideas, there has been a proliferation of huddle room and small meeting rooms. These new spaces demand technologies that are more convenient and enable a seamless collaboration experience so users can easily come together to exchange information, share ideas, and collaborate at any time. Yamaha has announced the CS-700, an all-in-one collaboration solution specifically designed to support these environments. The CS-700 combines clear audio with high-quality video to fulfill huddle room requirements and collaboration capabilities in one simple, wall-mounted system.

"The Yamaha CS-700 is the first of many solutions that combine the market expertise of Revolabs with the product expertise of Yamaha to deliver excellent audio, video, and collaboration capabilities," said Yoshi Tsugawa, director, Yamaha Commercial Audio Department. "The CS-700 is the first product in this initiative to demonstrate Yamaha's commitment to the business collaboration market and improving the meeting experience at every level."

Yamaha entered the conferencing market in 2006, offering microphone and speaker systems, including the YVC-1000 USB and Bluetooth conferencing phone. In 2014, the company acquired Revolabs, a provider of audio solutions for unified communications and enterprise collaboration. Together, these companies deliver solutions that ensure participants in remote conferences can hear and be heard clearly in every meeting environment.

The Yamaha CS-700 is the first solution of its kind to bring together comprehensive audio, video, and collaboration capabilities in a wall-mounted system. Combining Revolabs' expertise in microphone technology, Yamaha's

loudspeaker engineering, and new high-quality video and screen sharing capabilities, the CS-700 provides an affordable, simple-to-install, high-fidelity system for successful teamwork from a single USB connection.

For clear, stress-free audio, the CS-700 boasts a beamforming microphone array, ensuring that every word spoken is perfectly captured and delivered to the far end. In addition, four speaker elements provide the highest degree of audio coverage for all the participants in the room. Through the integrated USB port, the CS-700 is ready to connect to the organization's chosen unified communications platform, such as Microsoft Skype for Business, Cisco Spark, GoToConference, Google Chromebox for Meetings, Vidyo, WebEx, Zoom, BlueJeans, and many others. The unit's special wide-angle video camera captures all meeting participants in the room, even those close to the camera. The optical solution ensures a high "pixel-per-face" resolution necessary for participants to recognize nuanced facial expressions that are vital to effective meetings.

Over the same USB connection to their laptop or tablet, users can seamlessly and intuitively join a meeting. This plug-and-play approach allows users to quickly get started without wrestling with disparate video, audio, and collaboration components in the room, thus eliminating complex steps from the process that can waste valuable meeting time or require the assistance of on-call IT staff. In addition, the CS-700's integrated network management system allows IT staff to remotely manage each unit from one location, increasing service response and efficiency.

http://www.radio-electronics.com/news/telecoms-networks/video-sound-collaboration-system-launched-for-8222

Appendix 1

1. Как составить аннотацию к тексту на русском языке

При написании аннотации используйте следующие клише:

Статья (текст) посвящена проблеме/вопросу … В начале статьи

- речь идет о …
- дается определение …
- обосновывается значимость …
- привлекается внимание …

Далее

- описывается …
- рассказывается…
- рассматривается …
- излагается …

В частности

- отмечается, например, …
- подробно излагается …
- описывается схема …
- указывается …
- доказывается мысль …

Наконец

- рассказывается…

В заключение

- приводятся примеры

Подытоживая сказанное, следует отметить …

Как мне кажется, статья может представлять интерес для …

Думается, статья может оказаться полезной для …

2. Как составить аннотацию к тексту на английском языке

Для составления аннотации используйте следующие клише:

The text/article under review … (gives us a sort of information about …).

The article deals with the problem …

The subject of the text is …

At the beginning (of the text) the author describes … (dwells on …; explains…; touches upon …; analyses …; comments …; characterizes …)

The article begins with the description of …, a review of …, the analyses of …

The article opens with …

Then (after that, further on, next) the author passes on to…, gives a detailed (thorough) analysis (description), goes on to say that …

To finish with, the author describes …

At the end of the article the author draws the conclusion that …; the author sums it all up (by saying …)

In conclusion the author …

Appendix 2

Numbers

numbers	25 – twenty-five
	514 – five hundred and fourteen
	7,938 – seven thousand nine hundred and thirty-three
	2,045,238 – two million forty-five thousand two hundred and thirty eight
fractions and decimals	½ kilometer – half a kilometer
	1/3 ton – one third of a ton
	0.2 – point two
	6.145 – six point one four five

Abbreviations

A

A2DP – Advanced Audio Distribution Profile

ARPU – Average Revenue Per User

ADSL – Asymmetric digital subscriber line

AM – amplitude modulation

AGC – automatic gain control

B

BIP – Basic Imaging Profile

Bluetooth SIG – Special Interest Group

C

c/s – cycles per second

CDMA – Code division multiple access

CEO – Chief Executive Officer

E

etc. – Et cetera (and so on – и т.д.)

F

FDM – frequency division multiplexing

FDMA – frequency division multiple access

FM – frequency modulation

G

GATT – Generic Attribute Profile

Gbps – Gigabits per second

GHz – gigahertz

GPS – Global Positioning System

H

Hz – Hertz

HID – Human Interface Device Profile

I

i.e. – id est (то есть, т.е.)

IBM – International Business Machines Corporation

IMTS – improved mobile telephone service

IEEE – Institute of Electrical and Electronics Engineers

IoT – Internet of Things

ISM – Industrial, Scientific and Medical

K

kHz – kilohertz

M

MHz – Megahertz

MAC – media access control

Mbps – Megabits per second

MTSO – mobile telephone switching office

N

NASA – National Aeronautics and Space Administration

P

PAN – Personal Area Network

PSTN – Public Switched Telephone Network

Q

Q factor – добротность

R

RF – radio frequency

S

SAR – Specific Absorption Rate

SIM – Subscriber Identity Module

T

TDM – time division multiplexing

TDMA – time division multiple access

Tl – выделенная линия со скоростью передачи данных 1, 544 Мбит в сек

V

VLA – Very Large Array

VLBI – Very Long Baseline Interferometry

W

WBA – Wireless Broadband Alliance

WECA – Wireless Ethernet Compatibility Alliance

WLAN – wireless local area network

WDM – wavelength division multiplexing

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