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и защиты информации Украины

ODESSA NATIONAL A.S.POPOV ACADEMY OF TELECOMMUNICATIONS

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PRINCIPLES OF COMMUNICATION ENGINEERING

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Пособие охватывает темы:

- виды электросвязи;
- предоставление телекоммуникационных услуг;
- современные информационные технологии.

Пособие состоит из двух частей.

Часть 1 – Communication engineering.

Часть 2 – Modern ICT technologies.

Для студентов, изучающих информационные сети и телекоммуникационные технологии.

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Part I. COMMUNICATION ENGINEERING

1. DEVELOPING OF TELECOMMUNICATIONS

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

Late in the nineteenth century communications facilities were augmented by a new invention – telephone. In the USA its use slowly expanded, and by the 1900s the American Telephone and Telegraph Company controlled 855,000 telephones; but elsewhere the telephone made little headway until the twentieth century. After 1900, however, telephone installations extended much more rapidly in all the wealthier countries. The number of telephones in use in the world grew at almost 100 per cent per decade. But long-distance telephone services gradually developed and began to compete with telegraphic business. A greater contribution to long-range communication came with the development of wireless. Before the outbreak of the First World War wireless telegraphy was established as a means of regular communication with ships at sea, and provided a valuable supplement to existing telegraph lines and cables. In the next few years the telephone systems of all the chief countries were connected with each other by radio. Far more immediate was the influence that radio had through broadcasting and by television, which followed it at an interval of about twenty-five years.

Telephones are as much a form of infrastructure as roads or electricity, and competition will make them cheaper. Losses from lower prices will be countered by higher usage, and tax revenues will benefit from the faster economic growth that telephones bring about. Most important of all, by cutting out the need to install costly cables and microwave transmitters, the new telephones could be a boon to the remote and poor regions of the earth. And in rich places with reasonable telephone systems already in place, the effect of new entrants – the replacement of bad, overpriced services with clever, cheaper ones – is less dramatic but still considerable.

Global phones are not going to deliver all these benefits at once, or easily. Indeed, if the market fails to develop, it could prove too small to support the costs of launching satellites. And these new global telephones reflect a wider trend. Lots of other new communication services – on-line film libraries, personal computers that can send video-clips and sound-bites as easily as they can be used for writing letters, terrestrial mobile-telephone systems cheap enough to replace hard-wired family sets – are already technically possible. What they all need is deregulation. Then any of them could bring about changes just as unexpected and just as magical as anything that Alexander Graham Bell's telephone has already achieved.

Vocabulary list

to augment [ɔ:ɡment] – прибавлять

to benefit (from) – извлекать выгоду; выгода, польза
 boon – преимущество, удобство
 to bring about – вызывать, быть причиной
 broadcasting – трансляция ; радиопередача; вещание
 communications facilities – средства связи
 to compete – конкурировать
 considerable [kən'sɪd(ə)rəb(ə)l] – значительный
 deregulation [dɪ,regjʊ'leɪʃ(ə)n] – отмена регулирования и контроля; дерегуляция
 the development of wireless – развитие беспроводной связи
 entrants – зд. поступления
 hard-wired – проводной
 invention – изобретение
 long-distance telephone services – услуги телефонной связи на большие расстояния
 to make little headway – слабо продвигаться
 a means – средство
 microwave transmitters – микроволновые передатчики
 outbreak ['aʊtbreɪk] – начало
 replacement – замена
 a valuable supplement – значимое (чрезвычайно полезное) добавление
 a sound bite – звуковой фрагмент
 tax revenues – доход от налогов
 terrestrial [tə'restriəl] – наземный

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What were communications facilities augmented by late in the nineteenth century? 2. How many telephones did the American Telephone and Telegraph Company control by 1900? 3. What rate did the number of telephones in use in the world grow at? 4. Did long-distance telephone services begin to compete with telegraphic business? 5. When did a great contribution to long-range communication come? 6. Was wireless telegraphy established as a means of regular communication with ships at sea? 7. Are telephones as much a form of infrastructure as roads or electricity? 8. What will make telephones cheaper? 9. Why aren't global phones going to deliver benefits at once?

Exercise 2. Check how well you understand the following words and word combinations. Make up your own sentences with them.

Communications facilities, by a new invention, its use, to make little headway, telephone installations, rapidly, the number of telephones in use, to compete, regular communication, microwave transmitters, new entrants, to deliver, launching satellites, to reflect a wide trend, on-line film libraries, to send video-clips, terrestrial systems, to provide a valuable supplement.

Exercise 3. Complete the following sentences.

1. By 1900 the American Telephone and Telegraph Company controlled
2. Long-distance services began to compete
3. In the next few years the telephone systems were connected
4. There new global telephones reflect
5. Terrestrial mobile-phone systems are already

DEVELOPING LANGUAGE SKILLS

Exercise 1. Write down questions to which the following statements may serve as the answers, paying attention to the Past Indefinite Tense.

1. In 1833 an English inventor and mathematician Charles Babbage designed the first computer. 2. H.H. Aiken, professor of Harvard University, built the first programmed computer in 1939. 3. They did many operations on the computer. 4. He solved this equation by using a computer. 5. My friend didn't know how to compile the program.

DEVELOPING SPEAKING SKILLS

Exercise 1. Speak about developing of telecommunications in Ukraine.

2. PLAIN OLD TELEPHONE SERVICE

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

The pair of wires going to the telephone transmitter and receiver constitutes a four-wire circuit. The transmitter sends a speech signal down the telephone line, and the receiver receives the signal from the central office. However, a two-wire local loop connects the telephone instrument and hence two-wire to four-wire conversion is needed within the telephone instrument. A center-tapped transformer, called a hybrid, accomplishes this conversion. The leakage current in the secondary receiver circuit depends on how well a balance network exactly matches the impedance of the telephone line. Since this balance network can never match the line perfectly, a small

amount of the received transmitted signal leaks into the receiver circuit, and the user hears one's own speech, an effect known as sidetone . Actually, a small amount of sidetone is desirable because it makes the telephone seem live and natural, and thus the balance network is designed to allow an optimum amount of sidetone. Too much sidetone results in the user pulling the handset away from the head, which reduces the transmitted speech signal-an undesirable effect.

The use of an induction coil to balance the electrical sidetone was patented in 1918 by G.A. Campbell, an AT&T research engineer. The induction coil has been replaced in modern telephones by a speech network that electronically cancels the sidetone leakage and performs the two-wire to four-wire conversion.

The telephone ringer is connected in parallel across the telephone line before the switch hook's contacts. Thomas Watson applied for the first ringer patent in 1878, and today's electromechanical ringers have changed little since then. A hammer attached to an armature with a magnetic field strengthened by a permanent magnet moves in response to the ringer current loudly striking two bells. The high-impedance ringer was invented in 1890 by John J. Carty, a Bell engineer who had invented the two-wire local loop in 1881. A capacitor is placed on series with the ringer to prevent DC from flowing through it. The ringer signal consists of a short 2-s burst of a 75-V (rms), 20-Hz sine wave followed by 4 s of silence. Piezoelectric transducers and small loudspeakers are replacing electromechanical ringers in today's telephones.

The public switched network can be used to transmit and switch any signal that remains within its baseband, namely, about 4 kHz. Thus, devices other than just a telephone network can be used on the telephone network. The recent success of facsimile is one example; modems operating at speeds of 28.8 kb/s are another.

(From A. Michael Noll. The Communications Handbook. CRC Press Inc., 1997)

Vocabulary list

the pair of wires – пара проводов

a four-wire circuit – четырёхпроводная цепь

the central office – телефонная станция

local loop – абонентская линия

conversion [kən'veɪʃ(ə)n] – преобразование

to accomplish – выполнять

a center-tapped transformer – трансформатор со средней точкой

leakage [ˈli:kɪdʒ] – утечка

to match – согласовывать, приводить в соответствие

sidetone – боковая составляющая (спектра сигнала, например, при АМ-модуляции); местный эффект (в телефонии); слышимость собственного микрофона

handset – телефонная трубка
an induction coil – индукционная катушка, индуктор
the balance network – уравнивающая сеть
to cancel – отменить, прекратить
hook – рычаг
a capacitor – конденсатор, емкость
in series – последовательно (соединенный)
in response to – в ответ на

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What constitutes a four-wire circuit? 2. What does a transmitter send down the telephone line? 3. How is a center-tapped transformer called? 4. What does the leakage current in the secondary receiver circuit depend on? 5. Why does a small amount of the received transmitted signal leak into the receiver circuit? 6. What does a sidetone mean? 7. Why is a small amount of sidetone desirable? 8. What does too much sidetone result in? 9. When was the use of an induction coil to balance the electrical sidetone patented? 10. Who was it patented by? 11. What has the induction coil been replaced in modern telephones by? 12. What is the functioning principle of a speech network? 13. How is the telephone ringer connected? 14. Have today's electromechanical ringers changed little or much since 1878? 15. What is a hammer attached to? 16. Who was the high-impedance ringer invented by? When? 17. Why is a capacitor placed in series with the ringer? 18. What does a ringer signal consist of? 19. What is replacing electromechanical ringers in today's telephones? 20. What can the public switched network be used for? Why?

Exercise 2. Multiple choice:

1. A two-wire local loop connects
 - the telephone line;
 - the telephone instrument;
 - terrestrial microwave radio.
2. A network matches the impedance of the telephone line.
 - balance;
 - digital;
 - analog.
3. G. A. Campbell was
 - an AT&T research engineer;
 - a British physicist;
 - a competitive supplier.
4. A speech network electronically the sidetone leakage.

- depends on;
- uses;
- cancels.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the sentences with the correct preposition:

- 1 A hammer moves response to the ringer current loudly striking two bells.
- 2 The induction coil has been replaced in modern telephones a speech network.
- 3 Analog multiplexing is today obsolete telephony.
- 4 Long-distance transmission systems and local carrier systems utilize separate paths each direction of transmission.
- 5 The ringer signal consists a short 2-s burst of a 75 V.
- 6 An echo canceller is required each end of the transmission circuit.

Exercise 2. Ask questions so that the sentences given below were the answers:

- 1 Each baseband telephone channel was shifted in frequency to its own unique 4 kHz channel.
- 2 Today's fiber strands each carry a few gigabits per second.
- 3 A speech network performs the two-wire to four-wire conversion.
- 4 The transmission media and systems have progressed over the decades.
- 5 Today's transmission medium of choice is optical fiber utilizing digital, time-division multiplexing of the voice circuits.
- 6 The balance network is designed to allow an optimum amount of sidetone to make the telephone seem live and natural.
- 7 A number of fiber strands are usually placed together in a single cable.
- 8 The hybrids can not match perfectly the transmission characteristics of each and every local loop.

DEVELOPING SPEAKING SKILLS

Exercise 1. Arrange short debates on the following questions.

- a Can this balance network match the line perfectly?
- b How do you like the idea that a small amount of sidetone is desirable?
- c Why have today's electromechanical ringers changed little since 1878?

3. THEORY OF INFORMATION AND COMMUNICATION

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

In the 1940s, revolution was taking place in our understanding of communication. In 1948 Claude Shannon published a remarkable pair of papers laying the foundations for the modern theory of information and communication.

The key step taken by Shannon was to mathematically define the concept of information. In many mathematical sciences there is considerable flexibility in the choice of fundamental definitions.

Shannon was interested in two key questions related to the communication of information over a communications channel. First, what resources are required to send information over a communications channel? For example, telephone companies need to know how much information they can reliably transmit over a given telephone cable. Second, can information be transmitted in such a way that it is protected against noise in the communications channel?

Shannon answered these two questions by proving the two fundamental theorems of information theory. The first, Shannon's noiseless channel coding theorem, quantifies the physical resources required to store the output from an information source. Shannon's second fundamental theorem, the noisy channel coding theorem, quantifies how much information it is possible to reliably transmit through a noisy communications channel. To achieve reliable transmission in the presence of noise, Shannon showed that error-correcting codes could be used to protect the information being sent. A sophisticated theory of error-correcting codes now exists offering the user a plethora of choices in their quest to design a good error-correcting code. Such codes are used in a multitude of places including, for example, compact disc players, computer modems, and satellite communications systems.

Indeed, classical ideas of error-correction have proved to be enormously important in developing and understanding quantum error-correcting codes. In 1996, two groups working independently, Robert Calderbank and Peter Shor, and Andrew Steane, discovered an important class of quantum codes now known as CSS codes after their initials. By building upon the basic ideas of classical linear coding theory, these discoveries greatly facilitated a rapid understanding of quantum error-correcting codes and their application to quantum computation and quantum information.

The theory of quantum error-correcting codes was developed to protect quantum states against noise. What about transmitting ordinary classical information using a quantum channel? How efficiently can this be done? In 1992 Charles Bennett and Stephen Wiesner explained how to transmit two classical bits of information, while only transmitting one quantum bit from sender to receiver, a result dubbed superdense coding. Even more interesting are the results in distributed quantum computation. Imagine you have two computers networked, trying to solve a particular problem. How much communication is required to solve the problem?

Recently it has been shown that quantum computers can require exponentially less communication to solve certain problems than would be required if the networked computers were classical! A major challenge for the future of quantum computation and quantum information is to find problems of real-world importance

for which distributed quantum computation offers a substantial advantage over distributed classical computation.

(From Michael A. Nielsen and Isaac L. Chuang. Cambridge University Press)

Vocabulary list

to define [dɪ'faɪn] – определять
flexibility – гибкость
related to – связанный с
over a communications channel – по каналу связи
noiseless ['nɔɪzɪs] – бесшумный
noisy – шумный
coding theorem [θɪərəm] – теорема кодирования
to quantify [kwɒntɪfaɪ] – определять количество
reliable – надежный
quest – поиски
plethora [ple θərə] – множество; избыток
to dup – подгонять; выравнивать
superdense – сверхплотный; сверхкомпактный
exponentially – показательно
quantum computation – квантовое вычисление

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the questions.

1. When did Claude Shannon publish his remarkable paper? 2. What does it deal with? 3. What key questions was Shannon interested in? 4. What helped him to answer these two questions? 5. Characterize Shannon's noiseless channel coding theorem. 6. What can you say about his second fundamental theorem? 7. Can error-correcting codes be used to protect the information being sent? 8. Where are error-correcting codes used? 9. What have classical ideas of error-correction proved? 10. What did two groups discover? 11. What was the theory of quantum error-correcting codes developed for? 12. Who explained how to transmit two classical bits of information? 13. How can these two bits of information be transmitted? 14. What is a major challenge for the future of quantum computation and quantum information?

Exercise 2. Find the English equivalents for the following words and word combinations in the text and memorize them.

Заложив основу для, основной шаг, математические науки, определить концепцию, большая гибкость, послать информацию, шум в канале связи, основные теоремы, определить количество физических ресурсов, источник информации, надежно передавать, программа (коды) исправления ошибок,

множество, работающий независимо, квантовые коды, теория линейного кодирования, применение, защищать от, сверхплотное кодирование, решить проблему, преимущество над.

Exercise 3. Multiple choice:

1. Shannon was interested in two key questions related to
 - the use of an induction coil;
 - the communication of information over a communications channel;
 - the main transmission paths within a WAN.

2. The noisy channel coding theorem quantifies how much it is possible to reliably transmit through a noisy communications channel.
 - electricity;
 - multiplexing;
 - information;

3. The theory of was developed to protect quantum states against noise.
 - quantum error-correcting codes;
 - cryptography;
 - two random variables;

4. In Charles Bennett and Stephen Wiesner explained how to transmit two classical bits of information.
 - 1996;
 - 1948;
 - 1992.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Write down questions to which the following statements may serve as the answers paying attention to the modals with the Infinitive Passive.

1. A margin can be computed using any number of used subchannels. 2. The procedure to analyze the maximum data rate for the multitone system can be summarized in five steps. 3. A generic cell rate algorithm must be specified as the formal definition of traffic conformance. 4. Because of the fast reconfigurability this switching fabric could be applied in a variety of different switching applications. 5. These techniques can be subdivided into two main classes. 6. Specific codes can be constructed for different values of N. 7. The echo attenuation must be provided by the echo canceller to achieve proper system operation. 8. Frequency-division multiplexing links could be established between equipment of different vendors.

Exercise 2. Choose the necessary verb form to complete the following sentences.

fill known depends is contains performs used is be removed

1. The reliability of the network on the ability of the optical cross-connect system to reconfigure.
2. Each time slot on each input a unique channel of user data.
3. A user may the total bandwidth available on the facility to the switch.
4. The exchange the required action and sends a CONTINUE message to the database.
5. The basic principles of diversity have been since 1927 when the first experiments in space diversity were reported.
6. The probability of error for a multitone system the average of the probabilities of error for each of the subchannels.
7. The high-frequency quantization noise in the receive channel must by the digital decimation filters.
8. This line code is in Ethernet local area networks.
9. The special code pulses facilitating synchronization even when the original data has a long string of zeros.

DEVELOPING SPEAKING SKILLS

Exercise 1. Prepare your arguments for the following statement:

Claude Shannon laid the foundations for the modern theory of information and communication.

4. NETWORKS

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

LANs (Local Area Networks)

Networking allows two or more computer systems to exchange information and share resources and peripherals.

LANs are usually placed in the same building. They can be built with two main types of architecture: peer-to-peer, where the two computers have the same capabilities, or client-server, where one computer acts as the server containing the main hard disk and controlling the other workstations or nodes, all the devices linked in the network (e.g. printers, computers, etc.).

Computers in a LAN need to use the same protocol, or standard of communication. Ethernet is one of the most common protocols for LANs.

A router, a device that forwards data packets, is needed to link a LAN to another network, e.g. to the Net.

Most networks are linked with cables or wires but new Wi-Fi, wireless fidelity, technologies allow the creation of WLANs, where cables or wires are replaced by radio waves.

To build a WLAN you need access points, radio-based receiver-transmitters that are connected to the wired LAN, and wireless adapters installed in your computer to link it to the network.

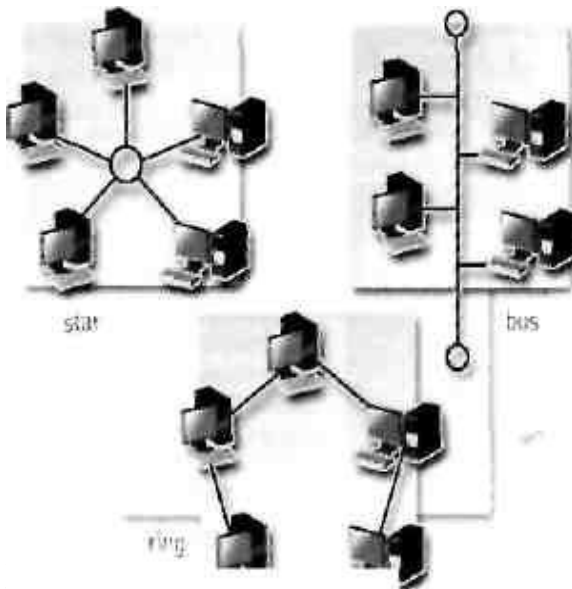
Hotspots are WLANs available for public use in places like airports and hotels, but sometimes the service is also available outdoors (e.g. university campuses, squares, etc.).

Network topology

Topology refers to the shape of a network. There are three basic physical topologies.

- Star: there is a central device to which all the workstations are directly connected. This central position can be occupied by a server, or a hub, a connection point of the elements of a network that redistributes the data.
- Bus: every workstation is connected to a main cable called a bus.
- Ring: the workstations are connected to one another in a closed loop configuration.

There are also mixed topologies like the tree, a group of stars connected to a central bus.



limit and may connect computers or LANs on
usually linked through telephone lines, fibre-
transmission paths within a WAN are high-speed

phone networks.
the Internet.

сурсами

от одного самостоятельного узла к другому

to have capabilities – иметь возможности

a node – узел (сети передачи данных)

Ethernet – стандарт организации локальных сетей

a router – маршрутизатор, (роутер)

to forward data packets – передавать пакеты данных

a wire – провод

wireless fidelity – беспроводная точность воспроизведения

to replace – заменять

to install – устанавливать
 a campus – студенческий городок
 to refer to – относиться к
 a hub – узел, концентратор (сети)
 to redistribute – перераспределять
 a closed loop – замкнутое кольцо; замкнутая двухпроводная линия; петля
 a fibre-optic cable – волоконно-оптический кабель
 a transmission path – канал передачи, тракт передачи
 a high-speed line – высокоскоростная линия
 a backbone – опорная сеть, магистраль сети
 bus – шина
 in existence – существующий

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the questions

1. What does networking allow to do?
2. Where are LANs usually placed?
3. What types of architecture are typical for LANs?
4. What do computers in a LAN need to use?
5. What is the most common protocol for LANs?
6. What is a router? Why is it necessary?
7. How are most networks linked?
8. What do you need to build a WLAN?
9. What are hotspots?
10. Give a definition of a topology.
11. What basic physical topologies do you know?
12. What can be said of WANs?

Exercise 2. Read and correct the following statements

1. LANs link computers and other devices that are placed far apart.
2. In a client-server architecture, all the workstations have the same capabilities,
3. The word protocol refers to the shape of the network.
4. Routers are used to link two computers.
5. Access points don't need to be connected to a wired LAN.
6. Wireless adapters are optional when you are using a WLAN.
7. Hotspots can only be found inside a building.
8. The Internet is an example of a LAN.
9. Wireless WANs use fibre and cable as linking devices.

Exercise 3. Use the words in the box to complete the sentences

LAN	nodes	hub	backbones	WLAN	peer-to-peer	server
-----	-------	-----	-----------	------	--------------	--------

1. All the PCs on a are connected to one, which is a powerful PC with a large hard disk that can be shared by everyone.
2. The style of networking permits each user to share resources such as printers.

3 . The star is a topology for a computer network in which one computer occupies the central part and the remaining are linked solely to it.

4 . At present Wi-Fi systems transmit data at much more than 100 times the rate of a dial-up modem, making it an ideal technology for linking computers to one another and to the Net in a

5 . All of the fibre-optic of the United States, Canada and Latin America cross Panama.

6. A joins multiple computers (or other network devices) together to form a single network segment, where all computers can communicate directly with each other.

Exercise 4. Read these descriptions of different physical topologies of communication networks and match them with the correct terms

- All the devices are connected to a central station.
- In this type of network there is a cable to which all the computers and peripherals are connected.
- Two or more star networks are connected together; the central computers are connected to a main bus.
- All devices (computers, printers, etc.) are connected to one another forming a continuous loop.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Make the following sentences interrogative, paying attention to the Future Simple.

1. The Virtual Local Network interface will have one client process on each host.
2. Different instances of the cluster will utilize different physical local networks.
3. A general distinction will be made between these services designed for the wider consumer market.
4. In the wireless multimedia age, standard voice telephony will be enhanced by the use of data, streaming video, and graphic images.
5. The use of wireless local area networks will enable corporations to provide employees with access to a whole range of services.
6. New equipment will take time to be delivered and installed.
7. Over 45,000 feet of hybrid copper/optical cabling will integrate different facilities in physical star topology.
8. Data voice and multimedia traffic will flow over the Global fiber-optic backbone at greater speed.

DEVELOPING SPEAKING SKILLS

Think of the advantages and disadvantages of using networks. Discuss it in class.

5. THE INTERNET

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

What the Internet is

The Internet is an International computer Network made up of thousands of networks linked together. All these computers communicate with one another; they share data, resources, transfer information, etc. To do it they need to use the same language or protocol: TCP / IP (Transmission Control Protocol / Internet Protocol) and every computer is given an address or IP number. This number is a way to identify the computer on the Internet.

Getting connected

To use the Internet you basically need a computer, the right connection software and a modem to connect your computer to a telephone line and then access your ISP (Internet Service Provider).

The modem (modulator-demodulator) converts the digital signals stored in the computer into analogue signals that can be transmitted over telephone lines. There are two basic types: external with a cable that is plugged into the computer via a USB port, and internal, an expansion card inside the computer. A PC card modem is a different, more versatile option for laptops and mobile phones.

At first most computers used a dial-up telephone connection that worked through the standard telephone line. Now a broadband connection, a high data transmission rate Internet connection, has become more popular: either ADSL (Asymmetric Digital Subscriber Line), which allows you to use the same telephone line for voice and fast access to the Internet, or cable, offered by most TV cable providers.

The basic equipment has changed drastically in the last few years. You no longer need a computer to use the Internet. Web TV provides email and access to the Web via a normal TV set plus a high-speed modem. More recently, 3 Generation mobile phones and PDAs, personal digital assistants, also allow you to go online with wireless connections, without cables.

Telephone lines are not essential either. Satellites orbiting the earth enable your computer to send and receive Internet files. Finally, the power-line Internet, still under development, provides access via a power plug.

Components of the Internet

The Internet consists of many systems that offer different facilities to users.

WWW, the World Wide Web, a collection of files or pages containing links to other documents on the Net. It's by far the most popular system. Most Internet services are now integrated on the Web.

Email, or electronic mail, for the exchange of messages and attached files.

Mailing lists (or **listservs**) based on programs that send messages on a certain topic to all the computers whose users have subscribed to the list.

Chat and **instant messaging**, for real-time conversations; you type your messages on the keyboard.

Internet telephone, a system that lets people make voice calls via the Internet.

Video conference, a system that allows the transmission of video and audio signals in real time so the participants can exchange data, talk and see one another on the screen.

File Transfer Protocol (FTP), used to transfer files between computers.

Newsgroups, where people send, read and respond to public bulletin board messages stored on a central computer.

TELNET, a program that enables a computer to function as a terminal working from a remote computer and so use online databases or library catalogues.

Vocabulary list

to be made up of – состоять из

to get connected – присоединяться, подключаться к

to access – получать доступ к

external – внешний

internal – внутренний

an expansion card – дополнительная карта

a dial-up telephone connection – соединение, осуществляемое при помощи дозвона

a broadband connection – широкополосное соединение

drastically [ˈdræstɪk(ə)li] – решительно, существенно, коренным образом

essential [ɪˈsenʃ(ə)l] – существенный, важный

power-line Internet – Интернет через линии электропитания

a power plug – источник питания

to offer different facilities – предлагать различные технические возможности

an attached file – прикрепленный файл

to subscribe to – подписаться на

to respond to public bulletin board – отвечать на электронные объявления

a remote computer – удаленный компьютер

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What is the Internet?
2. What happens when computers communicate with one another?
3. What is every computer given?
4. What do you need to use the Internet?
5. What does the modem convert?
6. What types of modems are there?
7. At first

most computers used a dial-up telephone connection, didn't they? 8. What has become more popular nowadays? 9. Does Web TV provide email and access to the Web via a normal TV set plus a high-speed modem? 10. Aren't telephone lines essential either? 11. Speak about components of the Internet.

Exercise 2. Read these sentences and decide if they are *True* or *False*. If they are false, correct them.

1. The Internet and the World Wide Web are synonyms.
2. Computers need to use the same protocol (TCP / IP) to communicate with each other.
3. Web TV can provide access to the Net.
4. ADSL and cable are two types of dial-up connections.
5. External, internal and PC card are types of connections.
6. Information can be sent through telephone lines, satellites and power lines.
7. The computer IP number is a way to identify it on the Internet.

Exercise 3. What Internet system should these people use?

1. 'I like receiving daily updates and headlines from newspapers on my computer.'
2. 'I'm doing some research and need computer access to the University library.'
3. 'I'd like to avoid flying to Japan to attend the meeting but I want to see what's going on there.'
4. 'I want to read people's opinions about environmental issues and express my views.'
5. 'I have designed a web page and want to transfer the data to my reserved web space.'
6. 'I'd like to check my students' draft essays on my computer and send them back with my suggestions.'
7. 'I don't want to spend too much money on international phone calls but I love hearing his voice.'
8. 'I live in a small village where there are no other teenagers. I wish I had the chance to meet and chat with friends.'

DEVELOPING SPEAKING SKILLS

Exercise 1. Speak about the role the Internet plays in your life.

6. SWITCHBOARD

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

In the old days, one telephone was connected to another telephone at switchboards operated by humans. A **switchboard** (also called a **manual exchange**)

was a device used to connect a group of telephones manually to one another or to an outside connection, within and between telephone exchanges or private branch exchanges (PBXs). The user was typically known as an operator. The human operators used cords with plugs at each end to make the connections. Each plug had a tip and a ring about the tip to create the electric circuit to carry the signals. A sleeve was used for signalling purposes to indicate whether a circuit was in use. Each human operator could reach as many as 10,000 jacks. Public manual exchanges disappeared during the last half of the 20th century, leaving a few PBXs working in offices and hotels as **manual branch exchanges**.

The electromechanical automatic telephone exchange, invented by Almon Strowger in 1888, gradually replaced manual switchboards in central telephone exchanges.

Manual PBXs have also for the most part been replaced by more sophisticated devices or even personal computers, which give the operator access to an abundance of features. In modern businesses, a PBX often has an attendant console for the operator, or an auto-attendant avoiding the operator entirely.

The switchboard is usually designed to accommodate the operator to sit facing it. It has a high backpanel which consists of rows of jacks, each jack designated and wired as a local extension of the switchboard (which serves an individual subscriber) or as an incoming or outgoing trunk line. The jack is also associated with a lamp.

When a call is received, a jack lamp lights up on the back panel and the operator responds by placing the rear cord into the jack and throwing the front key forward.

As telephone exchanges converted to automatic, or direct dial, service, switchboards remained in use for specialized purposes. Before the advent of direct-dialed long distance calls, a subscriber would need to contact the long-distance operator in order to place a call. In large cities, there was often a special number, such as 1-1-2 or 2-1-1, which would ring the long-distance operator directly. Elsewhere, the subscriber would ask the local operator to ring the long-distance operator.

Calls can be connected by physically connecting wires to create an electrical path, a technique called space switching. With space switching, individual telephone circuits are connected physically to each other by some form of electromechanical or electronic switch. Calls can also be connected by reordering the time sequence of digitized samples, a technique called time switching. Modern digital switching systems frequently utilize both techniques in the switching network.

The switching network in today's switching systems is completely digital. Telephone signals either arrive in digital or are converted to digital. The digital signals are then switched, usually using a combination of electronic space switching along with time switching of the sequence of digitized samples. The space switches are shared by a number of digital calls connecting each of them for short durations while a small number of bits in each sample are transferred.

Vocabulary list

a switchboard – телефонный коммутатор, АТС
 manual exchange – коммутатор; ручная телефонная станция; ручной коммутатор каналов
 telephone exchange – телефонный коммутатор (станция)
 public branch exchange – внутренняя телефонная станция с внешними линиями связи
 gradually – постепенно
 to replace – заменять
 sophisticated devices – сложные устройства
 to give access to – обеспечивать доступ к
 an abundance [ə'bʌndəns] – изобилие, избыток, богатство, множество
 to accommodate [ə'kɒmədeɪt] – размещать
 jack – клеммное гнездо
 a sleeve – патрубок
 local extension – местный добавочный номер
 long-distance calls – междугородние звонки
 space switching – пространственная коммутация; коммутация с пространственным разделением каналов
 time switching – временная коммутация; коммутация с разделением по времени
 gear – расположенный сзади
 plug – вилка (телефонная)
 digitized samples – оцифрованные образцы

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions:

- How was one telephone connected to another?
- What was a switchboard?
- Who was typically known as an operator?
- What did each plug have?
- What was a sleeve used for?
- How many jacks could each operator reach?
- When did PBXs disappear?
- Who invented the electromechanical automatic telephone exchange?
- What have manual PBXs been replaced by?
- What do modern PBXs often have?
- How is the switch board usually designed?
- What is each jack also associated with?
- What happens when a call is received?
- What would a subscriber need to do?
- How can calls be connected?
- What can you say about modern digital switching systems?
- Is the switching network in today's switching systems completely digital?

Exercise 2. Translate the following words and word combinations.

In the old days, to be connected to, operated by, a device, manually, to connect, within and between, telephone exchange, typically, to use cords, an operator, a plug, a

tip, to create the electric circuit, a sleeve, to indicate, a circuit, to be in use, gradually, sophisticated devices, an access, features, a console, backpanel, jacks, to convert to, advent, direct-dialed long distance calls, to place a call, a subscriber, to connect wires, to create an electric path, space switching, time switching, by reordering, to utilize, completely, digital signals, to transfer.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Translate the following sentences. Use a dictionary.

1. Алман Струоджер изобрёл автоматический телефонный коммутатор декадно-шагового типа ёмкостью до 99 абонентов.
2. АТС – устройство, автоматически передающее сигнал вызова от одного *телефонного аппарата* к другому.
3. Аналоговый сигнал оцифровывается в абонентском комплекте и передаётся внутри АТС и между АТС в цифровом виде, что гарантирует отсутствие затухания и минимальное число помех независимо от длины пути между АТС.
4. В цифровых АТС (IP-PBX) используется не коммутация каналов, а коммутация пакетов, и транспортом является протокол IP.
5. IP-АТС осуществляют коммутацию устройств IP-телефонии (VoIP).

Exercise 2. Complete the following sentences using parts from the right-hand column. Translate them.

- | | |
|--|--|
| 1. Touchtone is also known as | a) their functionality from the basic |
| 2. The telephone receiver is a small loudspeaker using | black, rotary-dial phones of the past. |
| 3. Filters are used at the switching machine at the central office to detect | b) receives the signal from the central office. |
| 4. The leakage current in the secondary receiver circuit depends on how well a balance network exactly matches | c) dual-tone multifrequency dialing. |
| 5. Telephone instruments have progressed greatly in | d) a permanent magnet, coil of wire and metal diaphragm. |
| 6. The transmitter sends a speech signal down the telephone line, and the receiver | e) the impedance of the telephone line. |
| | f) the frequencies of the tones and thus decode the dialed digits. |

Exercise 3. Choose the necessary verb form and translate the text.

These persistent problems by asking a little less of switching networks. Up to this point I ... only nonblocking networks: networks that ... path for any call that ... on a free trunk, for a free subscriber.switching networks of a different kind that... in a telephone exchange: seldom-blocking networks, which provide paths for most calls but not all.

Keys: *could be employed; provide; arrives; can be avoided; destined; have discussed; there are.*

DEVELOPING SPEAKING SKILLS

Exercise 1. What inventions, electronic and other devices would you call the most sophisticated ones in today's switching systems?

7. TWISTED PAIR

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

Twisted pair cabling is a form of wiring in which two conductors (two halves of a single circuit) are wound together for the purposes of canceling out electromagnetic interference (EMI) from external sources; for instance, electromagnetic radiation from unshielded twisted pair (UTP) cables, and crosstalk between neighboring pairs.

Twisting wires decrease interference because the loop area between the wires (which determines the magnetic coupling into the signal) is reduced. In balanced pair operation, the two wires typically carry equal and opposite signals (differential mode) which are combined by addition at the destination. The common-mode noise from the two wires mostly cancel each other in this addition because the two wires have similar amounts of EMI that are 180 degrees out of phase. This results in the same effect as subtraction. Differential mode also reduces electromagnetic radiation from the cable, along with the attenuation that it causes.

In contrast to FTP (foiled twisted pair) and STP (shielded twisted pair) cabling, UTP (unshielded twisted pair) cable is not surrounded by any shielding. It is the primary wire type for telephone usage and is very common for computer networking, especially as patch cables or temporary network connections due to the high flexibility of the cables.

Twisted pair cables were first used in telephone systems by Alexander Graham Bell in 1881. By 1900, the entire American telephone line network was either twisted pair or open wire with similar arrangements to guard against interference. Today, most of the millions of kilometers of twisted pairs in the world are outdoor landlines, owned by telephone companies, used for voice service, and only handled or even seen by telephone workers.

UTP cables are found in many Ethernet networks and telephone systems. For indoor telephone applications, UTP is often grouped into sets of 25 pairs according to a standard 25-pair color code originally developed by AT&T. A typical subset of these colors (white/blue, blue/white, white/orange, orange/white) shows up in most UTP cables.

For urban outdoor telephone cables containing hundreds or thousands of pairs, the cable is divided into smaller but identical bundles. Each bundle consists of twisted pairs that have different twist rates. The bundles are in turn twisted together to make up the cable. Pairs having the same twist rate within the cable can still experience some degree of crosstalk. Wire pairs are selected carefully to minimize crosstalk within a large cable.

UTP cable is also the most common cable used in computer networking. Twisted pair cabling is often used in data networks for short and medium length

connections because of its relatively lower costs compared to optical fiber and coaxial cable.

UTP cable is also finding increasing use in video applications, primarily in security cameras. Many middle to high-end cameras include a UTP output with setscrew terminals. This is made possible by the fact that UTP cable bandwidth has improved to match the baseband of television signals. While the video recorder most likely still has unbalanced BNC connectors for standard coaxial cable, a balun is used to convert from 100-ohm balanced UTP to 75-ohm unbalanced. A balun can also be used at the camera end for ones without a UTP output. Only one pair is necessary for each video signal.

Vocabulary list

to wind (wound) – обматывать, наматывать

interference – интерференция, помехи

twisted pair – витая пара; двухжильный шнур

unshielded – неэкранированный; незащищённый

noise – шум

subtraction – вычитание

along with – вместе с

attenuation – затухание, ослабление

shielded – экранированный; защищённый

patch cable – соединительный кабель; кабель с заплатой (латкой)

high flexibility – высокая гибкость (эластичность)

subset – подмножество

bundle – бухта (кабеля)

crosstalk – помеха; перекрестное затухание

setscrew – установочный винт; стопорный винт

balun – симметрирующий трансформатор

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What is twisted pair cabling?
2. Why are two conductors wired together?
3. What do twisting wires decrease?
4. What do two wires typically carry in balanced pair operation?
5. What do the two wires have?
6. What does it result in?
7. What does differential mode also reduce?
8. What isn't an unshielded twisted pair cable surrounded by?
9. Why is this wire type very common for computer networking?
10. When were twisted pair cables first used in telephone systems by Alexander Graham Bell?

11. What can you say about the entire American telephone line network by 1900?
12. Where are unshielded twisted pair cables found today?
13. How is UTP often grouped for indoor telephone applications?
14. What colors are used in most UTP cables?
15. What is the cable divided into for urban outdoor telephone cables?
16. Why are the bundles twisted together?
17. When can pairs experience some degree of crosstalk?
18. Where is twisted pair cabling often used?
19. What kind of cable is finding increasing use in security cameras? Why?

Exercise 2. Translate the following equivalents and memorize them.

Twisted pair, electromagnetic interference, unshielded twisted pair, crosstalk, to decrease interference, at the destination, to cancel, differential mode, to be surrounded by, computer networking, flexibility, outdoor landlines, identical bundles, security cameras, medium length connection, to match the baseband.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Insert prepositions

Keys: from, across, in, of, to, through, by

1. Twisted pair cables were first used in telephone systems Alexander Graham Bell.
2. Electronic mail is a way sending messages and letters directly your computer to another computer.
3. You can send a letter your hundreds of friends all around the world a few seconds.
4. Subnetworks are arranged in three stages so that each call passes three subnetworks.
5. The cellular service lowers the cost of calls borders in the region.

Exercise 2. Ask questions to which the following statements may serve as the answers

1. Twisted pair cabling can be used in data networks for short and medium length connections.
2. Wire pairs must be selected carefully to minimize crosstalk within a large cable.
3. A key telephone system may be connected directly to incoming calls.
4. All repairs must be performed by certified technicians using original equipment parts.
5. Customer premises equipment may be classified by function as well by type.

DEVELOPING SPEAKING SKILLS

Exercise 1. Discuss the problems mentioned in the text.

8. SWITCHING FABRICS

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

There are two distinct principles employed in electronic switching systems. They are known as circuit switching and packet switching.

In circuit switching a dedicated path is selected, established, and utilized for the entire duration of a message session between a calling terminal and at least one selected called terminal. It usually has the capability of simultaneous transmission in both directions, known as duplex. Establishment of a channel through one or more switches in sequence is known as a connection. The process of requesting and establishing a connection is known as a call. The bandwidth associated with each service of a call is reserved for the duration of the service and dedicated to that call.

In telecommunication systems the most important element is the message. If there are only two terminals, one to originate and another to terminate message, no switching is required. When there are more than two terminals, unless messages are broadcast, switching is required to provide selective communication among a number of terminals. Generally privacy is required so that a message will be received by only the terminal for which the message is intended. Communication privacy requires that contention will be included in the selection process to insure privacy and that a message reaches only the selected terminal over the selected path. Selection and contention are basic to switching.

Contention for the selection of channels occurs only at the time when a connection is being established. If a complete path is not possible when requested, the calling terminal is usually requested or scheduled to try to establish the connection again later.

The function within a switch that provides paths for connections is known as the switch fabric. This term is relatively new. In the past it has been known as the switching network or the switching center network.

In circuit switches, a message may be sent only one way, directed only from one terminal to another. Or there may be interactive or two-way messages. For two-way messages that occur in real time, circuit switching systems establish a path between two or more terminals exchanging messages.

Circuit switches are generally transparent to message content. However, to obtain efficiencies, circuit switching systems may remove or disconnect an established path in either or both directions during silent periods in the message and re-establish the circuit when the message information resumes.

This technique is sometimes referred to as virtual circuit switching. Virtual circuit switching assumes that there is no perceptible degradation of the message. This perception depends on the service quality expectations of users.

The combination of transmission, switching, and terminals form a telecommunications network. Where the nature of messages may not require real-time interaction, other forms of networks with different economic criteria for service quality and message delay may be employed. They may also be used where the network serves more than one type of telecommunications, for example, voice, data, and video.

In packet switching, messages are divided into segments or packets. These packets may be transmitted over different selected channels in a network. Each packet contains address information as well as other information regarding message treatment. Contention occurs for each packet at each switch. Most applications using packet switching are, traditionally at least, one way and not necessarily in real time; packets may be stored and delayed until the contention is resolved or the switch runs out of storage capacity. The memory used to store the packets is, for packet switching, the equivalent of the switching fabrics.

(Amos E. Joel Jr. Switching fabrics.)

Vocabulary list

switching fabric – механизм коммутации

distinct [dis'tɪŋ(k)t] – отчётливый; определённый

circuit switching – коммутация каналов

packet switching – коммутация пакетов (в сети)

a dedicated path – выделенный тракт

session – сеанс

to request [rɪ'kwest] – запрашивать

sequence [ˈsi:kwəns] – очередность

bandwidth [ˈbændwɪdθ] – ширина полосы; пропускная способность

to originate [ə'ɪdʒɪneɪt] – происходить (брать начало); инициировать

to terminate – заканчивать(ся); завершать

to broadcast (broadcast) – передавать (по радио или телевидению); вещание

contention – попытка одновременного использования канала связи

to schedule [ˈʃedju:l] – планировать очередность обслуживания (в сети)

two-way messages – двунаправленные сообщения

to obtain – получать

to disconnect – разъединять

to resume [rɪ'zju:m] – возобновлять

technique [tek'ni:k] – метод
to divide into – подразделять на

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions

1. How many distinct principles are there in electronic switching systems? 2. What are they known as? 3. Which path is selected in circuit switching? 4. What capability does it have? 5. What is known as a connection? 6. What process is known as a call? 7. What is the most important element in telecommunication systems? 8. In which case is no switching required? 9. Why is switching required when there are more than two terminals, unless messages are broadcast? 10. What does communication privacy require? 11. What is basic to switching? 12. When does contention for the selection of channels occur? 13. What happens if a complete path is not possible when requested? 14. What is known as the switch fabric? 15. How may a message be sent in circuit switches? 16. What messages for do circuit switching systems establish a path between two or more terminals exchanging messages? 17. When may circuit switching systems remove or disconnect an established path? 18. Which technique is sometimes referred to as virtual circuit switching? 19. What forms a telecommunications network? 20. Where are messages divided into segments or packets? 21. May these packets be transmitted over different selected channels in a network? 22. What does each packet contain? 24. How long may packets be stored and delayed?

Exercise 2. Read and translate the following equivalents. Use them in your own sentences:

Distinct principles, to be selected, at least, simultaneous transmission, in sequence, the process of requesting, for the duration, to provide selective communication, among a number of terminals, a complete path, relatively, to obtain efficiencies, during silent periods, virtual circuit switching, a user, real-time interaction, as well as, message treatment, to occur, to run out of storage capacity.

Exercise 3. Give synonyms of the following words

Selected, important, to provide, a path, new, to establish, to form, data, to be divided into.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the following sentences

1. The process of requesting and is known as a call.
2. are basic to switching.
3. In the past this term has been known as the switching network or
4. In circuit switches, a message may be sent only , directed from one terminal to another.
5. This technique is sometimes virtual circuit switching.
6. In packet switching, messages are divided

Exercise 2. Put the verbs in brackets into Present Simple Passive

1. Establishment of a channel through one or more switches in sequence (know) as a connection.
2. These devices (expect) to be ready with these technologies in five upcoming years.
3. The plugs (associate) with flexible cords, several of which operate over a field of jacks that together constitute a fabric.
4. Circuit switching channels also (establish) on a schedule.
5. Crosspoints (assemble) in various ways to form switch fabrics.
6. Switch fabrics (organize) into divisions that are analogous to transmission multiplexing techniques.
7. The capacity of a frequency-division switch fabric (limit) by the bandwidth of the transmission medium divided by the bandwidth of each connection.

DEVELOPING SPEAKING SKILLS

Exercise 1. Explain and expand.

1. In circuit switching, a dedicated path is selected and established.
2. In telecommunication systems the most important element is the message.
3. The function within a switch is known as a switch fabric.
4. In packet switching, messages are divided into segments or packets.

9. MULTIPLEXING

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

A channel is the bridge between a source and a receiver. In the early days of electrical wire communications, each channel was used to transmit only a single signal. Proliferation of separate channels could not be permitted to continue as communications expanded.

In the majority of applications, a variety of signals must be transmitted on a single channel. The channel must, therefore, be shared among the various users. The process of sending multiple signals on a single channel is called multiplexing.

If multiple signals are to be sent on a same channel, the various signals must not overlap; they must be separable. In a mathematical sense, the various signals must be orthogonal.

The form of multiplexing used in everyday speech requires time separation. In a conversation, the participants try not to speak at the same time. There are many other ways that signals can be nonoverlapping.

Frequency – division multiplexing (FDM) is the technique used to in standard analog transmit systems such as AM radio, FM radio, and television. It takes advantage of the observation that all frequencies of a particular message waveform can be easily shifted by a constant amount. The shifting is performed using a carrier signal. The original message is multiplied by a sinusoid.

The multiplexed signals can be separated using frequency gates (bandpass filters). The frequencies can then be shifted back to the baseband using demodulators. Frequency - division multiplexing is sometimes used to create a composite baseband signal. For example, in FM stereo, the two audio signals are frequency multiplexed to produce a new baseband signal. One of the audio signals occupies the band of frequencies between DC and 15kHz., whereas the second audio signal is shifted by 38kHz. It then occupies a band between 23 and 53 kHz. There is a complete duality between the time and frequency domain.

An analog signal can be transmitted by first sampling the waveform. In accordance with the sampling theorem, the number of samples required each second is at least twice the highest frequency of the waveform. If each pulse occupies only a fraction of the time spacing between samples, the time axis can be shared with other sampled signals.

The three signals are said to be time – division multiplexed. If the pulses are made narrower, additional signals can be multiplexed. Of course, the narrower the pulses, the wider the bandwidth is.

Vocabulary list

multiplexing – мультиплексирование; многократная передача; уплотнение

channel – канал

electrical wire communications – электропроводная связь

proliferation – количественный рост; распространение

multiple – многократный; множественный

to overlap – перекрывать(частично);

overlap – наложение

orthogonal [ˈθɒɡənl] – *mat.* прямоугольный; ортогональный

time separation – разделение времени

frequency-division multiplexing – частотное мультиплексирование

to shift – сдвигать, перемещать, переключать

a carrier signal – несущий сигнал

bandpass filter – полосовой фильтр

baseband – базовая полоса частот

a baseband signal – модулирующий сигнал

sampling – дискретизация; квантование; выборка
sample – образец; точка отсчета

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions

1. What is a channel? 2. How was each channel used in the early days of electrical wire communications? 3. What is called multiplexing? 4. In what case must the various signals be separated? 5. Where is frequency – division multiplexing used? 6. What is the original **message** multiplied by? 7. What do we use to separate the multiplexed signals? 8. What is there between time and frequency domain? 9. What happens if each pulse occupies only a fraction of the time spacing between samples? 10. When is the bandwidth wider?

Exercise 2. Translate the following equivalents and memorize them

In the early days of, separate channels, to be sent on a same channel, in a mathematical sense, at the same time, the original message, to create a composite baseband signal, to occupy the band of frequencies, in accordance with.

Exercise 3. Explain in English the meaning of the following words and the word combinations

Frequency – division multiplexing, a channel, the original message, an analog signal.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Insert the prepositions

Keys: *to, with, over, of, on, into*

When terrestrial multipoint communication became popular, the general approach was to maximize the distance ... which signals could be transmitted. The cellular radio concept is based... intentionally reducing the signal coverage area. Space-division multiplexing can also be accomplished... highly directional antennas. Some satellite systems divide the earth... regions and do simultaneous transmission... different signals... these regions using directional antennas.

Exercise 3. Read and translate the sentences containing complex subject

1. The original shifted signal is modified to contain the carrier sinusoid. 2. The three signals are said to be time – division multiplexed. 3. Realizations of either N and T in a queuing system should be expected to fluctuate markedly about their means. 4. This phenomenon is said to be discovered in 1864. 5. He seems to know

these results very well. 6. The laser beam seems to have almost unlimited possibilities. 7. The discovery of the theory of two random variables is sure to be of great value. 8. This quantizer is said to be uniform since all of the steps are of equal size.

DEVELOPING SPEAKING SKILLS

Exercise 1. Discuss the problems mentioned in the text.

10. FIBER OPTICS

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

There has always been a demand for increased capacity of transmission of information, and scientists and engineers continuously pursue technological routes for achieving this goal. The technological advances ever since the invention of the laser in 1960 have indeed revolutionized the area of telecommunication and networking. The availability of the laser, which is coherent source of light waves, presented communication engineers with a suitable carrier wave capable of carrying enormously large amounts of information compared with radio waves and microwaves. Although the dream of carrying millions of telephone (audio) or video channels through a single light beam is yet to be realized, the technology is slowly edging toward making this dream a reality.

A typical lightwave communication system consists of a lightwave transmitter, which is usually a semiconductor laser diode (emitting in the invisible infrared region of the optical spectrum) with associated electronics for modulating it with the signals; a transmission channel – namely, the optical fiber to carry the modulated light beam; and finally, a receiver, which consists of an optical detector and associated electronics for retrieving the signal. The information – that is, the signal to be transmitted – is usually coded into a digital stream of light pulses by modulating the laser diode. These optical pulses then travel through the optical fiber in the form of guided waves and are received by the optical detector from which the signal is then decoded and retrieved.

At the heart of a lightwave communication system is the optical fiber, which acts as the transmission channel carrying the light beam loaded with information. It consists of a dielectric core (usually doped silica) of high refractive index surrounded by a lower refractive index cladding. Incidentally, silica is the primary constituent of sand, which is found in so much abundance on our earth. Guidance of light through the optical fibers takes place by the phenomenon of total internal reflection. Sending the information-loaded light beams through optical fibers instead of through the open atmosphere protects the light beam from atmospheric uncertainties such as rain, fog, pollution, and so forth.

One of the key elements in the fiber optics revolution has been the dramatic improvement in the transmission characteristics of optical fibers. These include the attenuation of the light beam as well as the distortion in the optical signals as they race through the optical fiber. The development of low-loss optical fibers (20 dB/km at the He-Ne laser wavelength of 633 nm) in 1970 made practical the use of optical fibers as a viable transmission medium in lightwave communication systems.

Although a variety of optical fibers are available, the fibers in most use today are the so-called single-mode fibers with a core diameter of about 10 μm and an overall diameter of 125 μm . Optical fibers with typical losses in the range of 0.2 dB/km at 1550 nm and capable of transmission at 2-10 Gbit/s (Gb/s) are now

commercially available. Most currently installed systems are based on communication at a 1300-nm optical window of transmission. The choice of this wavelength was dictated by the fact that around an operating wavelength of 1300 nm the optical pulses propagate through a conventional single-mode fiber with almost no pulse broadening. Because silica has the lowest loss in the 1550-nm wavelength band, special fibers known as dispersion-shifted fibers have been developed to have negligible dispersion in the 1550-nm band, thus providing us with fibers having the lowest loss and almost negligible dispersion.

In the lightwave communication systems in operation today, the signals have to be regenerated every 30-60 km to ensure that information is intelligibly retrieved at the receiving end. This is necessary either because the light pulses have become attenuated, and hence the signal levels have fallen below the detectable level, or because the spreading of the pulses has resulted in an overlapping of adjacent pulses leading to a loss of information. Until now this regeneration had to be achieved by first converting the optical signals into electrical signals, regenerating the signals electrically, and then once again converting the electrical signals into optical signals by modulating another semiconductor laser; such devices are called regenerators. Recent developments in optical amplifiers based on erbium- (a rare earth element) doped silica optical fibers have opened up possibilities of amplifying optical signals directly in the optical domain without the need of conversion to electrical signals. Because of amplification in the optical domain itself, such systems are not limited by the speed of the electronic circuitry and indeed can amplify multiple signals transmitted via different wavelengths simultaneously.

*(Ajoy Ghatak and K.Thyagarajan.
Introduction to Fiber Optics)*

Vocabulary list

networking – организация (образование) сети; объединение в сеть

a coherent source – связанный (последовательный) источник

a carrier wave – волна-носитель

beam – луч; пучок лучей

to retrieve – разыскивать, выбирать

a dielectric core – диэлектрическая жила; диэлектрическая сердцевина (оптоволоконного кабеля)

attenuation – загасание (сигнала); ослабление

loss – потеря

in the range of – в диапазоне

single-mode fiber – (оптическое) волокно с одним режимом

an overlapping – частичное перекрывание; наложение

amplification – усиление

wavelength band – диапазон длин волны

refractive index – рефракционный (преломляющий) коэффициент
circuitry – схемы

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the questions. Use the topical vocabulary.

1. Why do scientists and engineers continuously pursue technological routes for increasing capacity of information transmission?
2. When was the laser invented?
3. What did the availability of the laser present communication engineers with?
4. What does a typical lightwave communication system consist of?
5. In what way is the information coded into a digital stream of light pulses?
6. Which form do these optical pulses travel through the optical fiber in?
7. How does the optical fiber act?
8. What does the optical fiber consist of?
9. What does sending the information loaded light beams through optical fibers protect the light beam from? Why?
10. What can you say about transmission characteristics of optical fibers?
11. Which fibers are in most use today?
12. What are most currently installed systems based on?
13. Which fact was the choice of this wavelength dictated by?
14. Why do the signals have to be regenerated every 30-60 km in the lightwave communication systems in operation today?
15. What do recent developments in optical amplifiers show?

Exercise 2. Translate the following equivalents and memorize them.

A demand for, increased capacity of transmission, to achieve the goals, invention, the availability of laser, a single light beam, to consist of, a semiconductor, a transmission channel, modulated, to be coded into, a digital stream, an optical detector, a dielectric core, information – loaded light beams, instead of, pollution, a viable transmission medium, wavelength, to propagate, silica, the lowest loss, the detectable level, adjacent pulses, to open up the possibilities, amplification.

Exercise 3. Multiple choice.

1. The technological advances ever since have indeed revolutionized the area of telecommunication and networking.
 - a) successful transmission at the rate of 1.1 trillion bits per second;
 - b) the invention of the laser in 1960;
 - c) the analysis of optical waveguides.
2. Guidance of light through the optical fibers takes place by the phenomenon of

- a) material dispersion ;
- b) nonlinear effects;
- c) total internal reflection.

3. have to be regenerated every 30-60 km to ensure that information is intelligibly retrieved at the receiving end.

- a) The signals ;
- b) Optical nonlinear effects;
- c) Periodic interactions in waveguides.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Translate the following sentences into English:

1. Типичная система оптоволоконной передачи состоит из оптического передатчика (лазерного диода), среды передачи и оптического приёмника (фотодетектора).

2. Информация посылается в форме оптических импульсов через линию связи.

3. Специальное оптоволокно известно как волокно с дисперсионным смещением.

4. Светонаведение происходит посредством явления полного внутреннего отражения.

5. Информацию обычно кодируют в цифровой поток световых импульсов путём модуляции лазерного диода.

Exercise 2. Make up questions beginning with the words(s) given in brackets:

1. This network will use multiple pairs of unshielded twisted pairs. (What?)

2. The length of any one segment cannot exceed 500 m. (How many?)

3. Sensing and transmission are done on two different channels. (Where?) 4. The parameters that characterize the retransmission backoff algorithm are also the same.

(What parameters?) 5. Neither of these pairs is shared with any other node. (What?)

6. A hub has multiple nodes attached to it. (What nodes?) 7. There is a possibility that when two signals collide, one of the two may be correctly captured by some or even all of the stations. (When?)

8. The node to hub distance and the interhub distances are limited to 250 m. (How many?)

Exercise 3. Translate these sentences into Russian, paying attention to the grammar.

1. Tomorrow he will be informed about it. 2. He will be given a new problem to solve. 3. Scientific laws are now being viewed as algorithms. 4. New type of computing equipment is being developed in our research lab. 5. They were asked to repeat the calculations. 6. A digital control system can be thought of as an operator

who follows a very complicated set of instructions. 7. Connections can also be made from the new cable via the three carriers' existing cable networks. 8. These instructions should be followed. 9. The results of the tests should be compared. 10. Then, the dialog may be restarted at an agreed (earlier) synchronization point. 11. These things cannot be compared.

DEVELOPING SPEAKING SKILLS

Exercise 1. Say what would have happened if the optical fiber hadn't been put into practice. Use the following:

to carry the modulated light beam, reduction in the propagation loss, to protect, large amounts of information, lightwave communication systems, negligible dispersion, the choice of.

Exercise 2. What inventions, technological advances would you call the most revolutionized ones that have been invented in the 21st century? Share your opinions on the topic.

11. PROBABILITIES AND RANDOM VARIABLES

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

Probability theory is used in communication theory and signal processing of random waveforms. All **first- and second-order time averages** are visualized statistically. The topics covered with some highlights are as follows:

1. *Discrete probability theory.* The *theorem of total probability*, which subdivides compound problems into weighted subproblems, is highlighted along with Bayes' theorem.
2. *The theory of one random variable.*
3. *The theory of two random variables.* **Joint distribution, density, and mass functions** give complete probabilistic information about two random variables and are the key to solving most applications involving continuous and discrete random waveforms and later random processes. The bridge from theory to application is short as in the relationship between finding the density or mass function of a function of two random variables and the communication problem of finding statistics of a system's random output when two random inputs are combined by operations such as summing or multiplying (modulation).

The elements of probability and random variable theory should be presented as a prerequisite to the study of random processes and communication theory.

Probability theory concerns itself with assumed random phenomena, which are characterized by outcomes which occur with statistical regularity. These statistical regularities define the probability $p(A)$ of any outcome A and the conditional

probability of A given B. In order to use these definitions it is required to know *counting theory or permutations and combinations*.

From basic counting formulas, which are inductively developed, plus an understanding of counting factors, probabilities of complex outcomes may be found.

The axioms of probability state that a probability is between zero and one and that the probability of the union of mutually exclusive outcomes is the sum of their probabilities. A historically elegant theorem which simplifies compound problems is *Bayes' Theorem*. Consider a random phenomenon where one trial consists in performing a trial of one of m random phenomena B_1, B_2, \dots, B_m where the probability of performing a trial of B_1 is $P(B_1)$ and so on until $P(B_m)$ is the probability of performing a trial of B_m . This is the *theorem of total probability*.

Whenever many probabilistic questions are asked about a random phenomenon, a structured outline is given for the solution in three steps.

In step 1 an appropriate *event space* or the **sample description space** of the phenomenon is listed. The sample description space is the set of finest grain, mutually exclusive, collectively exhaustive outcomes, whereas an event space is a listing of mutually exclusive, collectively exhaustive outcomes. In step 2, a probability is assignment to each outcome of the chosen space using the relative frequency or axiomatic formulas. In step 3, any desired probabilities are found by using the axiomatic formulas.

Density and mass functions allow for the use of integration and summations to answer probabilistic questions about a random variable.

A finite-power random or noise waveform is defined as being nondeterministic and such that statistics of a large section or of the whole waveform exist. Any time average may be found by the statistical formula.

When ergodic random processes are later encountered the time averages for any one member of the ensemble will be equivalent to the corresponding ensemble averages. A future task is to approximate time averages on a computer.

(Michael O'Flynn. San Jose State University)

Vocabulary list

probability – вероятность

random – случайный, беспорядочный

variable – переменная (величина)

average – математическое ожидание, среднее значение

to highlight – придавать большое значение

highlight – основной момент, факт

to subdivide into – подразделять на

density – плотность

output – *матем.* результат вычисления, выходные данные

multiplying – умножение

prerequisite – предпосылка, предварительное условие

to concern with – заниматься чем-л.

outcome – результат
 phenomenon (pl. phenomena) – явление
 regularity – регулярность, систематичность
 counting theory – теория подсчета
 permutation – *математ.* перестановка
 to state – формулировать, точно определять
 trial – испытание, опыт
 probabilistic – пробабилистический
 sample description space – интервал между характеристиками дискретности;
 поле описания дискретности (образца)
 exhaustive – исчерпывающий
 to be assigned to – быть предназначенным, установленным
 ergodic – эргодный
 to encounter – наталкиваться на что-либо
 ensemble – *математ.* множество

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. Where is probability theory used? 2. What does probability theory deal with?
 3. What is the definition of discrete probability theory? 4. What can you say about the theory of two random variables? 5. What are random phenomena characterized by? 6. Do statistical regularities define the probability $p(A)$ of any outcome A and the conditional probability of A given B ? 7. How may probabilities of complex outcomes be found? 8. What do the axioms of probability state? 9. What can you say about Bayes' Theorem? 10. How many steps is a structured outline for the solution given in? 11. What is listed in step 1? 12. What is a probability assigned to in step 2? 13. How are any desired probabilities found in step 3? 14. What do density and mass functions allow for the use of integration and summations? 15. How is a finite-power random or noise waveform defined? 16. Which formula may any time average be found by? 17. When will the time averages for any one member of the ensemble be equivalent to the corresponding ensemble averages?

Exercise 2. Find the English equivalents for the following words and word combinations in the text and memorize them.

Сложные задачи, случайные переменные (величины), условная вероятность, обработка сигнала, случайная форма волны, среднее значение времени первого порядка, теория дискретной вероятности, случайные выходные данные системы, предпосылка к изучению, статистическая регулярность, формулы подсчета, сложный результат, случайное явление, теорема суммарной вероятности, относительная частота; для того, чтобы использовать; структурированная схема, случайная форма волны с

ограниченной мощностью, средние значения множества; взаимоисключающие результаты.

Exercise 3. Explain in English the meaning of the following.

Probabilities, random, the axiom, mutually exclusive outcomes, noise.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the following sentences.

1. The theorem of total probability is highlighted along with
2. any desired probabilities are found by using the axiomatic formulas.
3. Density and mass functions allow to answer
4. Any time average by the statistical formula.
5. Random phenomena are characterized by outcomes which occur

Exercise 2. Choose the correct alternative in each of these sentences:

1. A sample problem *will be solved* / *will solve* using the relative frequency definitions of probabilities and counting formulas.
2. We *will be stated* / *will state* this theorem in a casual manner.
3. The elements of probability *will be presented* / *will present* as a prerequisite to the study of communication theory.
4. The random phenomenon of sampling the periodic waveform *will be considered* / *will consider* on the trial.
5. The topic of finding the density function of a function of two known random variables *will extend* / *will be extended* in the article.
6. He *will base* / *will be based* the statistical regularity of A only on trials when B occurs.

DEVELOPING SPEAKING SKILLS

Exercise 1. Prove that Bayes' Theorem simplifies compound problems.

12. THE OPEN SYSTEMS INTERCONNECTIONS

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

In the mid-1970s as different types of distributed systems (based on both public and private data networks) started to proliferate, the potential advantages of open systems were acknowledged by the computer industry. As a result, a range of standards started to be introduced. The first was concerned with the overall structure of the complete communication subsystem within each computer. This was produced by the International Standards Organization (ISO) and is known as the ISO reference model for open systems interconnection (OSI).

The aim of the ISO reference model is to provide a framework for the coordination of standards development and to allow existing and evolving standards activities to be set within a common framework. An application process in any computer is supported by a particular set of standards and communicates freely with an application process in any other computer that supports the same standards, irrespective of its origin.

Some examples of application processes are the following:

- a process (program) executing in a computer and accessing a remote file system
- a process acting as a central file service (server) to a distributed community of (client) processes
- a process on an office workstation (computer) accessing an electronic mail service
- a process acting as an electronic mail server to a distributed community of (client) processes
- a process in a supervisory computer controlling a distributed community of computer-based instruments or robot controllers associated with a process or automated manufacturing plant
- a process in an instrument or robot controller receiving commands and returning results to a supervisory system
- a process in a bank computer that initiates debit and credit operations on a remote system.

Open systems interconnection is concerned with the exchange of information between such processes. The aim is to enable application processes to cooperate in carrying out a particular (distributed) information processing task irrespective of the computers on which they are running.

A communication subsystem is a complex piece of hardware and software. The ISO has adopted a layered approach for the reference model. The complete communication subsystem is broken down into a number of layers each of which performs a well-defined function. Conceptually, these layers can be considered as performing one of two generic functions, network-dependent functions and application-oriented functions.

Each layer performs a well-defined function in the context of the overall communication subsystem. It operates according to a defined protocol by exchanging messages, both user data and additional control information, with a corresponding peer layer in a remote system. Each layer has a well-defined interface between itself and the layer immediately above and below.

Vocabulary list

to acknowledge – признавать, допускать; подтверждать

aim – цель

approach – подход

to execute – исполнять, выполнять; осуществлять

framework – структура; каркас

generic – общий

to implement – реализовать

irrespective of – независимо от
overall structure – всеобщая структура
to perform – выполнять, делать
to proliferate – распространяться; увеличивать
reference model – эталонная модель
remote – удалённый; дистанционный
supervisory – контролирующий
workstation – терминал, автоматизированное рабочее место, станция

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. When were the potential advantages of open systems acknowledged? 2. What was the first standard concerned with? 3. What model is known as the ISO reference model? 4. What can you say about the aim of the ISO reference model? 5. What application processes that may wish to communicate in an open way do you know? 6. What is the open systems interconnection concerned with? 7. How can these layers be considered? 8. How does each layer operate?

Exercise 2. Find the English equivalents for the following word combinations in the text.

Соединение открытых систем, распределённая система, частная (ведомственная) сеть для передачи данных, подсистема связи, эталонная модель, существующие и развивающиеся стандарты, прикладной процесс, независимо от происхождения, дающий доступ к удалённой файловой системе, распределённое сообщество, устройство управления, обмен информацией, определённая задача обработки информации, аппаратное обеспечение, целый ряд уровней, выполнять чётко определённую функцию; функции, зависящие от сети; функции, ориентированные на приложение; в соответствии с, соответствующий уровень одинакового по состоянию устройства.

Exercise 3. Match each group of words to the correct adjective suffix. The suffix must fit all three words in the group. What spelling changes do you have to make when you add the suffix?

- | | |
|--------------------------------|-----------|
| 1. Differ, depend, consist | a) - ive |
| 2. Electron, strategy, automat | b) - ent |
| 3. Rely, avail, exchange | c) - al |
| 4. Respect, interact, impulse | d) - able |
| 5. Nation, digit, addition | e) - ic |

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the statements using the words from the box:

Set, protocol, application-oriented, distributed, exchange, started, broken down, approach, systems

1. A range of standards to be introduced.
2. The implementation of a particular layer is independent of all other layers.
3. To overcome this problem, the International Standards Organization has adopted a layered for the reference model.
4. Both the network-dependent and components of this model are implemented as a number of layers.
5. Open systems interconnection is concerned with the of information between such processes.
6. This process acts as a central file server to a community of client-processes.
7. The potential advantages of open were acknowledged by the computer industry.
8. The complete communication subsystem is into a number of layers.
9. A of standards is associated with each layer.

Exercise 2. Change the following statements into questions paying attention to modal verbs and their equivalents.

1. The equipment from one manufacturer can be interchangeable with the equipment from any other manufacturer. 2. The initial payment must be made as planned. 3. You can have full and secure access to all the network facilities. 4. Operators can be rendered in the form of subscriber numbers, penetration levels and growth in either numerical or percentage form. 5. The open systems interconnection environment must add additional application-oriented protocols to end-systems. 6. The reference model is to provide a framework for the coordination of standards.

DEVELOPING SPEAKING SKILLS

Exercise 1. Make up a short oral summary of International standards organization reference model.

13. THE OSI SEVEN-LAYER MODEL

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

The logical structure of the ISO reference model is made up of seven protocol layers. The three lowest layers (1-3) are network dependent and are concerned with the protocols associated with the data communication network being used to link the two communicating computers. In contrast, the three upper layers (5-7) are application oriented and are concerned with the protocols that allow two end user

application processes to interact with each other, normally through a range of services offered by the local operating system. The intermediate transport layer (4) masks the upper application-oriented layers from the detailed operation of the lower network-dependent layers.

The function of each layer is specified formally as a protocol that defines the set of rules and conventions used by the layer to communicate with a similar peer layer in another (remote) system. Each layer provides a defined set of services to the layer immediately above. It also uses the services provided by the layer immediately below it to transport the message units associated with the protocol to the remote peer layer. For example, the transport layer provides a network-independent message transport service to the session layer above it and uses the service provided by the network layer below it to transfer the set of message units associated with the transport protocol to a peer transport layer in another system. Conceptually, therefore, each layer communicates with a similar peer layer in a remote system according to a defined protocol.

The application layer provides the user interface, normally an application program/process, to a range of network wide distributed information services. These include file transfer access and management, as well as general document and message interchange services such as electronic mail.

The presentation layer is concerned with the representation (syntax) of data during transfer between two communicating application processes. It negotiates and selects the appropriate transfer syntax (es) to be used during a transaction so that the syntax (structure) of the messages being exchanged between two application entities is maintained.

The session layer provides the means that enables two application layer protocol entities to organize and synchronize their dialogue and manage their data exchange.

The transport layer acts as the interface between the higher application-oriented layers and the underlying network-dependent protocol layers.

Vocabulary list

intermediate – промежуточный

conceptually – умозрительно

convention – соглашение

entity – реальность

to interact – взаимодействовать

interchange – обмен

link layer – канальный уровень

to mask – маскировать; скрывать

to negotiate – передавать; запускать

operation – эксплуатация; работа; функционирование; режим

presentation layer – уровень представления данных

representation – представление, изображение

set – набор; устройство
session layer – сеансовый уровень
transaction – обработка запроса; транзакция
transfer – передача; передавать
transport layer – транспортный уровень
unit – устройство; блок; модуль
in contrast – в противоположность
detailed operation – подробная работа

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. How many protocol layers is the logical structure of the ISO reference model made up of? 2. What are the three lowest layers concerned with? 3. What is the function of the intermediate transport layer? 4. What is the operation principle of each layer? 5. What does the application layer provide? 6. What is the presentation layer used for? 7. Is there any difference between the presentation layer and the session layer? 8. What can you say about the transport layer?

Exercise 2. Check how well you understand the following words and word combinations.

To be made up of, associated with, to interact, upper, the set of rules and conventions, to communicate with, immediately, message units, provided by, to transfer, peer, similar, a defined protocol, to include, electronic mail, the representation of data, during a transaction, to manage data exchange.

Exercise 3. Give the synonyms of the following words. Consult the dictionary if necessary.

To make up, to specify, to link, to allow, remote, layer, a range of.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete these sentences with these verbs.

masks *selects* *specified* *provides* *offers*

- 1 The function of each layer is as a protocol.
- 2 The transport layer a number of classes of service.
- 3 The intermediate transport layer the upper application-oriented layers from the detailed operation of the lower network-dependent layers.
- 4 Each layer a defined set of services to the layer immediately above.
- 5 The presentation layer the appropriate transfer syntax to be used during a

transaction.

Exercise 2. Translate the following sentences and state the function of the Present Participle Passive (*being done*).

1. Being written in pencil, the text was difficult to read. 2. The service being announced will be provided by the end of this month. 3. The three lowest layers are concerned with the protocols associated with the data communication network being used to link the two communicating computers. 4. The presentation layer selects the appropriate transfer syntax so that the syntax of the messages being exchanged between two application entities is maintained. 5. Being instructed a computer stores the code number 01000001.

Exercise 3. Use these linking words to complete these sentences:

in order to, however, and, although, as long as.

1. The new robot worked well Donovan watched it. 2. watch Dave in an emergency they had to create their own emergency. 3. the hole at the end of the tunnel was too small for a man to go through, they could look through it. 4. Powell lifted the detonator ...threw it down the tunnel. 5. The result, ... , was not what they expected.

(From "I, Robot" of Isaac Asimov)

DEVELOPING SPEAKING SKILLS

Exercise 1. Imagine you have received the task to make a lecture entitled "The function of the seven-layer model in the exchange of information between systems". What problems can be discussed in it?

14. ASYNCHRONOUS TRANSFER MODE (ATM)

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

Broadband integrated services digital network (B-ISDN) is conceived as a digital network envisioned to facilitate worldwide information exchange between any two subscribers without limitations that can be imposed by the communication medium or the media. At least conceptually, B-ISDNs will not only support all types of networking applications that we know of today but also provide the framework to support future applications.

B-ISDN standards are being developed in a number of national standards bodies around the world and by the International Telecommunications Union-

Telecommunications Standards Sector (ITU-TS). Another major contributor to solving interoperability problems among asynchronous transfer mode (ATM) equipment is the ATM Forum, a consortium of more than 500 companies worldwide. Its main mission is to speed up the development and deployment of ATM products through interoperability specifications.

The B-ISDN standards and protocol layers are being developed around the B-ISDN protocol reference model. ATM is the transport mode of choice for B-ISDN. It is a connection-oriented packet-switching technique that uses 53-byte fixed size cells to transfer information in the network. The short packet size of ATM, at high-transmission rates, is expected to offer full bandwidth flexibility, provide the basic framework to support a wide range of services required by different applications, and achieve high-resource utilization through statistical multiplexing. With statistical multiplexing, the sum of maximum bit rates of connections multiplexed on a link may exceed the link transmission rate if their average bit rates are (much) less than their maximum. The term asynchronous states that the cells generated by a source may appear at irregular intervals in the network. The connection-oriented nature of ATM arises out of the need to reserve resources in the network to meet the quality of service requirements of applications.

The transfer mode is defined as a technique used for transmission, multiplexing, and switching aspects of communication networks.

ATM is envisioned to have the following properties:

- Support all existing services and those with yet unknown characteristics that would emerge in the future in an integrated manner, including voice, video, image, audio, and data;
- Minimize switching complexity;
- Minimize the processing time at intermediate nodes to support very high-transmission speeds;
- Minimize the number of buffers required at the intermediate nodes to bound the delay and minimize buffer management complexity.

An ATM cell consists of a 5-byte cell header and a 48-byte payload. The cell header includes the following fields: *generic flow control, virtual path identifier, virtual channel identifier, payload type (PT), cell loss priority, and header error control.*

ATM requires connections to be established prior to data flow. It uses routing tables at each node along the path of a connection that maps the connection identifiers from the incoming links to the outgoing links.

(By Ralf O. Onvural)

Vocabulary list

path – маршрут; канал; тракт

broadband – широкополосный

to conceive – задумать

envisioned – представленный

to be imposed by – быть навязанным
to provide – обеспечивать, предоставлять
interoperability – способность к взаимодействию
equipment – оборудование
feature – особенность
at high-transmission rates – на высоких скоростях передачи (данных)
flexibility – гибкость
to support – поддерживать, обеспечивать, обслуживать
multiplexing – мультиплексирование, уплотнение
switching – коммутация
node – узел

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. Is broadband integrated services digital network conceived as a digital network? Why? 2. What are B-ISDN standards being developed by? 3. What is the ATM-Forum? 4. What is its main mission? 5. What are the B-ISDN standards and protocol layers being developed around? 6. What is an asynchronous transfer mode? 7. How many fixed size cells does this packet switching technique use? 8. What is the short packet size of ATM expected to do? 9. What does the term asynchronous state? 10. Do you know the properties of ATM? 11. What does an ATM cell consist of? 12. What fields does the cell header include? 13. Does ATM require connections to be established prior to data flow?

Exercise 2. Read and translate the following equivalents. Memorize them.

Integrated services digital network, to facilitate, a subscriber, the communication medium, national standard bodies, interoperability, a reference model, a packet-switching technique, to transfer information, at high-transmission rates, to provide the basic framework, different applications, average, to emerge, at intermediate nodes, the delay, cell header, virtual path identifier, payload, connection, data flow, to map, incoming links, outgoing links.

Exercise 3. Find words in the text to which the following are antonyms.

Minor, synchronous, to slow down, narrow, known, to maximize, trailer, regular, outgoing, national, analog.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the following sentences.

1. Asynchronous transfer mode is that uses 53-byte fixed size cells to transfer information in the network.

2. are being developed in a number of national standards bodies around the world.
3. The term asynchronous states that the cells may appear at irregular intervals in the network.
4. An ATM cell a 5-byte cell header and a 48-byte payload.
5. ATM requires connections to be established prior to

Exercise 2. Make the following sentences negative.

1. Each country developed its own cellular system.
2. The network with leased fiber formed a bi-directional, self-healing fiber optic cable system.
3. Nokia supplied GSM switching equipment last month.
4. The network operators made a lot of money from the traffic in August.
5. This cell-based mobile system appeared in 1973.
6. Cell delineation determined the cell boundaries from the received bit stream.
7. A low probability corrupted cell delivery capabilities.

DEVELOPING SPEAKING SKILLS

Exercise 1. What do you think are the advantages of Asynchronous Transfer Mode? And the disadvantages?

15. ECHO CANCELLATION

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

Full-duplex data transmission over a single twisted-pair cable permits the simultaneous flow of information in two directions when the same frequency band is used. Examples of this technique are digital communication systems that operate over the telephone network. In a digital subscriber loop, at each end of the full-duplex link, a circuit known as a hybrid separates the two directions of transmission. To avoid signal reflections at the near- and far-end hybrid, a precise knowledge of the line impedance would be required. Since the line impedance depends on line parameters that, in general, are not exactly known, however, an attenuated and distorted replica of the transmit signal leaks to the receiver input as an echo signal. Data-driven adaptive echo cancellation mitigates the effects of impedance mismatch.

A similar problem is caused by crosstalk in transmission systems over voice-grade unshielded twisted-pair cables for local-area network applications, where multipair cables are used to physically separate the two directions of transmission. Crosstalk is a statistical phenomenon due to randomly varying differential capacitive and inductive coupling between adjacent two-wire transmission lines. At the rates of several megabits per second that are usually considered for local-area network applications, near-end crosstalk represents the dominant disturbance; hence near-end crosstalk cancellation must be performed to ensure reliable communication.

In voiceband data modems, the model for the echo channel is considerably different from the echo model adopted in baseband transmission. In fact, since the transmitted passband signal is obtained by modulating a complex-valued baseband signal, the far-end echo signal may experience significant jitter and frequency shift, which are caused by signal processing at intermediate points in the telephone network. Therefore, a digital adaptive echo canceller for passband transmission needs to embody algorithms that account for the presence of such additional impairments.

(Giovanni Cherubini. IBM Zurich Research Laboratory)

Vocabulary List

full-duplex – дуплексный; полнодуплексный

simultaneous – одновременный

a digital subscriber loop – цифровая абонентская цепь (линия)

hybrid – дифференциальная система; преобразователь двухпроводного канала в четырёхпроводной

far-end – на дальнем конце

a circuit – канал; линия

impedance – полное сопротивление; импеданс

near – end – на близком(соседнем) конце

to depend on – зависеть от

replica – дубликат; (точная) копия

distorted – искажённый

to leak – просачиваться; проникать

echo cancellation – гашение эхо-сигнала

to mitigate – уменьшать

mismatch – несовпадение; несоответствие

disturbance – нарушение; помехи

passband – полоса пропускания

jitter – искажение сигнала

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Ask your own problem questions to the text.

Exercise 2. Check how well you understand the following words and word combinations. Make your own sentences with them.

Over a single twisted pair cable, the simultaneous flow of information, the same frequency band, at each end, to operate, to separate, signal reflections, precise knowledge, in general, to mitigate the effects, crosstalk, unshielded, due to, at the rates of, the dominant disturbance, cancellation, to ensure reliable communication, to be different from, the transmitted passband signal, frequency shift, jitter, at intermediate points, to account for.

Exercise 3. Find the corresponding ending for the following statements.

This sequence is converted into an analog signal	a precise knowledge of the line impedance would be required.
To avoid signal reflections at the near- and far-end hybrid,	is processed by a detector.
The signal obtained after echo cancellation	by a digital to analog converter.
The transmitted data consist of a sequence of	to ensure reliable communication.
Near-end crosstalk cancellation must be performed	independent and identically disturbed real-valued symbols.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the sentences with the correct preposition:

- 1 Signalling constitutes the control infrastructure the modern telecommunication network.
- 2 The signalling link functions correspond the data link layer.
- 3 In modern circuit switches, crosspoint memory is frequently found a common random access memory.
- 4 Conversion of signals analog to digital may occur in the switch.
- 5 The line impedance depends line parameters.
- 6 The telephone uses normal human speech and therefore can be used anyone.

Exercise 2. Translate the sentences paying attention to Gerund with prepositions.

1. By repeating the experiment you can get additional results. 2. Control unit is used for interpreting the machine instructions. 3. In describing most physical processes one can use mathematical equations. 4. In training specialists practice is as important as theory. 5. In modern computers transistors are used for performing complicated operations. 6. It would be impossible to offer a fully global service without using satellites.

Exercise 3. Translate into Russian paying special attention to Perfect Participle.

1. Having experienced the advantages, we plan to equip our 140 vehicles with mobile communication. 2. Having been repaired, the computer began operating better. 3. Having taken all these factors into account, the latest investment paid for itself. 4. Having repaired the computer, the engineer showed it to the manager. 5. Having been installed, the nonsystem premises wiring began to meet the

requirements of an insulation standards. 6. Having said this, she stopped speaking.7. Having established the channel response, the scheme illustrates noise spectrum identification.

Exercise 4. Choose the proper verb form and translate the text into Russian.

The Network

The switched network not only telephones but also facsimile machines, cellular telephones, and personal computers – anything that to the network. The telephones and other station apparatus in homes are all connected by pairs of copper wire to a signal point, the protector block, which simple protection to the network from overvoltages. A twisted pair of wires then the protector block all the way back to the central office. Many twisted pairs are all together in a cable that can be buried underground, in conduit, or strung between telephone poles. The twisted pair of wires station apparatus to the central office is called the local loop.

The very first stage of switching at the central office. From there, telephone calls may be connected to other central offices, over interoffice trunks. Calls may also..... over much greater distances by connection to the long-distance networks..... by a number of interchange carriers.

Keys: offers, operated, interconnects, be carried, called, is connected, occurs, connects, connecting, carried, placed.

DEVELOPING SPEAKING SKILLS

Exercise 1. Speak about echo channel models and the structure of digital echo cancellers for baseband and passband transmission. Use additional material.

16. ULTRAFAST FIBER SWITCHING DEVICES AND SYSTEMS

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

Future switching systems are expected to process net data rates approaching a terabit per second (Tbit/s).The terabit benchmark is significant from a research standpoint because it means that the system will require different devices and architectures that are currently in use. These future systems may use some aspect of photonic switching to take advantage of inherent optical properties.

“Ultrafast” means having speeds greater than 50 Gbit/s, or at least beyond the speeds that electronic systems may reach.

Devices that are based on “all-optical” interactions rely on virtual transitions in the material: i.e., the interaction is through deformation of wave functions, which is non-resonant and can be almost instantaneous. Since electrons are not “created”, the devices are not limited by carrier recombination times in the material. In general, all-optical switching can be realized well below the bandgap of materials, thereby avoiding linear and nonlinear absorption and the related heating effects that can be detrimental at high bit rates. For example, optical fibers are typically used below one-fifth of the energy gap and semiconductors may be used below their half-gap energy. Furthermore, unlike electronic devices where the energy incident on the device leads to heating, most of the energy incident on the waveguide or fiber devices is guided and reappears at the output of the device.

Ultrafast devices can be divided into two general categories. The first is a routing switch in which the input is connected to one of several output ports, and the routing is based on either the intensity of the signals or an externally supplied control beam. If only one output port is employed, then the routing switch works like an on-off switch. Also, if the routing is based on the intensity of the input, then device may be used as a limiter or a saturable absorber. Routing switches are “physical” switches since photons are physically moved from one port to another. The other category is a logic gate in which a Boolean operation is performed based on the values of the input signals. The logical approach can be powerful because it allows intelligence to be distributed throughout the system (in the sense that one data stream can control another); and this is one reason that modern electronic systems operate based on digital logic.

Routing and logic switches differ fundamentally in the manner of the control. In routing switches, the control is typically in a different physical format than the data, and the control network may be external to the switching fabric. In a logic gate, on the other hand, the control is in the same physical format as the data, and, therefore, the control can be distributed throughout the switching fabric. Another difference between the two devices is the representation of the decision. A routing switch represents its decision by the position or location of data, while the output of a logic gate has a “0” or “1” logic level. Since routing switches route the same photons from the input to the output, the signals may degrade because of loss, dispersion or cross-talk. In digital logic gates, the signal level and timing is regenerated at the output of each gate by replacing the input photons with new photons from a local power supply. The penalty for high-speed, digital logic-based systems is that the switching energy and power supply requirements are major constraints.

Vocabulary list

switching system – коммутационная система

data rate – скорость передачи данных

to process – обрабатывать

standpoint – точка зрения
inherent – присущий, свойственный
virtual transition – виртуальный переход
bandgap – промежуток в диапазоне (полосе)
to avoid – избегать
detrimental – вредный, приносящий убыток
incident on – случайный, второстепенный
a routing switch – коммутатор выбора направления (связи)
a logic gate – логический селекторный вентиль
switching fabric – механизм переключения (коммутации)
to degrade – ухудшать(ся)
cross-talk – перекрёстные помехи (искажения)
power supply – электропитание
penalty – отрицательная сторона

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What is expected to process net data rates approaching a terabit per second?
2. Why is the terabit benchmark significant? 3. What may these future systems use?
4. What does “ultrafast” mean? 5. What do devices based on “all-optical” interactions rely on? 6. Why aren't the devices limited by carrier recombination times in the material? 7. In what way can all-optical switching be realized? 8. Where does most of the energy incident on the waveguide or fiber devices reappear? 9. How many categories can ultrafast devices be divided into? 10. What can you say about the first category? 11. What happens if only one output port is employed? 12. Why are routing switches called “physical” switches? 13. What is the other category? 14. Why do modern electronic systems operate based on digital logic? 15. How do routing and logic switches differ? 16. How is the signal level and timing regenerated at the output of each gate in digital logic gates?

Exercise 2. Find the English equivalents for the following words and word combinations in the text.

Коммутационные системы, с точки зрения исследования, присущие оптические свойства, искажение волновой функции, высокие скорости передачи битов, волновод, выходной порт, маршрутизация, логический подход, на основе цифровой логики, логический вентиль, с другой стороны, механизм коммутации, отрицательная сторона.

Exercise 3. Complete the following sentences.

1. "Ultrafast" means having speeds greater than , or at least beyond the speeds that electronic systems may reach.
2. Devices that are rely on virtual transitions in the material.
3. , all optical switching can be realized well below the bandgap of materials.
4. Ultrafast devices can be divided into
5. If only one output port is employed, then works like an on-off switch.
6. can be powerful because it allows intelligence to be distributed throughout the system.
7. Routing and logic switches differ fundamentally in the manner
8. In a logic gate, the control is as the data.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the following sentences using the words from the box.

<i>phase</i>	<i>means</i>	<i>include</i>	<i>preserved</i>	<i>logic</i>	<i>decreases</i>
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1. All-optical interactions are coherent processes in which the input signal phases are ...
2. It that the system will require different devices and architectures than the currently in use.
3. Optics can be used beneficially in photonic interconnections and highly parallel operations.
4. As the bit rate increases, the bit period and the tolerance to timing jitter.
5. In a synchronous system all parts must be and frequency locked to a master clock.
6. Sources of pulse distortion nonlinear absorption and low-frequency Raman effects.

Exercise 2. Translate the following passive constructions paying attention to the verbs followed by prepositions:

1. Electronic computers are paid attention to in this article.
2. The speed of information processing should be paid special attention to.
3. The results of calculations performed by a computer can be fully relied upon.
4. All the achievements of modern science are being made use of in modern production processes.
5. Different types and systems of computing technique were being spoken about at the January conference.
6. I think all the necessary materials should be immediately sent for.
7. What was your experiment followed by?
8. This device should be looked upon as an experimental one.
9. His works are often referred to by other researchers.
10. My decision may be influenced by your advice.
11. The invention is much talked about.

DEVELOPING SPEAKING SKILLS

Exercise 1. Discuss the problem.

The interest in such ultrafast switches stems from their ability to answer two questions. First, how can processing beyond electronic speeds be accomplished? Second, how can the bandwidth-rich environment provided by optical fibers be further utilized?

What do you think about it? Can you support your point of view with facts and examples?

17. VIDEO CONFERENCING

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

In a face-to-face meeting, participants automatically filter out routine disturbances in their local environment. In distance conferencing, audio and video disturbances are transmitted to the receiving studios, along with the information that is meant to be sent. Because humans filter extraneous information differently when it is presented by electronic means, small disturbances, such as tapping a pen on a table, become magnified to the point when they can distract the audience from getting the intended message.

Videoconferencing studios should provide a normal meeting environment, even though the participants in the meeting may, in fact, be thousands of kilometers apart. Equivalent capabilities must be made available electronically to the meeting parties, including a whiteboard, a document display and, above all, the facility to see, speak and listen normally in a natural and non-intimidating environment.

A videoconferencing studio is normally constructed for four to six participants, sitting along one side of a conference table. Facing them will be a video wall in which the screens and cameras are mounted.

For more than three participants, two cameras are recommended. These are mounted near the centre of the video wall and are aimed 'cross-fire' to avoid the unfortunate intimidating effect that follows from a participant staring directly, and apparently fixedly, into the camera whilst, in fact, viewing the main monitor. The use of dual cameras ensures that the image of each person is of reasonable size and that not too much space is registered above and in front of the participants.

The two pictures are combined by a split-screen unit (SSU) into the video frame for transmission. At the remote site, the SSU can de-split the picture on to two screens. If there are three or fewer participants, the SSU can be switched off from the users panel. Fixed camera positioning is generally preferable and is less expensive. Systems, usually activated by voice switches, which 'zoom-in' on the speaker, are available but have the disadvantage of preventing the remote viewer from seeing the reactions of the local participants.

The cameras should be mounted at median eye height, which is defined as 1.29 meters above floor level. Thus, the main viewing screens, installed close together to provide continuity of the de-split image, must be mounted below the camera level.

Vocabulary List

to become magnified to the point – увеличивать до такой степени

continuity [kəntɪnju:ti] – непрерывность; последовательность
cross-fire – перекрёстные помехи
de-split image – декомбинированное изображение
to distract – отвлекать, уводить в сторону
disturbance – нарушение, помеха
to ensure – обеспечивать, гарантировать
extraneous – посторонний
to filter out – фильтровать, обрабатывать
median – средний
to be mounted – быть смонтированным, установленным
non-intimidating – непугающий, неугрожающий
participant [pa:tɪsɪpənt] – участник
preferable – предпочтительный
split-screen unit – устройство с комбинированным экраном
staring – пристальный
tapping – постукивание
unfortunate – неудачный
viewing – просмотр, обозрение
whiteboard – доска
zoom-in – гудящий звук

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What else is transmitted to the receiving studios, along with the information?
2. What environment should videoconferencing studios provide?
3. How many participants is a videoconferencing studio normally constructed for?
4. How many cameras are recommended for more than three participants?
5. Why are the cameras mounted near the centre of the video wall?
6. What are the two pictures combined by?
7. How should the cameras be mounted?

Exercise 2. Find the English equivalents for the following words and word combinations in the text.

Участники, ограниченная среда, обрабатывать постороннюю информацию, постукивание ручкой, эквивалентные возможности, в непугающей обстановке, установить камеры, избегать, двусторонние камеры, изображение каждого человека, для передачи, три или меньше участника, недостаток, на высоте глаз, изображение, сделать доступным, небольшие помехи.

Exercise 3. Make an adverb from the given adjectives.

Automatical, different, normal, electronic, direct, apparent, general, local, main, successful.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Make the following sentences interrogative paying attention to modal verbs with the Infinitive Passive:

1. Data terminal support may be provided by digital telephone sets or data terminals. 2. Access to distance education and the internet can be offered by this new service. 3. The document transmission camera must be ceiling mounted directly above the document field. 4. The pictures can be captured by a digital video camera. 5. Ground communication with new satellites must be established successfully by the network control centre. 6. The two pictures must be combined by a split-screen unit. 7. The cameras should be mounted at median eye height.

Exercise 2. Complete the following sentences using parts from the right-hand column. Translate them.

- | | |
|---|--|
| 1. Customer premises wiring is classified as either | a) obsolete in telephony. |
| 2. The telephone company is not responsible | b) of feature-rich electronic sets. |
| 3. Depression of a line selection button | c) appropriate and sufficient in communication. |
| 4. The digital interface allows use | d) connected the hand-set to that line. |
| 5. Analog multiplexing is today | e) for nonsystem premises wiring. |
| 6. Today's packet-switched networks are most | f) nonsystem premises wiring, or system premises wiring. |

Exercise 3. Analyze the following sentences having complex subject and complex object. Translate them.

1. This investigation is likely to produce good results. 2. Automatic electronic links to customers are expected to be introduced in the second stage of the project. 3. This causes the current to flow in the circuit. 4. Graphic symbols on a map are said to be more readily understood than a written text or synthesized speech. 5. Maintenance costs are likely to be minimal. 6. All messages are likely to be sent over the satcoms network. 7. The nature of the constellation allows a partial service to be offered with just four satellites in orbit. 8. They determined signals on the thinner cable to be less immune and to suffer greater degradation. 9. We observe the transmitting nodes detect collisions when voltages in excess of the amount. 10. The demand for networked digital video conferencing systems on PCs or workstations is expected to be substantial.

DEVELOPING SPEAKING SKILLS

Exercise 1. Prove that enterprises can save money with videoconferencing.

Exercise 2. Write a specification sheet for videoconferencing technology that you think would allow people to create the environment of a face-to-face meeting, wherever they might be in the world. Present it to your group mates.

18. AUDIO ENVIRONMENT IN VIDEOCONFERENCING

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

Echo cancelling systems and echo compensators are available for the audio environment. In the case of an echo compensator system, the size of the signal processor defines how much of the feedback can be cancelled; a poor room will have echo and concomitant problems for the participants, unless receive volume is set at an extremely low level. Echo cancellation systems will reduce the receive volume very quickly to compensate for reverberation but that can lead to clipping of the incoming speech, and in particularly bad circumstances, to half-duplex audio operation.

To obtain a natural meeting environment, open or voice switches should be installed about 60 cm from the participants. Good audio is dependent on insulation to minimize external sound sources and room reverberation time. The CEPT advises an insulation of 45 dB to achieve 40 dB (A) ambient sound level in the empty conference room. Reverberation time is a function of room volume and the materials used within it. A sound-damping suspended ceiling and a good quality carpet are absolutely essential for optimal audio quality and the walls should be covered with a soft, sound-absorbing material.

Even in the most basic and simple installations it is necessary to pay close attention to sound quality and to minimize possibilities for audio interference. For example, light partition walls are quite unsuitable to provide acceptable sound insulation and echo damping. Videoconferencing facilities should be as small in volume as is commensurate with viewing distance and the number of participants. Suspended ceilings always provide some degree of sound absorption. Sound collector boxes can also improve audio quality, often dramatically.

Vocabulary List

circumstances – обстоятельства

clipping – пропускание; проглатывание; ограничение

commensurate – соответственный, соразмерный

concomitant – сопутствующий

dramatically – ясно, наглядно

echo cancelling system – эхоподавитель; система гашения эхо-сигнала

echo compensator – эхокомпенсатор

feedback – обратная связь

half-duplex – полудуплексный

partition – разделение

receive volume – громкость приёма

reverberation – отражение

sound collector box – звуковой коллектор

sound-damping suspended ceiling – звукопоглощающий подвесной потолок

CEPT (Conference of European Posts and Telecommunications) – Европейская конференция почтовой и телекоммуникационной связи

VOCABULARY AND COMPREHENSIONS CHECK EXERCISES

Exercise 1. Ask your own problem questions to the text.

Exercise 2. Check how well you understand the following words and word combinations.

Echo cancelling systems, to be available for, the size of, feedback, concomitant problems, at a low level, to reduce the receive volume, to obtain, to be dependent on, to minimize external sound sources, to achieve, reverberation time, sound-absorbing material, to pay close attention to, audio interference, solid, to improve audio quality.

Exercise 3. Give your own definitions of the following terms.
An echo cancelling system, a signal processor, a sound-absorbing material, audio interference, videoconferencing.

DEVELOPING LANGUAGE SKILLS

Exercise 1. Translate the following sentences paying attention to the grammar.

1. The service being announced will be provided by the end of this month.
2. The three lowest layers are concerned with the protocols associated with the data communication network being used to link the two communicating computers.
3. Being instructed a computer stores the code number 01000001.
4. This results in a frame of data either being repeated or deleted at output of the buffer.
5. The speed of light being extremely great, we cannot measure it by ordinary means.
6. With satellite communications there are no security worries about the transmissions being intercepted.
7. The images were edited before being dispatched to news rooms throughout the country.

Exercise 2. Translate the sentences paying attention to the Future Perfect Tense:

1. Over the five year period this company will also have laid domestic fiber optic cables.
2. The ATM switch will have supported virtual path identifier switching by the next week.
3. They will have completed their experiments by the end of the week.
4. I shall have read the article about broadband development by this time tomorrow.
5. A connection between several users will have been established by the end of the year.
6. Some of the original equipment (such as the ATM switch) will have been replaced when the TRIBUNE network is assembled by the end of October.
7. The protocol will have provided data to the system manager as well as to individual users on the network by the next week.
8. New broadband services will have been offered using data rates of up to 2 Mbits/s, such as colour fax and multimedia computer connections before summer.

Exercise 3. Make the following sentences interrogative:

1. The next step is to separate and identify all costs involved in the current methods of communication.
2. The operator has to know all the relevant cost elements.
3. Users can compare the likely costs and benefits of using different satcoms services.
4. Each option may need a different specification of mobile and office equipment.
5. Satcoms can be used to monitor virtually anything that can be measured using electronic sensors.
6. Program parameters can be changed over the satellite link from the control center.
7. The figures can be stored in the user's database.
8. A simple unit can send or receive and print fixed messages.

DEVELOPING SPEAKING SKILLS

Exercise 1. Speak about the advantages of videoconferencing.

Exercise 2. Pretend you are an inventor. Describe your inventions. What does it do? How does it work?

PART II. MODERN ICT TECHNOLOGIES

1. LIVING WITH COMPUTERS

I. **People who have grown up with PCs and microchips are often called *the digital generation*. What would you say about the use of computers in your life?**

II. ***Read, translate and discuss how different professionals use computers in their work.***

A secretary: 'I use computers to do the usual office things like write letters and faxes, but what I find really useful is email. We are an international company and I send emails to our offices all over the world.'

A publisher: 'We use PCs to produce all sorts of texts in digital format. We publish e-books (electronic books) and interactive e-learning programs on CD, and we help a local company to design an online newspaper, displayed on the Web.'

A bank manager: 'We use financial software to make calculations and then generate graphs or charts. We also use a database to store information so that it can be easily searched:

A home user: "I like to retouch photos on my computer; I improve them by making a few touches and then save them on a CD. I also enjoy looking at music portals on the Web. I surf the Web every day and I often download files, I copy music files from the Net to my PC.'

III. ***Read the following facts. Is a computer a friend ... or a foe?***

- Our society has developed technological dependence. When computers are down, our way of life breaks down: planes stop flying, telephones don't work, banks have to close.
- Computers produce electronic waste, plastic cases and microchips that are not biodegradable and have to be recycled or just thrown away.
- They are responsible for health problems, e.g. computer addiction, an inappropriate and excessive use of computers.
- Cybercrime, crime committed with the help of computers, is creating serious problems.
- Citizens may feel a loss of privacy because of unauthorized use of personal data or receiving unwanted electronic messages.

Vocabulary list

digital [ˈdɪdʒɪt(ə)l] – цифровой

software – программное обеспечение

to make calculations – делать вычисления

to generate charts – создавать диаграммы
 database – база данных
 to store – хранить, сохранять
 to search – искать
 to retouch [,ri:'tʌtʃ] photos – корректировать и улучшать фото
 to download files – загружать файлы
 technological dependence – технологическая зависимость
 to break down – ломаться (о компьютере)
 waste – n. мусор
 biodegradable [,baɪəʊdɪ'grɛɪdəb(ə)l] – подвергающийся биораспаду
 computer addiction – компьютерная зависимость
 inappropriate [,ɪnə'prɒpɪət] – несоответствующий; нежелательный
 excessive [ɪk'sesɪv] – избыточный
 to commit a crime – совершить преступление
 privacy ['prɪvəsi] – личная информация
 unauthorized [ʌn'ɔ:θəraɪzd] use – нелегальное использование
 to delay – задерживать
 to cancel – отменять
 to scrap – превратить в лом, выбросить за ненадобностью
 obsolete ['ɒbsəli:t] – устаревший

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Complete these sentences with the suitable words.

1. The.....is a piece of software that interfaces with your PC and allows you, via keyboard commands, to get any text information read to you in synthetic speech.
2., as popularized by virtual reality, lets the user immerse him/herself in a synthetically generated environment.
3. An.....is a touch-sensitive device where a special pen or your finger can act as a mouse.
4. . .Bill James is now the proud owner of a dark silver BMW, complete with leather interior,navigation, and a..... with LCD TV screens.

Exercise 2. What problem do these sentences refer to? Discuss.

1. We are sorry to announce that most flights are delayed or cancelled.
 2. He should go to a psychologist. He spends hours surfing the Web.
 3. Technology changes so quickly that we have to scrap computers when they become obsolete.
 4. I've been getting emails about offers for lots of different products.

5. My computer system has been broken into and some useful information has been destroyed.

Exercise 3. Use the following words in your own sentences.

A publication, a business graph, Web-pages, e-mail, photo-editing.

Exercise 4. Read the text and fill it in with the following words.

financial Internet electronic print design microchips

A digital era

Computers have changed the way we do everyday things, such as working, shopping and looking for information. We (1)houses with the help of PCs; we buy books or make flight reservations on the (2).....; we use gadgets that spring to life at the instant they are switched on, for example the mobile phone, the music player, or the car ignition, all of which use (3) Many people now work at home, and they communicate with their office by computer and telephone. This is called 'teleworking'. With the appropriate hardware and software, a PC can do almost anything you ask. It's a magical typewriter that allows you to type and (4) any sort of document. It's a calculating machine that makes (5)calculations. It's a filing cabinet that manages large collections of data. It's a personal communicator that lets you interact with friends. It's a small lab that helps you edit photos and movies. And if you like (6).....entertainment, you can also use it to relax with games.

DEVELOPING SPEAKING SKILLS

Look at new computers on the Internet or in magazines. Find one you like. Make a note of its specifications. Discuss it in class with your classmates.

2. COMPUTERS AND WORK

1. **Read and translate the text. Use a dictionary to help you.**

Jobs in computing

Most ICT-related jobs have developed to meet the need to analyze, design, develop, manage or support computer software, hardware or networks.

All the people involved in the different, stages of development of a computer project, i.e. analysts, programmers, support specialists, etc. are controlled by a project manager.

ANALYZE A **database analyst** is in charge of the research and development of databases; **network analysts** study the network requirements and recommend the most suitable type of network; **systems analysts** decide what ICT system will cater for the requirements of a specific institution.

DESIGN AND DEVELOP **Web designers**, also called **webmasters**, create and maintain web pages and web applications for websites.

Software engineers, either application programmers or systems programmers, plan, design, and test computer programs.

Hardware engineers design and develop ICT devices.

Security specialists specialize in the design of software and hardware to protect information from malware: viruses, spyware, etc.

MANAGE **Network or computer systems administrators** install and maintain networks.

Database administrators manage the accuracy and efficiency of databases.

SUPPORT **Computer operators** control computer data processing.

Help desk technicians are in charge of troubleshooting, the solution of technical problems.

Computer training instructors or trainers teach people how to use hardware and software.

Technical writers write the instructions for ICT systems.

COMPUTERS AND JOBS: NEW WAYS, NEW PROFILES

With the development of ICT, there has been a change in the way lots of jobs are done. Lots of people have become teleworkers – people who work at home thanks to teleworking or telecommuting – away from their official workplace. High speed communications have made it possible.

There is a new specialization in teaching as well. This is an on-line teacher who is a specialist in e-learning, distance education via the Internet.

Nowadays some doctors also practice telemedicine. Real-time data transmissions and virtual operations enable doctors to cure people who are far-away.

Desktop publishers can create documents with DTP software.

ICT has made the job of a computer animator much easier as well.

Vocabulary list

DTP software – настольные издательские программы

ICT – Information & Communications Technologies

to support – поддерживать

to be involved in – участвовать в, быть вовлеченным в

a project manager – менеджер по проектам

requirement [rɪ'kwaɪəmənt] – требование

suitable [ˈs(j)u:təb(ə)l] – пригодный, подходящий

to cater for – заботиться о

to maintain – осуществлять техническую поддержку

malware – вредоносное программное обеспечение
 spyware – шпионское программное обеспечение
 to install – устанавливать
 accuracy [ˈækjʊrəsi] – точность
 efficiency [ɪˈfɪj(ə)nsɪ] – эффективность
 a help desk technician [tekˈnɪj(ə)n] – специалист службы технической поддержки
 to be in charge of – быть ответственным за
 troubleshooting [ˈtrʌb(ə)l,ju:tɪŋ] – выявление неисправностей, неполадок
 a technical writer – специалист по написанию технических инструкций
 a teleworker – телеработник; удаленный сотрудник, надомник (работник, получающий задания по телефону или электронной почте); работник удаленного офиса
 telecommuting – работа в дистанционном режиме
 to cure [kjʊə] – лечить
 a computer animator – компьютерный аниматор

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the questions.

1. Why have most ICT-related jobs developed? 2. Who is in charge of the research and development of databases? 3. What do network analysts study? 4. What decision do system analysts make? 5. Who creates and maintains web pages and web applications for websites? 6. Hardware engineers design and develop ICT devices, don't they? 7. Do software or hardware engineers plan, design and test computer programs? 8. What do security specialists specialize in? 9. What specialists install and maintain networks? 10. Do database administrators manage the accuracy and efficiency of databases? 11. What specialists provide support of ICT systems? 12. Speak about new jobs that have appeared with the development of ICT.

Exercise 2. Classify these jobs under the heading that best describes their functions

Software engineer	Helpdesk Technician	Database Administrator
Trainer	Network Analyst	Systems Analyst
Hardware Engineer	Network Administrator	

ANALYZE

a

b

DESIGN/
DEVELOP

c

d

MANAGE

e

f

SUPPORT

g

h

Exercise 3. Draw the lines between the columns to make true sentences about jobs.

A technical	designer	controls all the operations and people in a project.
A project	writer	writes documentation of a program or device.
A web	specialist	plans and keeps websites updated.
A security	manager	designs applications against viruses.

Exercise 4. Read the advertisement. What jobs are offered?

We are seeking a person to operate peripheral computer equipment, and perform report distribution duties and backup procedures on our servers.

Major Responsibilities

- Operating printers and unloading reports from the printer and distributing them through the internal mail system.
- Performing backups on various operating systems.
- Analysing and troubleshooting problems in the Data Centre reported by Help Desks or IT support associates.

The successful candidate will be responsible for maintaining logical and physical database models as well as managing the database.

Job Requirements

- Bachelor's degree in Computer Science, a related field or equivalent experience Analytical skills and a proficiency in developing structured logic.

Exercise 5. Complete the text with the correct words.

The use of ICT has caused the development of new ways of working. People no longer need to be stuck in an office. Laptops, the Internet and wireless technologies allow (1)..... . What's more, there are more and more people who have decided to become (2)..... and so have no need to travel to work at all.

The Internet has also enabled doctors to practise (3) and educators to work as (4).....ICT technologies have introduced changes in the artistic world, too. Cartoons are now made by (5)and (6)..... produce materials ready for publication.

DEVELOPING SPEAKING SKILLS

1. Prepare a summary: How have computers changed the way we live and work. Present it in class.
2. Make a list of advantages and disadvantages that teleworking might have for us.

3. A TYPICAL PERSONAL COMPUTER

- I. **Name the computer essentials that you know.**
- II. **Read the text and translate it.**

A computer is an electronic machine that accepts, processes, stores and outputs information. A typical computer consists of two parts: hardware and software.

Hardware is any electronic or mechanical part of the computer system that you can see or touch.

Software is a set of instructions, called a program, which tells a computer what to do.

There are three basic hardware sections.

The CPU is the heart of the computer, a microprocessor chip which processes data and coordinates the activities of all the other units.

The main memory holds the instructions and data which are being processed by the CPU. It has two main sections: RAM (random access memory) and ROM (read only memory). The CPU controls how fast the computer processes data, or information.

Peripherals are the physical units attached to the computer. They include: input devices, which let us enter data and commands (e.g. the keyboard and the mouse).

Output devices let us extract the results (e.g. the monitor and the printer).

Storage devices, which are used to store information permanently (e.g. hard disks and DVD-RW drives).

Disk drives are used to read and write data on disks. At the back of a computer there are ports into which we can plug external devices (e.g. a scanner, a modem, etc.). They allow communication between the computer and the devices.

Computer technology changes very fast, but a desktop PC usually has a tower, a separate monitor, a keyboard and the mouse. Notebooks are usually more expensive than desktops with similar specifications.

Functions of a PC:

– Input

We enter data with a keyboard, a webcam, etc.

– Processing

The data is manipulated according to program instructions.

– Output

We can see the result on the screen or in printed form.

– Storage

We keep data and programs in memory systems where they are available for processing.

Vocabulary list

to accept – принимать

to process – обрабатывать

processing – обработка (данных, информации)
 to store – хранить, сохранять
 to output – выводить (данные, информацию)
 to attach to – присоединять к
 physical units – физические устройства
 the main memory – основная (оперативная) память
 input devices – устройства ввода
 output devices – устройства вывода
 storage devices – устройства хранения (данных, информации)
 RAM – оперативная память, оперативное запоминающее устройство (ОЗУ),
 память с произвольным доступом
 ROM – постоянное запоминающее устройство
 to extract the results – извлекать, получать результаты
 permanently – постоянно
 to plug external devices – подключать внешние устройства

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the questions about the text.

1. What is a computer? 2. What does a typical computer consist of? 3. What is hardware? 4. What is called a program? 5. Name three basic hardware sections. 6. What is called the heart of the computer? 7. What does the main memory hold? 8. What do peripherals include? 9. What are disk drives used to? 10. Where do we plug external devices into? 11. Speak about functions of a PC?

Exercise 2. Read these quotations and say which computer essentials they refer to.

1. 'Accelerate your digital lifestyle by choosing a Pentium at 4.3 GHz.'
2. 'Right-click to display a context-sensitive menu.'
3. 'You will see vivid, detailed images on a 17" display.'
4. This will produce high-quality output, with sharp text and impressive graphics.'
5. 'Use it when you want to let the grandparents watch the new baby sleeping.'
6. 'Press any key to continue.'

Exercise 3. Match the terms with their definitions.

- | | |
|-----------------|--|
| 1. CD/DVD drive | a) any socket into which a peripheral device may be connected |
| 2. speaker | b) device used to produce voice output and play back music |
| 3. modem | c) mechanism that reads and/or writes to optical discs |
| 4. port | d) device that converts data so that it can travel over the Internet |

Exercise 4. Complete the sentences with the right words.

1. Computer..... is the visible or audible result of data processing – information that can be read, printed or heard by the user.

2. The CPU will process data as instructed by the programs you're running. includes functions like calculating, sorting, editing, drawing and searching.
3. DVDs are expected to replace CDs asdevices.
4. As a scanner, the Sigma-100 can be used to photographs as well as documents into the computer.

DEVELOPING SPEAKING SKILLS

1. Find the ad of a computer you would like to purchase. Discuss its features in class.

4. OPERATING SYSTEMS AND THE GUI

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

Types of software; the operating system (OS)

1. **System software** controls the basic functions of a computer, e.g. operating systems, programming software and utility programs.

2. **Application software** lets you do specific jobs such as writing letters, doing calculations, drawing or playing games. Examples are a word processor or a graphics package.

An operating system is a set of programs that control the hardware and allow people and applications to communicate with the hardware. Typical functions of the OS are handling input/output operations, running programs and organizing files on disks. The OS also gives access to networks and allows multitasking:

a user can run several programs (and do various tasks) at a time. Examples are:

- **the Windows** family – designed by Microsoft and used on most PCs
- **Mac OS** – created by Apple and used on Macintosh computers
- **Unix** – found on mainframes and workstations in corporate installations, as it supports multi-users
- **Linux** – developed under the GNU General Public License; anyone can copy its source code, modify and redistribute it. It is used on PCs and in appliances and small devices.

The Graphical User Interface

A GUI makes use of a **WIMP** environment: Windows, Icons, Menus and Pointer. This type of interface is **user-friendly**, where system functions are accessed by-selecting self-explanatory **icons** (pictures representing **programs** or **documents**) and items from menus. A **drop-down menu**, or **pull-down menu**, is a list of options that appear below a menu bar when you click on an item.

The pointer is the arrow, controlled by the mouse, which lets you choose options from menus.

The background screen that displays icons, representing programs, files and folders (directories) is called the desktop. Double-clicking a folder icon opens a window which shows the programs, documents and other folders contained within the folder.

System utilities

These are small programs included with an OS that improve a system's performance. They can be desk accessories, device drivers, or system extensions activated when you turn on the PC.

- **A crashed disk rescuer** is used to restore disks and corrupted files.
- **An accessibility program** makes a PC easier for disabled users to use.
- **A compression utility** rewrites data so that it takes less space on disk.
- **A media player** lets you watch DVDs, play music and listen to the radio on the Web.

Vocabulary list

utility [ju:'tɪlɪtɪ] – утилита (служебная программа)

multitasking – многозадачность

to run a program – запустить программу

source code – исходный код, исходная программа

self-explanatory – не требующий разъяснений

a folder [ˈfəʊldə] – папка

system's performance – функциональные характеристики системы

desk accessory [ək'sesəɪrɪ] – настольная стандартная программа

a crashed disk rescuer – восстановитель поврежденного диска

an accessibility program – программа специальных возможностей

a compression utility – служебная программа для сжатия

to restore disk – восстанавливать диск

to corrupt files – повреждать файлы

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions about the text.

1. What is an operating system?
2. What does the system software control?
3. What specific job does the application software let you do?
4. Give a definition of an operating system.
5. What operating systems do you know?
6. Speak about features of GUI.
7. What are system utilities?
8. What is the function of a crashed disk rescuer?
9. What does a compression utility do?

Exercise 2. Find the right word for the following.

1. the difference between system software and application software
2. software that enables users and programs to communicate with hardware
3. the meaning, of 'multitasking'
4. a multi-user OS used on large, powerful computer systems
5. the operating system that is freely distributed
6. the operating system designed by Apple
7. the OS created by Microsoft
8. the meaning of WIMP in a graphical user interface (GUI)
9. the expression used to describe a system that is easy to use

Exercise 3. Which utility would you use to do these tasks?

1. to play and organize multimedia on your PC
2. to diagnose and repair damaged disks
3. to help computer users with sight, hearing or mobility difficulties
4. to make files smaller, so you can send them with emails

DEVELOPING LANGUAGE SKILLS

Exercise 1. Complete the sentences with the correct preposition.

1. An operating system is a setprograms.
2. The arrow is controlledthe mouse.
3. You type a command at the pointthe display screen.
4. An operating system is requiredapplications software to run on your computer.
5. The user usually works the applications software.
6. A user can run several programsa time.
7. A small amount of each program is processed, and then the processor moves ... the remaining programs.

DEVELOPING SPEAKING SKILLS

Exercise 1. Look at the Internet and find some information about other OS. Make up your own report. Present it in class.

Exercise 2. Write a sentence explaining why Windows is so popular.

5. TYPES OF COMPUTER SYSTEMS

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

A mainframe is the most powerful type of a computer. It can process and store large amounts of data. It supports multiple users at the same time and can support more simultaneous processes than a PC. The central system is a large server connected to hundreds of terminals over a network. Mainframes are used for large-scale computing purposes in banks, big companies and universities.

A desktop PC has its own processing unit (or CPU), monitor and keyboard. It is used as a personal computer in the home or as a workstation for group work. Typical examples are the IBM PC and the Apple Macintosh. It's designed to be placed on your desk. Some models have a vertical case called a tower.

A laptop (also called a notebook PC) is a lightweight computer that you can transport easily. It can work as fast as a desktop PCI, with similar processors, memory capacity, and disk drives, but it is portable and has a smaller screen. Modern notebooks have a TFT (Thin Film Transistor) screen that produces very sharp images.

Instead of a mouse, they have a touchpad built into the keyboard - a sensitive pad that you can touch to move the pointer on the screen.

They offer a lot of connectivity options: USB (Universal Serial Bus) ports for connecting peripherals, slots for memory cards, etc.

They come with battery packs, which let you use the computer when there are no electrical outlets available.

A tablet PC looks like a book, with an LCD screen on which you can write using a special digital pen. You can fold and rotate the screen 180 degrees. Your handwriting can be recognized and converted into an editable text. You can also type at the detached keyboard or use voice recognition. It's mobile and versatile.

A personal digital assistant or PDA is a tiny computer which can be held in one hand. The term PDA refers to a wide variety of handheld devices, palmtops and pocket PCs. Some models incorporate handwriting recognition, which enables a PDA to recognize characters written by hand. Some PDAs recognize spoken words by using voice recognition software. They can be used as mobile phones or as personal organizers for storing notes, reminders and addresses. They also let you access the Internet via wireless technology, without cables.

Vocabulary list

mainframe – большая вычислительная машина
large amounts of data – большое количество информации
multiple users – многочисленные пользователи
simultaneous [sɪm(ə)l'teɪniəs] – одновременный, мгновенный
large-scale [ˌlɑ:dʒ'skeɪl] – масштабируемый; эд. универсальный
purpose [ˈpɜ:pəs] – цель
computing – вычислительный
processing unit – блок обработки данных, процессор
workstation – рабочая станция
a vertical case – вертикальный блок
a tower – корпус ПК (стоячего типа)
memory capacity – объем памяти
TFT (Thin Film Transistor) – тонкопленочный транзистор
to produce a sharp image – давать четкое изображение
a touchpad – сенсорная панель
connectivity – возможность подключения и взаимодействия
USB (universal serial bus) – универсальная последовательная шина
peripherals – периферийные устройства
to be available – быть доступным для, иметься в наличии
an electrical outlet – электрическая стенная розетка
to fold – складывать
to recognize – распознавать
to convert – преобразовывать
a detached keyboard – отдельная клавиатура
voice recognition – распознавание голоса
versatile [ˈvɜ:sətəɪl] – многофункциональный
to incorporate – включать, объединять
wireless technology – беспроводная технология

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What is the most powerful type of a computer?
2. What can a mainframe do?
3. Is the central system a large server connected to hundreds of terminals over a network?
4. Mainframes are used for large-scale computing purposes in banks, big companies and universities, aren't they?
5. What does a desktop PC have?
6. What do some models have?
7. What type of a computer can you transport easily?
8. Why do modern notebooks have very sharp images?
9. How can you move a pointer on a screen?
10. What does a USB stand for?
11. How does a tablet PC look like?
12. What does the term PDA refer to?
13. What do PDAs also allow you to do?
14. Can they be used as mobile phones or as personal organizers for storing notes, reminders and addresses?

Exercise 2. Which type of computer do these descriptions refer to?

- 1 a hand-held computer which can be used as a telephone, a web explorer and a personal organizer
- 2 a typical computer found in many businesses and popular for home use
- 3 a large computer used for intensive data processing and often linked to many terminals
- 4 a small computer that fits into items of clothing
- 5 a portable computer that can be closed up like a briefcase, but it can be as powerful as a desktop PC
- 6 a full-function PC, though it only weighs 1.2 kg - you can go to a meeting and write your notes on it, like a paper notepad; its screen mode can be changed from portrait to landscape

Exercise 3. Find a computer advertisement in a specialized magazine. Read it and find the answers to the following questions. Discuss the answers in class with your classmates.

1. What type of computer is advertized?
2. What kind of screen does it have?
3. What type of ports does it have for connecting cameras and music players?
4. What sort of power supply does it use?

Exercise 4. Read this interview with James Hawkins, an IT manager, and complete it with words from the text.

Interviewer: What are the basic features of a PDA?

James: Well, a typical PDA is a (1)... device that runs on batteries and combines computing, phone and Net capabilities. Interviewer: And how do you enter information?

James: For input, you use a (2)..... or pen to write and make selections on a (3).... ; they also have buttons for launching programs. Some models have a small keyboard.

They may have a (4)....system that reacts to the user's voice.

Interviewer: Do they need special software?

James: Yes, most of them run on *Windows Mobile*. Palmtops supported by Palm Inc. use *Palm OS*. Pen-based systems include (5)....., so you write on the screen and the computer recognizes your handwriting and inserts the appropriate letters.

Interviewer: What sort of things can you do with a PDA?

James: You can store personal information, take notes, draw diagrams and make calculations. Many PDAs can access the Net via (6)... technology.

DEVELOPING SPEAKING SKILLS

1. Write down two benefits and two limitations of PDAs.
2. Write a paragraph explaining how laptops can be beneficial to business people. Present it to your groupmates.

6. WORD PROCESSING FEATURES

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

Word processing

A **word processor** enables you to create a document, store it electronically on a disk, display it on a screen, modify it by entering commands and characters from the keyboard, and print it on a printer.

The great advantage of word processing over using a typewriter is that you can make changes without retyping the entire document. If you make a typing mistake, you simply back up the cursor and correct your mistake. If you want to delete a paragraph, you simply remove it, without leaving a trace. It is equally easy to insert a word, sentence or paragraph in the middle of a document.

Word processors usually support these features (and a few others).

- **Cut and paste:** Allows you to remove (cut) a section of text and insert (paste) it somewhere else.
- **Find and replace:** Allows you to direct the word processor to search for a particular word or phrase. You can also direct the word processor to replace one group of characters with another everywhere that the first group appears.
- **Word wrap:** The word processor automatically moves to the next line when you have filled one line with text, and it will readjust text if you change the margins.
- **Print:** Allows you to send a document to a printer to get hard copy.
- **Font specifications:** Allows you to change fonts within a document. For example, you can specify bold, *italics*, and underlining. Most word processors also let you change the font size and the typeface.
- **Graphics:** Allows you to include illustrations and graphs in a document. Some programs let you create the illustrations within the word processor; others let you insert a picture from a different program.

- **Headers, footers and page numbering:** Allows you to specify customized headers and footers that the word processor will put at the top and bottom of even- page. The word processor automatically keeps track of page numbers so that the correct number appears on each page.
- **Layout:** Allows you to specify different margins within a single document and to specify various methods **for indenting paragraphs** - how much space you leave between the margins and the paragraphs.
- **Merge:** Allows you to merge text from one file into another file. This is particularly useful for generating many files that have the same format but different data. Generating mailing labels is the classic example of using merges.
- **Spell checker:** A utility that allows you to check the spelling of words. It will highlight any words that it does not recognize.
- **Thesaurus:** Allows you to search for synonyms without leaving the word processor.

The line dividing word processors from desktop publishing systems is constantly shifting. In general, though, DTP applications support finer control over layout and more support for full-colour documents.

Vocabulary list

word processor – текстовый редактор

to enter – вводить (данные, информацию, команды)

a character [ˈkærɪktə] – символ

entire [ɪnˈtaɪə] – весь

a trace – след

paste – вставить

word wrap [ˈwɜːp] – перенос по словам

readjust – настроить заново

to change margins – изменять поля

font – шрифт

bold – жирный (шрифт)

italics – курсив (шрифт)

underlining – подчеркивание

a header – верхний колонтитул

a footer – нижний колонтитул

layout – расположение

to indent – выравнивать, сместить вправо, структурировать текст

to merge [mɜːdʒ] – соединять, сливать, поглощать

mailing labels – почтовая этикетка, почтовая наклейка

spell checker – проверка правописания

thesaurus [θɪˈzɔːrəs] – энциклопедия, справочник, тезаурус

a desktop publishing system – настольная электронная издательская система

to shift – перемещаться, передвигаться

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text. Answer the following questions.

1. What does a word processor enable you to do?
2. What is the great advantage of a word processor over a typewriter?
3. What are the features that the word processor usually supports?
4. What function allows you to automatically move to the next line?
5. What feature allows you to change the font size and the specifications?
6. Do some programs allow you to insert the illustrations?
7. What specifies different margins within the document?
8. What is merge feature particularly useful for?
9. What does a spellchecker highlight?
10. What can be said of DTP applications?

Exercise 2. Match words from the text with these definitions.

1. a program used for preparing documents and letters
2. a row of words that open up menus when selected
3. the distinctive design of letters and characters, e.g. *Arial*, *Courier*
4. text printed in the top margin
5. text printed in the bottom margin
6. the way text is arranged on the page, including margins, paragraph format, columns, etc.
7. a function that enables you to combine two files into one

Exercise 3. Complete these statements with the correct word.

1. A..... consists of three elements: typeface, type style and type size; for example **Arial bold at 9 points**.
2. Notice that when you get to the end of each line, Word starts a new line automatically. It moves the word you are typing to a new line when it enters an invisible margin running down the right-hand side of the screen. This feature is called
3.and.....lets you find a word and change it into another word throughout the text.
4. A good.....program can be used not only to rectify accidental spelling mistakes and typing errors, but also to speed typing input.
5. Many word processors include a, so you can look for words with similar meanings.
6. The.....contains a row of icons that perform particular actions when clicked.
- 7a paragraph involves moving your writing in from the margins of the page. For example, a left indent is the distance between the left margin and the text.

DEVELOPING SPEAKING SKILLS

1. Speak about Word Processing features.

7. SPREADSHEETS AND DATABASES

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

A spreadsheet program helps you manage personal and business finances. Spreadsheets, or worksheets, are mathematical tables which show figures in rows and columns.

A cell can hold three types of data: text, numbers and formulae.

Formulae are entries that have an equation which calculates the value to display; we can use them to calculate totals, percentages, discounts, etc. Spreadsheets have many built-in functions, prewritten instructions that can be carried out by referring to the function by name. For example, =SUM(D2:D7) means add up all the values in the cell range D2 to D7.

The format menu lets you choose font, alignment, borders, etc.

Parts of a database

Database basics

A database is essentially a computerized record keeping system.

Each unit of information you create is called a record and each record is made up of a collection of fields. Typically, a single record consists of a set of field names like: Title, FirstName, Surname, JobTitle, TelNo and ID. You fill in a form with the relevant information for each field to add a new record to the database. There are different data types.

- Text – holds letters and numbers not used in calculations
- Number – can only hold numbers used in calculations and reports
- Memo – can store long texts
- Date/Time – a date or time or combination of both
- AutoNumber – assigns a number to each record
- OLE Object – (object linking and embedding) holds sounds and pictures
- Yes/No – for alternative values like true/false, yes/no, on/off, etc.
- Hyperlink – adds a link to a website

Once you have added data to a set of records, indexes must be created to help the database find specific records and sort (classify) records faster. An index performs the same function as in the back of a book or in a library. For example, if you regularly search your database by surname, the index should be defined on this field.

Relational databases

Two database files can be related or joined as long as they hold a piece of data in common. A file of employee names, for example, could include a field called 'DEPARTMENT NUMBER' and another file, containing details of the department itself, could include the same field. This common field can then be used to link the two files together.

Extracting information from a database is known as performing a query. For example, if you want to know all customers that spend more than £9,000 per month, the program will search the name field and the money field simultaneously.

Vocabulary list

spreadsheet – электронная таблица

worksheet – рабочая таблица, рабочий бланк

row – ряд

cell – ячейка

equation – уравнение

alignment [ə'laɪnmənt] – подгонка элементов, линирование строки; выравнивание

to embed [ɪm'bed] – вставлять, встраивать

extract ['ekstrækt] – извлекать

query ['kwɪ(ə)rɪ] – запрос

simultaneously [sɪm(ə)'teɪniəsli] – одновременно

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Find the terms which correspond with these definitions.

1. software which allows data to be displayed and managed in a table format
2. it goes up and down and has letter labels
3. it goes across and has number labels
4. an area in a spreadsheet which contains data
5. the current cell where you enter information
6. mathematical equations that help you calculate and analyze data
7. ready-to-use formulae that help you perform specialized calculations, e.g. SUM, AVF-RAGE, etc.

Exercise 2. Complete the text below with the suitable words.

A (1) program allows the user to store, change and retrieve information.

A database file is a collection of records. Each (2) contains a set of fields.

Each (3) holds a separate piece of information; for example, a student file contains a list of records, each of which consists of several fields which give their name, address, birthday, etc.

In a (4) database, information is stored in tables that have a connection or link with one another.

A database lets you create an (5), a list of records ordered according to the content of certain fields; this helps you search and (6) records into numerical or alphabetical order very fast. It also has a (7) function which allows you to extract information that meets certain criteria.

DEVELOPING SPEAKING SKILLS

1. Which data fields would you include in these databases?

- the patients of a hospital
- a library catalogue

8. TYPES OF GRAPHICS SOFTWARE

Read and translate the text

Computer graphics are pictures created, changed or processed by computers. There are two categories.

1 . Bitmapped graphics represent images as bitmaps; they are stored as pixels and can become a bit distorted when they are manipulated. The density of dots, known as the resolution and expressed in dots per inch, determines how sharp the image is.

2 . Vector graphics represent images as mathematical formulae, so they can be changed or scaled without losing quality. They are ideal for high-resolution output.

There are different types of graphics software.

- Image manipulation programs let you edit your favourite images. For example, you can scan a picture into your PC or transfer a photo from your camera and then add different effects, or filters.
- Painting and drawing programs, also called illustration packages, offer facilities for freehand drawing, with a wide choice of pens and brushes, colours and patterns. One example is *Windows Paint*.
- Business graphics programs, also called presentation software, let you create pie charts, bar charts and line graphs of all kinds for slide shows and reports. You can import data from a database or spreadsheet to generate the graphs.
- Computer-aided design (CAD) is used by engineers and architects to design everything from cars and planes to buildings and furniture. First they make a wireframe, a drawing with edges and contour lines. Then if they want to colour the objects and add texture, they create a surface for the object; this is called 'filling the surface'. Finally, the design is rendered to make the object look realistic. Rendering is a process that adds realism to graphics by-using shading, light sources and reflections.
- Desktop publishing (DTP) is based around a page layout program, which lets you import a text from a word processor, clip-art (ready-made pictures) from graphics packages, and images from scanners or cameras, and arrange them all on a page. It is used to design and publish books, newspapers, posters, advertisements, etc.
- Digital art, or computer art, is done with applets that use mathematical formulae to create beautiful bright shapes called fractals. A fractal is a geometrical figure with special properties, e.g. the Koch snowflake or the Mandelbrot set. Fractals can also be used to model real objects like clouds, coastlines or landscapes.
- Computer animation uses graphics programs (e.g. cligita cartooning systems) to create or edit moving pictures. Each image in a sequence of images is called a 'frame'.
- Geographic information systems (GIS) allow cartographers to create detailed maps.

Vocabulary list

bitmapped graphics – растровая графика

a bitmap – растр, побитовое изображение, графическое изображение

distorted – искаженный

sharp image – четкое изображение

to scale – определять масштаб, приводить к масштабу

high-resolution output – вывод с высоким разрешением

to edit – редактировать

pattern – графический шаблон

a pie chart – диаграмма

computer-aided design (CAD) – компьютерное конструирование; проектирование

a wireframe – каркасное представление (пространственной модели), режим просмотра рисунка, объекты которого представляются только их контурами

an edge – край, грань

rendering – визуализация предметов

desktop publishing (DTP) – настольная издательская программа

a page layout program – программа компоновки страниц

a fractal – квантиль, фрактал

a property – свойство

the Koch snowflake – снежинка Коха

the Mandelbrot set – множество Мандельброта

coastline – побережье

cartoon – мультфильм

Geographic information systems (GIS) – геоинформационная система (ГИС)

a cartographer – картограф

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the questions.

1. How are computer graphs created? 2. What categories of computer graphs do you know? 3. Do image manipulation programs or painting and drawing programs allow you to edit your favourite images? 4. What is DPT based around? 5. Computer-aided design (CAD) is used by engineers and architects, isn't it? 6. What is digital art done with? 7. Does computer animation use graphics programs? 8. Geographic information systems (GIS) allow cartographers to create detailed maps, don't they?

Exercise 2. Decide which type of graphics software is best for these users.

- 1 a person who wants to edit photos at home
- 2 an economist who wants to present statistics in a form that can be easily understood
- 3 engineers who need to design the interior and exterior of a new aeroplane
- 4 a company which needs to design and publish a magazine

5 an artist who wants to produce illustrations and freehand drawings for a book

6 an organization that needs to make maps and 3D virtual models of the surface of the Earth

7 computer animators who make movies like *Toy Story* and *Shrek*

1 a mathematician who wants to make fractal shapes of natural phenomena

Exercise 3. Complete the sentences with the correct words.

1. Painting programs work by giving a colour to each pixel in an image, creating a Unlike vector graphics, the image is a single layer, so once something is painted, it becomes part of the whole picture.

2. In..... painting programs and image editors are special effects that can be applied to a picture, including drop shadows, textures, distortions, etc.

3. The model is the simplest interpretation of a true three-dimensional object. Here the object is represented by its edges and contours and is therefore similar in form to a normal engineering drawing or sketch.

4.adds textures to each surface, and generates realistic reflections, shadows and highlights.

5. Most illustration packages come with a bundle of resources that include ready-made images and a selection of fonts.

6.are geometrical patterns that are repeated at a small scale to generate irregular shapes, some of which are similar to objects in nature.

Exercise 4. Find the tools that match these definitions.

1 . This is like a magnifying glass which changes your view of a drawing.

2 . This brush lets you paint in different shapes and patterns.

3 . This is used to draw curves in different thicknesses.

4. This rubs out the part of the picture you drag it over.

5 . This tool lets you pick a colour from an area of an image, instead of choosing tricolour from the colour palette.

6 . This tool is used to fill a shape with a colour of your choice.

7 . This makes straight lines.

8 . This basic tool is used to draw freehand, i.e. to draw free-form shapes.

9 . This group of tools is used for drawing shapes: rectangles, ellipses and polygons.

10 . This produces individual pixels of colour in a spray pattern.

11 . These tools let you make rectangular or freehand selections around the things you want to select.

12 . This is used to type a text.

DEVELOPING SPEAKING SKILLS

1. You probably have a paint program at home. Describe what you can do with it.

2. Speak about two possible applications of using computer graphs in business.

9. INPUT DEVICES

Read the text. Use a dictionary to translate it

Input devices are the pieces of hardware which allow us to enter information into the computer.

The keyboard

A standard PC keyboard has various groups of keys.

- Alphanumeric keys – these represent letters and numbers, arranged as on a typewriter.
- A numeric keypad appears to the right of the main keyboard and contains numeric and editing keys; the Num Lock key is used to switch from numbers to editing functions.
- Function keys appear at the top of the keyboard and can be programmed to do special jobs.
- Cursor keys include 'arrow keys' which move the insertion point, and keys such as Home, End, Page Up, and Page Down, which let you move around documents.
- Dedicated keys are used to issue commands or produce alternative characters. For example: Ctrl changes the functions of other keys (e.g. Ctrl + X cuts the selected text).

Caps Lock sets the keyboard in 'CAPITALS' mode; it only affects letters.

Enter (or Return) is pressed to select options from a menu or to start a new paragraph.

Backspace deletes the character to the left of your current position.

The mouse

A mouse is a hand-held device that lets you move a pointer (or cursor) and select items on the screen. It has one or more buttons to communicate with the PC. A scroll wheel lets you move through your documents or web pages. The pointer looks like an I-bar, an arrow or a pointing hand.

An optical mouse has an optical sensor instead of a ball underneath.

A cordless (wireless) mouse has no cable; it sends data via infrared signals or radio waves.

Mouse actions:

- **to click**, press and release the left button;
- **to double-click**, press and release the left button twice;
- **to drag**, hold down the button, move the pointer to a new place and then release the button;
- **to right-click**, press and release the right button; this action displays a list of commands.

Voice input

Today you can also interact with your computer by voice with a voice-recognition system that converts voice into a text, so you can dictate the text directly onto your word processor or email program. You can also control your PC with voice commands; this means you can launch programs, open, save or print files. Some systems let you search the Web or chat using your voice instead of the keyboard.

Scanners

Input devices such as scanners and cameras allow you to capture and copy images into a computer.

A scanner is a peripheral that reads images and converts them into electronic codes which can be understood by a computer. There are different types.

- A flatbed is built like a photocopier and is for use on a desktop; it can capture a text, colour images and even small 3D objects.
- A film scanner is used to scan film negatives or 35 mm slides – pictures on photographic film, mounted in a frame.
- A hand-held scanner is small and T-shaped, ideal to capture small pictures and logos.
- A pen scanner looks like a pen; you can scan a text, figures, barcodes and handwritten numbers.
- Barcode scanners read barcodes on the products sold in shops and send the price to the computer in the cash register. Barcodes consist of a series of black and white stripes used to give products a unique identification number.
- The resolution of a scanner is measured in dpi or dots per inch. For example, a 1,200 dpi scanner gives clearer, more detailed images than a 300 dpi scanner.
- Most scanners come with Optical Character Recognition software. OCR allows you to scan pages of the text and save them into your word processor; they can then be edited.

Digital cameras

A digital camera doesn't use a film. Photos are stored as digital data (bits made up of 1s and 0s), usually on a tiny storage device known as a flash memory card. You can connect the camera or memory card to a PC and then alter the images using a program like Adobe Photoshop, or you can view the images on a TV set. Many printers have a special socket so that you can print images directly from a memory card or camera.

Digital video cameras and webcams

Webcams (short for Web cameras) let you send and receive live video pictures through the Internet. They're primarily used for video conferences - video calls - but they can be used to record photos and video onto your hard disk.

The resolution of webcams is expressed in megapixels (million pixels). Webcams connect to the PC via a USB (universal serial bus) or Fire Wire port; they

display video at 24 to 30 frames (pictures) per second. Some include a headset with a microphone and earpiece.

Vocabulary list

various ['ve(ə)riəs] – различный

alphanumeric [ˌælfənju:'merɪk(ə)l] – буквенно-числовой

keypad ['ki:pæd] – клавиатура, кнопочная панель

to edit – править, редактировать

to switch – переключаться

the insertion point – место ввода (информации)

dedicated keys – клавиши специального назначения

to issue commands – выдавать команды

caps lock – замок верхнего регистра, клавиша фиксации заглавных букв

backspace – клавиша возврата на одну позицию

to delete – стирать

underneath [ˌʌndə'ni:θ] – внизу

a cordless (wireless) mouse – беспроводная мышь

to release the button – отпустить кнопку

voice input – ввод информации при помощи голоса; голосовой ввод

a voice-recognition system – система распознавания голоса

to launch programs – запускать программы

to capture and copy images – фиксировать и копировать изображение

a peripheral – периферийное устройство

a flatbed – планшетного типа; планшетный (сканер)

a barcode – штрих код

optical character recognition software – программное обеспечение для распознавания оптических символов

word processor – текстовый редактор

to alter the image – изменять изображение

resolution – разрешающая способность; разрешение

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Translate the following questions in writing and make sure you can answer them. Ask each other questions in class.

1. Какие устройства ввода Вы знаете? 2. Какие клавиши клавиатуры Вы знаете? 3. Какие функции Вы можете выполнять при помощи мыши? 4. Как Вы можете взаимодействовать с компьютером при помощи голосовой распознающей системы? 5. Что Вы можете делать при помощи сканеров? 6. Назовите типы сканеров, которые Вам известны. 7. Как работает цифровая камера? 8. Для чего используются видеокамеры?

Exercise 2. Which input device would you use for these tasks?

- to play computer games
- to copy images from paper into a computer
- to read price labels in a shop
- to select a text and click on links on web pages
- to enter drawings and sketches into a computer
- to input voice commands and dictate a text
- to draw pictures or select menu options directly on the screen
- to take and store pictures and then download them to a computer

Exercise 3. Complete each sentence by choosing from the following devices: touch screen, trackball, touchpad, webcam.

1. A is a stationary device that works like a mouse turned upside down. You roll the ball with your hand to move the pointer on the screen.
2. Interactive are used in museums, information centres and Internet kiosks. You use your finger to point directly to objects on the screen.
- 3..... A is used to send live video images via the Internet.
- 4..... A is found on notebook PCs. You use it by pressing the sensitive pad with a finger.

Exercise 4. Complete these sentences with the correct 'mouse action'.

1. To start a program or open a document you..... on its icon – that is, you rapidly press and release the mouse button twice.
- 2..... If you want to select a menu option, you just..... on the left button.
- 3... If you want to find the commands for a particular text, image, etc.. you have to on it.
- 4..... If you want to move an object, press the button and the object to the desired location.

Exercise 5. Solve the clues and complete the sentences with the right words.

1. Scanners and cameras are devices used to transfer images into a format that can be understood by computers.
2. Alets you copy photos and printed documents into your PC.
3. It has become one of life's most familiar sounds – the beep of the supermarket till whenever a..... is scanned.
4. If you need to scan 35mm..... you should go for a dedicated 35mm film scanner which concentrates all its dots into a tiny area.
- 5..... This scanner has a resolution of 300 x 600
- 6 . Ascanner is small enough to hold in your hand.
- 7 . Ascanner is used to capture lines of a text, barcodes and

numbers.

- 8..... Most digital cameras use flash..... cards to store photos.
9. scanners have a flat surface and take at least A4-sized documents.
10. To scan photographic negatives or slides you will need a.....scanner.

Exercise 6. Decide if these sentences are *True* or *False*. If they are false, correct them.

- 1 The details detected by a scanner are not determined by its resolution.
- 2 A barcode scanner is a computer peripheral for reading barcode labels printed on products.
- 3 Scanners cannot handle optical character recognition.
- 4 A digital camera uses a light sensitive film instead of a memory card for storing the images.
- 5 A digital video (DV) camera is used to take still photographs.
- 6 Video editing software allows you to manipulate video clips on the computer.

Exercise 7. Complete this advertisement with the correct words.

Having (1)....with friends and family has never been easier or more enjoyable. You get the highest-quality audio and video, no matter which chatting solution you use. With the WebCam Live! Ultra, its CCD image sensor with 640 x 480 (VGA) resolution produces rich, vibrant colours.

Combined with its (2)....2.0 Hi-Speed connection, the result is top-quality, full-motion video at 30 (3)....per second for all your web conversations, even in dimly-lit rooms.

The WebCam Live Ultra lets you do more. Let your voice be heard clearer than ever before with the included (4).... unlike the built-in microphones in most other (5).... Take still pictures at up to 1.3 (6) resolution (interpolated), and enjoy the many great features that accompany the bundled award-winning WebCam Center software, such as motion detection, remote security monitoring, time lapse video capture and much more.

DEVELOPING SPEAKING SKILLS

Exercise 1. Make a list of things you can do with a voice-recognition system.

Exercise 2. Describe the basic features of a digital camera and the things you can do with it.

10. OUTPUT DEVICES

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

Technical details and types of printers

A printer is a device that prints your texts or graphics on paper.

A dot-matrix printer uses a group, or matrix, of pins to create precise dots. A print head containing tiny pins strikes an inked ribbon to make letters and graphics. This impact printing technology allows shops, for example, to print multi-part forms such as receipts and invoices, so it's useful when self-copying paper is needed. It has two important disadvantages: noise and a relatively low resolution (from 72 to ISO dpi).

An ink-jet (also called bubble-jet) printer generates an image by spraying tiny, precise drops of ink onto the paper. The resolution ranges from 300 to 1,200 dpi, suitable for small quantities or home use.

A standard ink-jet has a three-colour cartridge, plus a black cartridge. Professional ink-jets have five-colour cartridges, plus black; some can print in wide format, ranging from 60 cm up to 5 metres (e.g. for printing advertising graphics).

Some ink-jet based printers can perform more than one task. They are called *multi-function printers* because they can work as a scanner, a fax and a photocopier as well as a printer. Some units accept memory cards and print photos directly from a camera.

A laser printer uses a laser beam to fix the ink to the paper. A laser works like a photocopier; a powder called a toner is attracted to paper by an electrostatic charge and then fused on by a hot roller.

Laser printers are fast and produce a high resolution of 1,200 to 2,400 dpi, so they are ideal for businesses and for proofing professional graphics work.

Lasers use *a page description language* or PDL which describes how to print the text and draw the images on the page. The best-known languages are Adobe PostScript and HP Printer Control Language.

A professional *imagesetter* is a typesetting printer that generates very high-resolution output (over 3,540 dpi) on paper or microfilm. It's used for high-quality publications.

A plotter is a special type of a printer which uses ink and fine pens held in a carriage to draw detailed designs on paper. It's used in computer-aided design, maps, 3-D technical illustrations, etc.

CTRs and LCDs

The screen of a computer is often known as the monitor, or VDU (visual display unit). Inside the computer, there is a video card which processes images and sends signals to the monitor.

When choosing a monitor, you have to take into account a few basics.

– Type of display – the choice is between a **CRT** or an **LCD** screen.

The **Cathode Ray Tube** of a monitor is similar to a traditional TV set. It has three electron guns (one for each **primary colour**: red, green and blue) that strike the inside of the screen, which is coated with substances called **phosphors**, which glow and create colours. CRTs are cheap, but they are heavy, can flicker and emit radiation.

A **Liquid Crystal Display** is made from flat plates with a liquid crystal solution between them. The crystals block the light in different quantities to create the image. **Active-matrix** LCDs use TFT (thin film transistor) technology, in which each pixel has its own transistor switch. They offer better quality and take up less space, so they are replacing CRTs.

- **Screen size** – the viewing area is measured **diagonally**; in other words, a 17" screen measures 17 inches from the top left corner to the bottom right.
- **Resolution** – the clarity of the image depends on the number of **pixels** (short for picture elements) contained on a display, horizontally and vertically. A typical resolution is 1,024 x 768. The sharpness of images is affected by **dot pitch**, the distance between the pixels on the screen, so a dot pitch of 0.28 mm or less will produce a sharp image.
- **Brightness** – the luminance of images is measured in cd/m^2 – (candela per square metre).
- **Colour depth** – the number of colours a monitor can display. For example, a VGA monitor produces 256 colours, enough for home use; a SuperVGA can produce up to 16.7 million colours, so is ideal for photographic work and video games.
- **Refresh rate** – the number of times that tin image is drawn each second. If a monitor has a refresh rate of 75 Hertz (Hz), it means that the screen is scanned 75 times per second. If this rate is low, you will notice a flicker, which can cause eye fatigue.
- There are also **Big screens**: plasma (high-contrast images and bright colours, wideviewing angles, perfect for movies. The images are generated by a plasma discharge which contains noble, non-harmful gases) and projection TVs (video projector and the screen with a large TV box).

Vocabulary list

a dot-matrix printer – матричный принтер

precise [prɪ'saɪs] – точный

an inked ribbon – чернильная лента

a receipt [rɪ'si:t] – квитанция

an invoice – счет

impact printing technology – контактная печать

resolution [ˌrezə'lu:ʃ(ə)n] – разрешение, разрешающая способность

an ink-jet printer – струйный принтер

to fuse on – плавить, соединять, растворять

roller ['rɒlə] – валик, ролик, каток

to proof – надежно защищать, делать стойким

a page description language – язык страничных описаний (позволяющий сочетать текстовую и графическую информацию, выдаваемую на разные устройства печати); язык описания страниц
 an imagesetter – устройство вывода изображения
 a plotter – плоттер, самописец, графическое регистрирующее устройство
 fine – зд. тонкий, точный, изящный
 a cathode ray tube – катодно-лучевая трубка
 to glow – светиться, сверкать, накаляться
 to flicker – мерцать, рябить
 to emit – излучать
 a plate – лист, пластина
 solution – раствор, состав
 brightness – яркость
 luminance – светимость, свечение, характеристики яркости изображения
 eye fatigue – утомляемость глаз

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Ask questions to the text. Discuss the answers to the questions with your classmates.

Exercise 2. Complete these sentences with the suitable words.

1. The differences in are noticeable: the more dots per inch, the clearer the image.
2. A print resolution of between 600 and 2,400 ensured that even text as small as 2 pt was legible.
3. Passengers with an electronic ticket will need a of ticket confirmation or a boarding pass to be admitted to secured gate areas.
- 4..... The key advance of recent years is printing speed: the latest generation of ink-jets, prints black-and-white text at 15
- 5..... With appropriate software, you can view the images on a computer, manipulate them, or send them to a..... and produce excellent quality colour copies.
- 6..... A..... is a dedicated computer that connects a printer to a network. It enables users to share printing resources.
7. A..... is a utility that organizes and arranges any documents waiting to be printed.
8. In computers, a is a program installed to control a particular type of a printer.

Exercise 3. Choose the most appropriate type of a printer for these situations.

- home user who wants to print text documents and family photographs
- business people who need to print in large quantities at high quality in an office

- engineers who want to make detailed line drawings
- professional typesetters in desktop publishing (e.g. to publish catalogues and magazines)
- a company that wants to print carbon copies of bills and receipts

Exercise 4. Find terms which correspond to these definitions.

1. a container that holds the ink in an ink-jet printer
2. powdered ink used in laser printers
3. small needles that press on the inked ribbon to make the characters on paper
4. printer technology that produces a text and pictures by hammering pins against a ribbon and the paper
5. a language that tells a printer how to print a document
6. peripheral which combines a printer, a fax machine and photocopying and scanning capability into one device CRTs and LCDs

Exercise 5. Read and then correct these false statements.

- 1 . The images shown on a monitor are not generated by the video card.
- 2 . All visible colours can be made from mixing the three primary colours of red, yellow and blue.
- 3 . Typical CRT-based displays occupy less space than LCD displays.
- 4 . Active-matrix LCDs do not use a technology called thin film transistor or TFT.
- 5 . The size of the screen is measured horizontally.

Exercise 6. Match each term with the correct definition.

- | | |
|-----------------|--|
| a. phosphors | 1. the frequency at which a monitor renews its image, measured in Hz. |
| b. LCD screen | 2. a flat-panel display which works by emitting light through a special liquid. |
| c. pixel | 3. the space between a display's pixels. |
| d. dot pitch | 4. the smallest element in a displayed image. |
| e. refresh rate | materials that emit light and produce colours when they are activated by an electron beam. |

Exercise 7. Complete these sentences with the suitable words.

1. If you intend to set up aconsider getting a very big screen, a DVD recorder and a good set of speakers.
2. A - takes digital images and displays them on a screen or wall.
3. The company announced plans to expand its - (DI.P) cinema technology, which has thrilled test audiences with its dazzling colours and pin-sharp images.
4. In a TV, a large box contains both the projector and the screen built in.
5. The gas mixture in a is not dangerous.

DEVELOPING LANGUAGE SKILLS

1. Describe the characteristics of the printer that you have or would like to have at home or at work. Give details about: type of a printer, speed, resolution, ink cartridges, price and customer support.
2. Describe the home cinema of your dreams. Use these notes to help you.
 - Type of a display: CRT television, LCD screen, plasma TV or video projector.
 - Screen size.
 - Resolution (image quality).
 - Video source: TV, VCR or DVD recorder.
 - Sound capabilities.

11. DISKS AND DRIVES

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

Magnetic storage

Magnetic devices store data magnetically. A disk drive spins the disk at high speed and reads its data or writes new data onto it.

A floppy disk drive used 5.5 inch diskettes which could only hold 1.44 MB of data; it was often called A: drive and was relatively slow.

Most PCs have one internal hard disk, usually called C: drive, which can hold several gigabytes of data. It's used to keep the operating system, the programs and the user's files easily available for use.

When you format a disk, or prepare it for use, its surface is divided into concentric circles called tracks. Each track is further divided into a number of sectors. The computer remembers where information is stored by noting the track and sector numbers in a directory.

The average time required for the read/write heads to move and find data is called access time; it is measured in milliseconds (ms). Don't confuse 'access time' with 'transfer rate', the rate of transmission of data from the disk to the CPU (e.g. 15 megabytes per second).

– A portable hard drive is an external unit with the drive mechanism and the media all in one sealed case. You can use it to make a backup, a spare copy of your files, or to transport data between computers.

Optical storage

Optical drives use a laser to read and write data, so they are not affected by magnetic fields; but they are slower than hard drives. Modern DVD recorders accept all CD and DVD formats.

CDs (compact discs) can store up to 650-700 MB of data.	DVDs (digital versatile discs) are similar in size to CDs (both are 1.2
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<p>CD-ROMs (read only memory) are 'read-only' units, so you cannot change data stored on them (e.g. a dictionary or a game).</p> <p>CD-R (recordable) discs are write-once devices which let you duplicate CDs.</p> <p>CD-RW (rewritable) discs enable you to write onto them in multiple sessions, like a hard disk.</p>	<p>mm thick), but they differ in structure and capacity. DVDs have more tracks and more pits (tiny holes) per track, and can store from 4.7 GB to 17 GB of data, movies, high-definition sound, etc., so They will probably replace CDs. DVD formats include'</p> <p>DVD-ROM (read-only memory)</p> <p>DVD-R or DVD+R (recordable only once)</p> <p>DVD-RW or DVD+RW (rewritable, so it can be erased and reused many times).</p>
--	---

Portable DVD players let you watch movies or TV, play games and listen to music, wherever you are. They usually run on batteries, have a widescreen (rectangular 16:9 format) LCD and support multi-format playback, allowing you access to many file formats including DVD video, JPEG pictures, MP3 music, etc. They have two built-in stereo speakers, or headphones if you don't want to disturb other people.

Removable flash memory

Flash memory is solid-state, rewritable memory; it is non-volatile, so it retains data when the power is turned off. This explains its popularity in small devices.

- Flash memory cards such as Compact Flash or Secure Digital are found in cameras, PDAs and music players.
- Flash drives, also known as thumb or pen drives, are connected to a USB port of the computer. They let you save and transfer data easily.

Vocabulary list

to spin – вращаться, крутиться
inch – дюйм
relatively – относительно
average – средний
to measure – измерять
an external unit – внешнее устройство
a sealed case – герметичный корпус
rectangular – прямоугольный
solid-state – твердотельная память
non-volatile – постоянная память
a thumb drive – флэшка, флэш-накопитель

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. How do magnetic devices store data?
2. What is most PCs internal hard disk called?
3. What happens when you format a disk?
4. What is called access time?
5. What device can you use to make a backup, a spare copy of your files, or to transport data between computers?
6. What do you know about CDs and DVDs?
7. Is flash memory non-volatile?
8. Where are flash memory cards found?

Exercise 2. Choose a term from this word web to complete the sentences below.

1. The first rule of data storage is to make a of all important files.
2. A is slower than a hard drive and can only hold 1.44 MB disks.
3. The inside your PC is made of aluminium alloy covered with a magnetic coating. This makes the disk itself a rigid plate, hence its name.
4. The are circles around a disk and the are segments within each circle.
5. This hard drive is a 60 GB IBM model with a fast of 8 ms.
6. The is the rate of transmission of data from the disk to the CPU. This is usually described in megabytes per second.
7. Apple's iPod music player can double as a for transporting computer data.

Exercise 3. Find the right word for the following descriptions:

1. the CD and DVD formats that can be rewritten many times;
2. the CD and DVD formats that can be written to by the user only once;
3. the CD and DVD formats that can be read by a computer but not written to;
4. the type of cards used in digital cameras;
5. a type of drive that plugs into a USB port and lets you share photos and music with friends;
6. the memory without moving parts; it is erasable, non-volatile and used in small devices;
7. the expression that means to 'initialize a disk and prepare it to receive data'.

Exercise 4. Complete this product description with the correct words.

The Panasonic DVD-LS91 is a top-of-the-range (1), which provides pure entertainment wherever you go.

It has a big 9 inch built-in (2) LCD, so you can really enjoy movies. The built-in stereo speakers allow you to listen along, or if you want to listen alone, just plug in a pair of (3)..... . This portable machine provides (4)..... –, so you can play DVD Audio/Video, CD-R/RW, DVD-RAM, DivX and MP3 files. Its compact design features a built-in rechargeable 6 hour battery pack.

The DVD-LS91 allows 6 hours of playback, and provides a perfect way to entertain yourself and your kids during long trips.

DEVELOPING SPEAKING SKILLS

Exercise 1. Which devices or formats would be most suitable for storing these things? Discuss. Give your reasons.

- The operating systems and the programs on a home computer.
- An electronic encyclopedia for children.
- A movie in a digital format.
- The music tracks by your favourite band.
- All the files generated by a company in one day.
- The photos taken by a digital camera.

12. PROGRAMMING

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

Programming languages

Programming is the process of writing a program using a computer language. A program is a set of instructions which a computer uses to do a specific task (e.g. a solution to a Maths problem).

The only language a PC can directly execute is machine code, which consists of 1s and 0s. This language is difficult to write, so we use symbolic languages that are easier to understand. For example, assembly languages use abbreviations such as ADD, SUB, MPY to represent instructions. The program is then translated into machine code by software called an assembler.

Machine code and assembly languages are called low-level languages because they are closer to the hardware.

High-level languages, however, are closer to human languages; they use forms resembling English, which makes programming easier. The program is translated into machine code by software called a compiler. Some examples are:

- FORTRAN – used for scientific and mathematical applications.
- COBOL – popular for business applications.
- BASIC – used as a teaching language; Visual BASIC is now used to create Windows applications.
- C – used to write system software, graphics and commercial programs.
- Java – designed to run on the Web; Java applets are small programs that run automatically on web pages and let you watch animated characters, and play music and games.
- The languages used to create Web documents are called markup languages; they use instructions (markups) to format and link text files. Examples are:
 - HTML – the code used to create Web pages.
 - VoiceXML – it makes Internet content accessible via speech recognition and phone. Instead of using a web browser on a PC, you use a telephone to access voice-equipped websites. You just dial the phone number of the website and then give spoken instructions, commands, and get the required information.

Steps in writing a program

- To write a program, software developers usually follow these steps.
- First they try to understand the problem and define the purpose of the program.
- They design a flowchart, a diagram which shows the successive logical steps of the program.
- Next they write the instructions in a high-level language (Pascal, C, etc.). This is called coding. The program is then compiled.
- When the program is written, they test it, they run the program to see if it works and

- use special tools to detect bugs, or errors. Any errors are corrected until it runs smoothly. This is called debugging, or bug fixing.
- Finally, software companies write a detailed description of how the program works, called program documentation. They also have a maintenance program. They get reports from users about any errors found in the program. After it has been improved, it is published as an updated version.

Vocabulary list

a specific task – особая задача

a solution to a Maths problem – решение математической задачи

to execute [ˈɛksɪkjʊ:t] – выполнять

a symbolic language – символический язык

an assembly [əˈsɛmblɪ] language – язык ассемблера

an abbreviation [əˌbrɪ:vɪˈeɪ](ə)n – сокращение

an assembler [əˈsɛmblə] – ассемблер

a low-level language – язык низкого уровня

a compiler [kəmˈpaɪlə] – компилятор

to run on web-pages – запускать на веб-страницах

a mark-up language – язык разметки

accessible [əkˈsɛsəb(ə)l] – доступный

via [ˈvaɪə] – через

speech recognition – распознавание речи

a developer – разработчик

a flowchart – диаграмма

successive [səkˈsɛsɪv] – последовательный

coding – кодирование

to use special tools – использовать специальный инструментарий

to detect bugs – обнаруживать ошибки, погрешности

an error – ошибка

bug fixing – устранение ошибок, погрешностей

a maintenance [ˈmeɪnt(ə)nəns] program – программа-руководство по эксплуатации

an updated version – улучшенная, обновленная версия

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Translate and answer the questions.

1. Что такое программирование? 2. Дайте определение программы. 3. Из чего состоит машинный код? 4. Какие языки называются языками низкого

уровня? 5. Какие языки ближе к языку людей? Приведите примеры. 6. Какие языки мы используем для создания веб-документов? 7. Опишите последовательность шагов в создании программы. 8. Когда издается обновленная версия программы?

Exercise 2. Match the term with their definitions.

- | | |
|------------------------|--|
| 1. programming | a) basic language which consists of binary codes |
| 2. machine code | b) programming language such as C, Java or Visual BASIC |
| 3. assembly language | c) writing computer programs |
| 4. high-level language | d) low-level language translated into machine code by an assembler |
| 5. Java applet | e) software which converts a source program into machine code |
| 6. compiler | f) language used to create and format documents for the Web |
| 7. markup language | g) small self-contained program written in Java |

Exercise 3. Put the programming steps into the correct order.

- Document and maintain the program
- Test the program and detect bugs
- Make flowchart
- Write code and compile
- Analyze the problem
- Debug and correct it if necessary

Exercise 4. Complete this article with the correct words from the box.

HTML	dial	Voice XML	commands	speech recognition
------	------	-----------	----------	--------------------

You don't need a sophisticated cell phone to surf the Internet when you're on the road – just your own voice. That's the idea behind a new breed of voice service that is popping up all over the place.

Subscribers (1).....a toll-free phone number and use spoken (2) to listen to anything from weather conditions to stock quotes, or flight information to news stories. Half a dozen of these services have already gone live or are testing their systems. These launches are all happening because two crucial technologies have come of age.

(3) software from different companies can now understand a wide range of accents and diction without having to be trained to a specific voice. And computer languages such as Voice XML make it as easy to write voice

services as (4) has made it to write web pages. With (5) the human voice becomes a substitute for a computer mouse and the spoken command

for a click. It doesn't however, call up conventional web pages, but content which is specially composed for a telephone: sound clips, numbers, music, spoken texts.

DEVELOPING SPEAKING SKILLS

Exercise 1. Prepare a summary on computer languages. Use your own experience in using one of the programming languages for designing a program. Present it in class.

13. PROCESSING

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

The processor

The processor, also called the CPU or central processing unit, is the brain of your computer. In PCs, it is built into a single chip – a small piece of silicon with a complex electrical circuit, called an integrated circuit – that executes instructions and coordinates the activities of all the other units.

Three typical parts are:

- the control unit, which examines instructions from memory and executes them;
- the arithmetic and logic unit (ALU), which performs arithmetic and logical operations;
- the registers, high-speed units of memory used to store and control data.

The speed of a processor is measured in gigahertz (GHz). Thus, a CPU running at 4 GHz can make about four thousand million calculations a second. An internal clock sends out signals at fixed intervals to measure and synchronize the flow of data.

The main circuit board is known as the motherboard. This contains the CPU, the memory chips, expansion slots and controllers for peripherals, connected by internal buses, or paths, that earn, electronic signals. For example, the front side bus carries all data that passes from the CPU to other devices.

Expansion slots allow you to install expansion cards which provide extra functions, e.g. a video card or a modem. Laptops have PC. cards, the size of a credit card, which add features like sound, memory and network capabilities.

RAM and ROM

When you run a program, the CPU looks for it on the hard disk and transfers a copy into the RAM. RAM (random access memory) is temporary or volatile, that is, it holds data while your PC is working on it, but loses this data when the power is switched off.

However, ROM (read only memory) is permanent and contains instructions needed by the CPU; the BIOS (basic input/output system) uses ROM to control communication with peripherals, e.g. disk drives.

The amount of RAM determines the number of programs you can run simultaneously and how fast they operate. It can be expanded by adding extra RAM chips.

Units of memory

The electronic circuits in computers detect the difference between two states: ON (the current passes through) or OFF (the current doesn't); they represent these states as 1 or 0. Each 1 or 0 is called a binary digit or bit. Bits are grouped into eight-digit codes that typically represent characters (letters, numbers and symbols). Eight bits together are called a byte. For example, 01000001, is used for the character A. Computers use a standard code called ASCII for the binary representation of characters.

In order to avoid complex calculations of bytes, we use bigger units. A kilobyte (KB) is 1,024 bytes; a megabyte (MB) is 1,024 kilobytes; a gigabyte (GB) is 1,024 megabytes; a terabyte (TB) is 1,024 gigabytes. We use these units to describe the RAM memory, the operating capacity of disks and the size of a program or document.

Vocabulary list

silicon – кремний

complex – сложный

integrated – встроенный

the arithmetic and logic unit – арифметическое логическое устройство

internal clock – внутренний генератор тактовых импульсов

to synchronize – синхронизировать

circuit board – плата

a slot – разъем

peripherals – периферийные устройства

an internal bus – внутренняя шина

path – путь доступа; канал

to install – устанавливать

to provide – предоставлять

to add features – давать дополнительные характеристики

capability – возможность, стойкость, характеристика

RAM – ОЗУ, оперативная память

ROM – ПЗУ (постоянное запоминающее устройство)

to expand – расширять

current – ток

ASCII – Американский стандартный код обмена информации

representation – представление

a character – символ

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Match the sentence beginnings with the correct endings.

1 . The CPU processes data and

a. areas within the CPU.

2 . The control unit is the part of the CPU that

b. you can't make changes to it.

. The arithmetic and logic unit is able to make

c. controls the way instructions are executed.

. The registers are high-speed storage

d. the computer is turned off.

- | | |
|--|--|
| 3 . Data contained in RAM is lost when | e. coordinates the other parts of the computer. |
| 4 . ROM memory can only be read: | f. calculations: add, subtract, multiply and divide. |

Exercise 2. Complete the sentences with the suitable words.

1. Intel are used in many computers.
2. Each 0 or 1 is called a bit, short fordigit.
3. Special cards can be inserted into expansion
4. A controls the timing within the PC by sending signals to synchronize its circuits and operations.
5. The processor speed is measured in
6. carry signals between different parts of a PC.
7. cards improve the computer's performance.
8. The uses ROM to control the input/output of data.
9. The main printed circuit board is called the
10. The brain of the computer is

Exercise 3. Fill in the blanks with the correct unit of memory.

1. One represents one character.
2. One represents 1,024 characters (about a small page of text).
3. One represents about one million characters (about the text of a small book).
4. One represents about 1,000,000,000 characters (about 1,000 books).
5. One represents about 1,000,000.000,000 characters (about one million books in a big library).

DEVELOPING SPEAKING SKILLS

Exercise 1. Find extra information about processing. Make up an oral summary and present it in class.

14. THE WORLD WIDE WEB

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

What the Web is

The World Wide Web, Web or WWW is a network of documents that works in a hypertext environment, i.e. using a text that contains links, hyperlinks to other documents.

The files, web pages, are stored in computers, which act as servers. Your computer, the client, uses a web browser, a special program to access and download them. The web pages are organized in websites, groups of pages located on the Web, maintained by a webmaster, the manager of a website.

The Web enables you to post and access all sorts of interactive multimedia information and has become a real information highway.

How to surf the Web

To surf or navigate the Web, access and retrieve web pages or websites, you need a computer with an Internet connection and a web browser. After you have launched it, you must type the website address or URL (Uniform Resource Locator), which may look like this:

<http://www.cup.org/education/sample.htm>

http: indicates the type of **protocol** that, the server and browser will use to communicate. Here it is Hypertext Transfer Protocol.

www. shows that it is a resource on the **World Wide Web**.

cup.org is the **domain name** of the web server that hosts the website.

education is the **path**, the place where a web page is located.

sample.htm is the **filename** or name of a single web page.

The different parts are separated by full stops (.) and forward slashes (/). When we say a URL, we say dot (.) and slash (/).

To find interesting sites you can use search engines, where the website information is compiled by spiders, computer-robot programs that collect information from sites by using keywords, or through web indexes, subject directories that are selected by people and organized into hierarchical subject categories. Some web portals-websites that offer all types of services, e.g. email, forums, search engines, etc. – are also good starting points.

The most relevant website addresses can be stored in your computer using the bookmarks or favourites function in your browser.

Websites usually have a beginning page or home page. From this starting point you can navigate by clicking your mouse on hyperlinks in texts or images.

Vocabulary list

a hypertext environment – гипертекстовая среда

to contain links – содержать ссылки

an information highway – информационная магистраль

to surf the Web – просматривать веб-страницы в Интернете, получать доступ к информационным ресурсам

to retrieve web pages – загружать веб-страницы

to indicate – указывать

a domain name – доменное имя

a full stop – точка (пунктуационный знак)

a search engine – поисковая система

a spider – программа глобального поиска в системе Web; сетевой паук

relevant – соответствующий, подходящий

a bookmark – закладка

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What is the World Wide Web?
2. How are web-pages stored in a computer?
3. How are web-pages organized?
4. What does the Web enable you to do?
5. What do you need to know for navigating the Web?
6. What does the web-site address consist of?
7. How are different parts of the web-site address separated?
8. To find interesting sites you can use search engines, can't you?
9. How can the most relevant website addresses be stored in your computer?
10. What do web-sites usually have?
11. Is the Web an open door to a universe of multimedia resources that people use in many different ways?

Exercise 2. Solve the clues and complete the sentences with the correct words.

1. The WWW is also called the information
2. A link in a web page.
3. A website that offers a variety of services.
4. The first page of a website is thepage.
5. A person who keeps a blog.
6. The manager of a web page is its web.....
7. An animal closely linked to the Web.
8. Another word for directory.
9. Another word for bookmark.

Exercise 3. Complete these instructions about how to navigate with the words in the box.

Client	web page	surf	web browser
Search engine	web server	website	URL

1. Start up your computer and connect to the Internet.
2. Open your
3. Type the ... to access a website.
4. Your web browser sends the request to the correct
5. The server looks for the document and sends it to thecomputer.
6. Your web browser displays the selected..... on the screen.

7. From the home page of the you can..... to other pages by clicking on hyperlinks.
8. If you want to find more websites, use a

Exercise 4. What are the main parts of this URL? How would you say the URL?

<http://www.cambridgeesol.org/exams/cpe.htm>

DEVELOPING SPEAKING SKILLS

Exercise 1. The Web is an open door to a universe of multimedia resources that people use in many different ways. What you can do on the Web?

15. INTERNET SECURITY

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

Internet crime

The Internet provides a wide variety of opportunities for communication and development, but unfortunately it also has its dark side.

Crackers, or black-hat hackers, are computer criminals who use technology to perform a variety of crimes: virus propagation, fraud, intellectual property theft, etc.

Internet-based crimes include scam, email fraud to obtain money or valuables, and phishing, bank fraud, to get banking information such as passwords of Internet bank accounts or credit card details. Both crimes use emails or websites that look like those of real organizations.

Due to its anonymity, the Internet also provides the right environment for cyberstalking, online harassment or abuse, mainly in chat rooms or newsgroups.

Piracy, the illegal copying and distribution of copyrighted software, information, music and video files, is widespread.

But by far the most common type of crime involves malware.

Malware: viruses, worms, trojans and spyware

Malware (malicious software) is software created to damage or alter the computer data or its operations. These are the main types.

- Viruses are programs that spread by attaching themselves to executable files or documents. When the infected program is run, the virus propagates to other files or programs on the computer. Some viruses are designed to work at a particular time or on a specific date, e.g. on Friday 13th. An email virus spreads by sending a copy of itself to everyone in an email address book.

- Worms are self-copying programs that have the capacity to move from one computer to another without human help, by exploiting security flaws in computer networks. Worms are self-contained and don't need to be attached to a document or program the way viruses do.
- Trojan horses are malicious programs disguised as innocent-looking files or embedded within legitimate software. Once they are activated, they may affect the computer in a variety of ways: some are just annoying, others are more ominous, creating a backdoor to the computer which can be used to collect stored data. They don't copy themselves or reproduce by infecting other files.
- Spyware, software designed to collect information from computers for commercial or criminal purposes, is another example of malicious software. It usually comes hidden in fake freeware or shareware applications downloadable from the Internet.

Preventative tips

- Don't open email attachments from unknown people; always take note of the file extension.
- Run and update antivirus programs, e.g. virus scanners.
- Install a firewall, a program designed to prevent spyware from gaining access to the internal network.
- Make backup copies of your files regularly.
- Don't accept files from high-risk sources.
- Use a digital certificate, an electronic way of proving your identity, when you are doing business on the Internet. Avoid giving credit card numbers.
- Don't believe everything you read on the Net. Have a suspicious attitude toward its contents.

Vocabulary notes

to provide a wide variety of opportunities – предоставлять широкие возможности

a cracker – компьютерный взломщик

a black-hat hacker – компьютерный пират

a virus propagation – распространение вируса

a fraud [frɔ:d] – мошенничество

an intellectual property theft – кража интеллектуальной собственности

scam – мошенническая проделка, афера

to obtain valuables – получить ценности

phishing – "фишинг" преступная деятельность интернет-мошенников, действующих под видом благонадёжных компаний и юр. лиц, с целью незаконного получения секретной информации: паролей, данных кредитных карточек, логинов...

anonymity [ˌænəˈnɪmɪti] – анонимность

cyberstalking – кибер преследование, домогательство

online harassment [ˈhærəsmənt] – домогательство, приставание, преследование

abuse – брань, ругательства, оскорбление

piracy – пиратство
 copyrighted software – авторское программное обеспечение
 to be widespread – быть широко распространенным, повсеместно используемым
 malware – вредоносное программное обеспечение
 a worm – червь
 to alter the computer data – изменять информацию в компьютере
 an executable [ɪg'zɛkjʊtəb(ə)l] file – выполняемый файл
 to be disguised [dis'gaɪzd] as – быть замаскированным как
 an innocent-looking file – невинно выглядящий файл
 ominous [ˈɒmɪnəs] – зловещий
 to create a backdoor – создавать черный ход
 a fake freeware – фальшивое бесплатное программное обеспечение
 preventative tips – советы по предотвращению
 to run and update antivirus programs – запускать и обновлять антивирусные программы
 to install a firewall – устанавливать брандмауэр
 to gain access to the network – получать доступ к сети
 to make a backup copy – создавать резервную копию
 to accept files from high-risk sources – получать файлы из источников повышенного риска
 to use a digital certificate – использовать цифровой сертификат
 to prove one's identity – удостоверить свою личность
 to have a suspicious attitude towards something – иметь подозрительное отношение к чему-либо

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What does the Internet provide? 2. Who uses technology to perform a variety of crimes? 3. Name some Internet-based crimes. 4. The Internet doesn't provide the right environment for cyberstalking, online harassment or abuse, does it? 5. Is piracy, the illegal copying and distribution of copyrighted software, information, music and video files, also widespread? 6. What is the most common type of Internet crimes? 7. Why is malware created? 8. What are the main types of malware? 9. An email virus spreads by sending a copy of itself to everyone in an email address book, doesn't it? 10. Are worms self-copying programs? 11. What is disguised as innocent-looking file? 12. Why is spyware designed? 13. Speak about preventative tips. 14. Which of the above mentioned tips do you always follow?

Exercise 2. Identify the Internet crimes sentences (1-6) refer to. Then match them with the advice below (a-f).

- 1 . Crackers try to find a way to copy the latest game or computer

program.

2 . A study has revealed that half a million people will automatically open an email they believe to be from their bank and happily send off all their security details.

3 . This software's danger is hidden behind an attractive appearance. That's why it is often wrapped in attractive packages promising photos of celebrities.

4 . There is a particular danger in Internet commerce and emails. Many people believe they have been offered a special gift only to find out later they have been deceived.

5 . 'Nimda' spreads by sending infected emails and is also able to infect websites, so when a user visits a compromised website, the browser can infect the computer.

6 . Every day, millions of children spend time in Internet chat rooms talking to strangers. But what many of them don't realize is that some of the surfers charring with them may be sexual predators.

a. People shouldn't buy cracked software or download music illegally from the Internet.

b. Be suspicious of wonderful offers. Don't buy if you aren't sure.

c. It's dangerous to give personal information to people you contact in chat rooms.

d. Don't open attachments from people you don't know even if the subject looks attractive.

e. Scan your email and be careful about which websites you visit.

f. Check with your bank before sending information.

Exercise 3. Fill in the gaps in these security tips with words from the box.

Digital certificate malware virus scanner spyware firewall antivirus
--

1. Malicious software (1), can be avoided by following some basic rules.
2. To prevent crackers from breaking into your internal network and obtaining your data, install a (2) It will protect you from (3)..... .
3. Internet users who like cybershopping should get a (4), an electronic identity card.
4. If you have been hit by a (5)....., don't panic! Download a clean-up utility and always remember to use an (6) program, for example, a virus (7)

DEVELOPING SPEAKING SKILLS

Exercise 1. What do you do to prevent computer infections?

Exercise 2. Do you keep your virus protection updated?

16. E-MAIL

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

What an email is

An email is an electronic message sent from one computer to another that can also include attachments: documents, pictures, sounds and even computer programs.

Although it's much faster and easier to use than the post, snail mail, the two have many things in common: you send an email to a mail server (an electronic post office) where it is stored in a mailbox, which holds incoming mail until the recipient downloads it. Users are given an email address and a password by an Internet Service Provider (ISP).

A typical email address has three parts.

mbrown@googlemail.com

Username	The	The domain name or network
A person's name or nickname	@ sign means 'at'.	address: the mail server where the account is located. The final part of it, the top-level adds information about it, e.g. .com = company, .org = non institution, .co.uk = a company in the UK, .es = Espana, etc.

Emails usually have two main parts.

1. The header generally includes these:

TO (name and address of the recipient) **CC** (carbon copy sent to another addressee)

BCC (blank / blind carbon copy)

SUBJECT (topic of the message)

2. The body (the message itself)

Some email programs also include a signature, with added information about the sender, at the end of the message.

You can make your message look more expressive or attractive by using smileys (also called emoticons): little pictures either made with characters from the keyboard such as :-) for happy, :-o surprised, :-(sad, etc. or downloaded images and animations.

Spam

Spam, or junk email, is the name given to unwanted messages, mainly commercial advertising. Some companies, spammers, use it extensively because it's cheaper than other types of advertising: you or your Internet Service Provider pay for it.

Mailing lists and newsgroups

A mailing list is a basic type of discussion group that uses email to communicate. The messages are distributed to all the subscribers, i.e. everyone who belongs to the list. Newsgroups are similar. The main difference is that the message is not sent to someone's mail server but to a bulletin board where everybody can read and answer the message.

Vocabulary list

an attachment – подключение

an incoming mail – входящая почта

a recipient – получатель

a header –заголовок

a carbon copy – копия письма электронной почты для рассылки нескольким адресатам

a blank / blind carbon copy – рассылка первых копий без уведомлений получателя о других адресатах

the body of the message – основная часть, текст сообщения

a commercial advertising – коммерческая реклама

to distribute – распределять

a bulletin board – электронная доска объявлений
[ˈbʊlətɪn]

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Ask 10 questions to the text in writing. Read and answer your questions with your classmates.

Exercise 2. Find the correct words and match these definitions.

1. a file that has been included as a part of an email message
2. conventional mail delivered very slowly in contrast with email
3. symbols used to express emotions in an email
4. the part of the email address that identifies the user of the service
5. the computer that provides you with mail service
6. a facility that allows users to send and receive messages via the Internet
7. the part of the email where you write the information about the addresses and subject
8. the part of the email address that identifies the server
9. the place where your Internet Service Provider stores new email for you

Exercise 3. Look at the main parts of an email message. Where would you write the information below? What additional information do the TLDs (top-level domains) of the addresses give you?

- 1 peterswinburn@jazzy.free.com
- 2 Eleanor Richardson Manager
- 3 maryjones@arrakis.es: susanwilt@hotmail.co.uk
- 4 Plane tickets
- 5 Peter,

I've already booked the plane tickets to attend the Managers' Conference. Mary and Susan are joining us. Best wishes

Exercise 4. A manager is giving his colleagues some advice on how to prevent spam. Complete the sentences with the words in the box.

mailing list spam email address newsgroups spammers

1. Never ever reply to a email or click on a link within the mail – this will lead to more junk email being sent to you. Unsubscribing only confirms you do actually exist, so they've hit the jackpot.

2. Don't let your email address be displayed anywhere on the Internet, including, chat rooms or any websites.

3. Never forward a spam to other people – might be able to track their addresses too, and you could end up losing friends!

4. Send your emails on a strictly 'need to know' basis: don't include everyone on a unless it is really necessary.

5. Treat your like your phone number – don't give it out randomly. Try to use a different one when shopping online.

DEVELOPING SPEAKING SKILLS

1. **Go to Options window in your e-mail program and choose some features to change on your e-mail. Report back to the class on the changes you made.**

17. MULTIMEDIA

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

A multimedia system

Multimedia refers to the technologies and applications that integrate different media: text, graphics, sound, video and animation.

Its power resides in interactivity, hypertext and hypermedia. Multimedia software is usually interactive, so you can choose what you want to watch, listen to or write. Hypertext means that you can click on a word and jump to another screen with

more information; hypermedia is similar, but works with sounds and images (e.g. the Web).

An IT student says:

I use multimedia for my extracurricular activities. I download music from the Net and burn music onto CDs - I copy songs onto CDs. I talk with my friends on the Messenger. I also retouch digital pictures and edit video clips. To run multimedia software you need a fast CPU, expandable RAM and a large hard disk. But what marks a computer out as a multimedia PC is its audio and video capabilities: a sound card, a microphone, a decent pair of speakers, a high-quality monitor and a DVD writer; and its performance depends on all these components working in harmony.'

It is also very important to note the applications of multimedia which can be used

- In public places (e.g. museums and stations), there are information kiosks that use multimedia,
- In education, it is used in presentations and computer-based training courses.
- On the Web, audio and video are integrated into web pages. For example, RealPlayer supports streaming, which lets you play sound (e.g. from radio stations) and video files as a continuous stream while they are downloading.
- In virtual reality, users interact with a simulated world: doctors train using virtual surgery; pilots use flight simulators to do their training; people visit virtual exhibitions, etc.
- You can play games on a computer or video games on a dedicated machine, called a video console, which you connect to a TV set. You can also play games on the Net; some websites have a multiplayer facility that enables lots of people to play the same game at the same time.

Dealing with multimedia you often come across different file formats. Here is some information for you to recognize them. You know that to identify the type of a file, an extension is added to the filename when it is saved on a disk.

Common text extensions:
.pdf (portable document format)
.doc (MS Word document)
.rtf (rich text format)
.html or .hml (hypertext markup language for Web files)

Graphics include charts, photos, drawings, buttons, etc.
.gif (graphics interchange formats)
.jpeg(.jpg – joint photographic experts group)
.tif (tagged image file)

You can hear sound such as songs, movie soundtracks and speeches. Common audio formats:
.wav (Windows wave and audio format)
.ra (RealAudio file)
.mp3 (compressed music files)

Video refers to recording, editing and displaying moving images.

Common formats:
.avi (audio video interleave)
.mov (QuickTime movie)

Animations are made up of series of independent pictures put together in a sequence to look like moving pictures.

Common formats:

File **compressed** with Winzip have a .zip extension. A popular format used to compress and distribute movies on DVDs or over the Net is **DivX**, a digital video codec

.mpg (**.mpeg** – moving picture experts group) **.gif** for animated gifts (Compress, DECompress)
.swf for *Flash* files

Vocabulary list

to refer to – относиться к

to integrate ^[ˈɪntɪɡreɪt] – интегрировать, объединять, включать в состав

to reside ^[rɪˈzaɪd] in – постоянно храниться (в памяти)

to be similar – быть подобным, похожим

extracurricular ^[ˌɛkstrəkʊrɪkʊlə] activities – деятельность в свободное от учебы время

to burn music onto CDs – записывать музыку на диски

to retouch ^[ˌrɪːtʌtʃ] digital pictures – ретушировать, исправлять цифровые изображения

an expendable ^[ɪkˈspendəb(ə)l] FAM (file access auxiliary memory) – дополнительная память для доступа к файлу

a descent ^[ˈdɪsɛnt] pair of speakers – приличная пара наушников

performance ^[pəˈfɔːməns] – результативность, качество функционирования, режим; характеристика

to support streaming ^[ˈstriːmɪŋ] – поддерживать распределение потоков информации

a simulated ^[ˈsɪmjʊleɪtɪd] world – моделируемый мир

a dedicated machine – выделенная машина

a file extension – расширение файла

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What does multimedia refer to?
2. Where does its power reside in?
3. Multimedia software is usually interactive, isn't it?
4. What does hypertext mean?
5. What do you use multimedia for in you extracurricular activities?
6. Where can multimedia applications be used?
7. What file formats do you most often come across?

Exercise 2. Find the correct word for the following:

- the type of text that contains links to other texts
- the expression that means 'to record music onto a CD'
- a system that combines hypertext and multimedia
- the most common extensions for graphics files
- the most common text formats
- three popular video formats

- three common file formats for storing audio data

Exercise 3. Solve the clues.

1. A series of still images shown in sequence.
2. files are processed by sound software.
3. In medicine, doctors use virtual systems to simulate particular situations.
- 4 . The suffix placed after a dot at the end of a filename.
- 5 . A format used to compress and transmit movies over the Web.
- 6..... People use special programs to and decompress files so that they occupy less disk-space.
- 7 . A video format developed by the Moving Picture Experts Group.
- 8 . A system of filming, processing and showing moving pictures.
- 9..... Gif stands for interchange format.
10. The technique which allows you to play music and watch video before the entire file has downloaded.

Exercise 4. Complete the article with the words from the box

Graphics	interactive	video games	consoles	multiplayer
----------	-------------	-------------	----------	-------------

There are games you play on video (1) such as Nintendo, Sega, and the PlayStation. And there are games you play on a computer, either alone or at multiplayer online sites such as Microsoft's Internet Gaming Zone and Battle.net. (2) have been made into films, such as *Mortal Kombat I* and *2*, and film stars now sometimes appear in video games. The (3) in many games have taken on such a high degree of realism that they almost seem like film. The *X-Files* game was practically an (4) movie, full of actors from the show and sections of dialogue and video. Some people claim that the *Blade Runner* video game was better than the movie – not only were the sets incredible but you also got to control the action and the ending. (5) online gaming is the next wave in the video game world. It provides a better gaming experience, simply because people are more creative and more challenging adversaries than computers. Thousands of people can play simultaneously all over the world.

DEVELOPING SPEAKING SKILLS

Exercise 1. Discuss the following topics:

1. Have you ever used a multimedia encyclopedia? If so, note down three important features about it.
2. Think about the advantages of using multimedia for presentations.
3. Do you like video and computer games? Make a list of pros and cons.

18. WEB-DESIGN

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

HTML

Web pages are created with a special language HTML (Hyper Text Markup Language), which is interpreted by a web browser to produce hypertext, a blend of text, graphics and links.

You can view the source or raw HTML code by choosing the *View Source* option in your web browser.

To build a website you could learn how to write HTML tags, the coded instructions that form web pages, or else use an HTML editor, a WYSIWYG (What You See Is What You Get) application that converts a visual layout into HTML code. A simpler option is to use a web template provided by a web-based site builder, where you just fill in the information you want on the page.

Basic elements

Some of the basic elements that can be found on a web page are:

- Text, which may be displayed in a variety of [sizes](#), styles and fonts
- Links, connections from text or graphics on the current web page to different parts of the same page, to other web pages or websites, or to external files.
- Graphics, pictures created with formats such as JPEG (Joint Photographic Experts Group), which is ideal for pictures with a wide range of colours, e.g. photographs, and GIF (Graphical Interchange Format), which is good for pictures with fewer colours or with large areas of the same colour, e.g. buttons, banners and icons.
- Tables, intended for the display of tabular data, but often used to create page layouts.
- Frames, subdivisions of a web page allowing the display of different HTML documents on the same page.

Instructions for the presentation, the styling of elements on a page such as text or background colour, can be included in the HTML code. However, it is becoming more common to use CSS (Cascading Style Sheets) to separate style from content. This makes pages easier to maintain, reduces download time and makes it easy to apply presentation changes across a website.

Video, animations and sound

Web pages can also include multimedia files: animations, audio and video files. Sounds are recorded with different audio formats. MIDI, WAV, AU and MP3 are some of the most popular ones.

Shockwave and Flash are technologies that enable web pages to include video and animations.

Java applets, specific applications using that programming language, may be used to add interactivity to web pages.

To see or hear all these files, you need to download the right plug-in, the additional software that enables the web browser to support this new content.

Vocabulary list

Hyper Text Markup Language – язык разметки гипертекста

a blend – перемешивание, сочетание

a tag – ярлык

WYSIWYG (What You See Is What You Get) – "что видишь, то и получишь"; принцип WYSIWYG

web template ^['templɪt] – веб-шаблон

a visual layout – визуальное расположение

a font – шрифт

current – настоящий

a banner – баннер, заголовок

tabular data – данные, сведенные в таблицу

to use CSS (Cascading Style Sheets) – использовать каскадные таблицы стилей

an applet – апплет, прикладная мини-программа

a plug-in – подключаемое расширение, дополнительный модуль

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. How are web pages created?
2. How can you view the source HTML code?
3. What do you need to learn to build a website?
4. A simpler option is to use a web template provided by a web-based site builder, isn't it?
5. What are some of the basic elements that can be found on a web page?
6. What can be included in the HTML code?
7. What is becoming more common?
8. What can web pages also include?
9. What are some of the most popular audio formats?
10. What do you need to download to see or hear all these files?

Exercise 2. Solve the clues.

1. What you see is what you get.
2. You can make a web page using an HTML.....
3. You just have to fill it in to create a web page.
4. Templates are found in *a* web-based site.....
5. The instructions in HTML.
6. Another word for raw HTML code.
7. The language used to make web pages.

Exercise 3. Complete this advice about web design.

A well-designed website should be neat and organized. Words should be surrounded by sufficient white space. Use dark (1) on a light (2), preferably white. You can divide the page into columns with a (3).....or use (4)

..... to create the page layout. Usually the navigation bar appears on the left side of the page. You can display it on all the pages of your website by using a (5) It is a good idea to put a (6)..... to the top of the page at the bottom of a long text.

The graphical element of a web page is crucial. (7) load slowly, so use them sparingly and for good reason. There are two common picture formats: (8) for pictures with lots of colours and (9), which is ideal for buttons and banners.

Exercise 4. Match the sentence beginning with the correct ending

- | | |
|-------------------------------------|---|
| 1. A plug-in is | a. let you interact with information on the |
| 2. Shockwave and Flash | screen. |
| 3. Multimedia files can be included | b. usually needed to enjoy audio and video files. |
| 4. Java applets | c. are some of the common audio formats. |
| 5. MIDI, WAV, MP3 and AU | d. applications help to create animations. |
| | e. in web pages. |

DEVELOPING SPEAKING SKILLS

Exercise 1. Next time you surf the Web, look at the pages you visit in detail and decide if they are well designed. Discuss your opinion in class with your classmates.

19. ICT SYSTEMS

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

ICT systems: components and functions

ICT systems are much more than computers. An ICT system involves the use of computers or other types of hardware to meet a specific need. A LAN, local area network, can be an example of an ICT system, but interactive television and the database of a library are types of systems too.

ICT systems have these components: The components perform these basic functions:

- | | |
|--|--|
| <ul style="list-style-type: none">- software, instructions and data- hardware, computers and other devices- personnel, people who use, design, control or benefit from the system | <ul style="list-style-type: none">- input, the data is collected and entered- processing, data is changed or manipulated- output, the results are shown
- communication and feedback, the results are sent out and new data is collected and entered in the system
- memory or storage of data. |
|--|--|

Types of systems

ICT systems are classified according to their aim.

- 'In our hospital we have set up **an information system** to manage data and information about our patients.'
- 'My house is an example of **a control system**. Its main aim is to control the different devices, e.g. switches that turn lights on and off as a security measure, sensors that detect smoke and set off the alarms, etc'
- 'The Internet is a good example of **a communication system**; other examples are a mobile phone network or digital television. This type of system is designed for sending data between different devices.'

Types of devices and services

At present most of the devices used in ICT systems are multi-purpose: mobile phones can be used as digital cameras or agendas, printers are also scanners and faxes. Not only is there media integration in the hardware, but also in the services offered by these telecommunication systems.

Call centres are one exam of computer telephony integration where companies use databases and telephones for telemarketing.

Digital television uses digital technology to increase the number of channels and their quality of image. It also enables viewers to interact with the content and provide feedback to the programmer via telephone line, cable or satellite.

Teletext is a text-based information service provided by television companies. It uses part of a TV signal and is visible on sets with suitable decoders.

The Internet, a global network of computers, enables users to exchange files, send emails and surf the Web to find information, take part in e-commerce, etc.

Faxes or telefaxes use telecommunication Technology to send copies of documents through telephone lines.

Radio has also adopted the digital technology DAB, Digital Audio Broadcasting. Most digital radio stations are broadcast together with television signals.

Vocabulary list

to meet a specific need – соответствовать особым нуждам

to enter data – вводить информацию

to manipulate – изменять

to benefit from – получать пользу, выгоду от

feedback – обратная связь

storage of data – сохранение информации

according to – в соответствии с

security measure – меры безопасности

to detect – обнаруживать

to set off the alarms – включать сигнал тревоги

a mobile phone network – мобильная телефонная сеть

multi-purpose – многоцелевой

an agenda – повестка дня

to increase the number of channels – увеличивать количество каналов

to interact with the content – взаимодействовать с контентом

to be visible on – быть видимым на

to exchange files – обмениваться файлами

to adopt the digital technology – переходить на цифровую технологию

to broadcast – транслировать; вещать

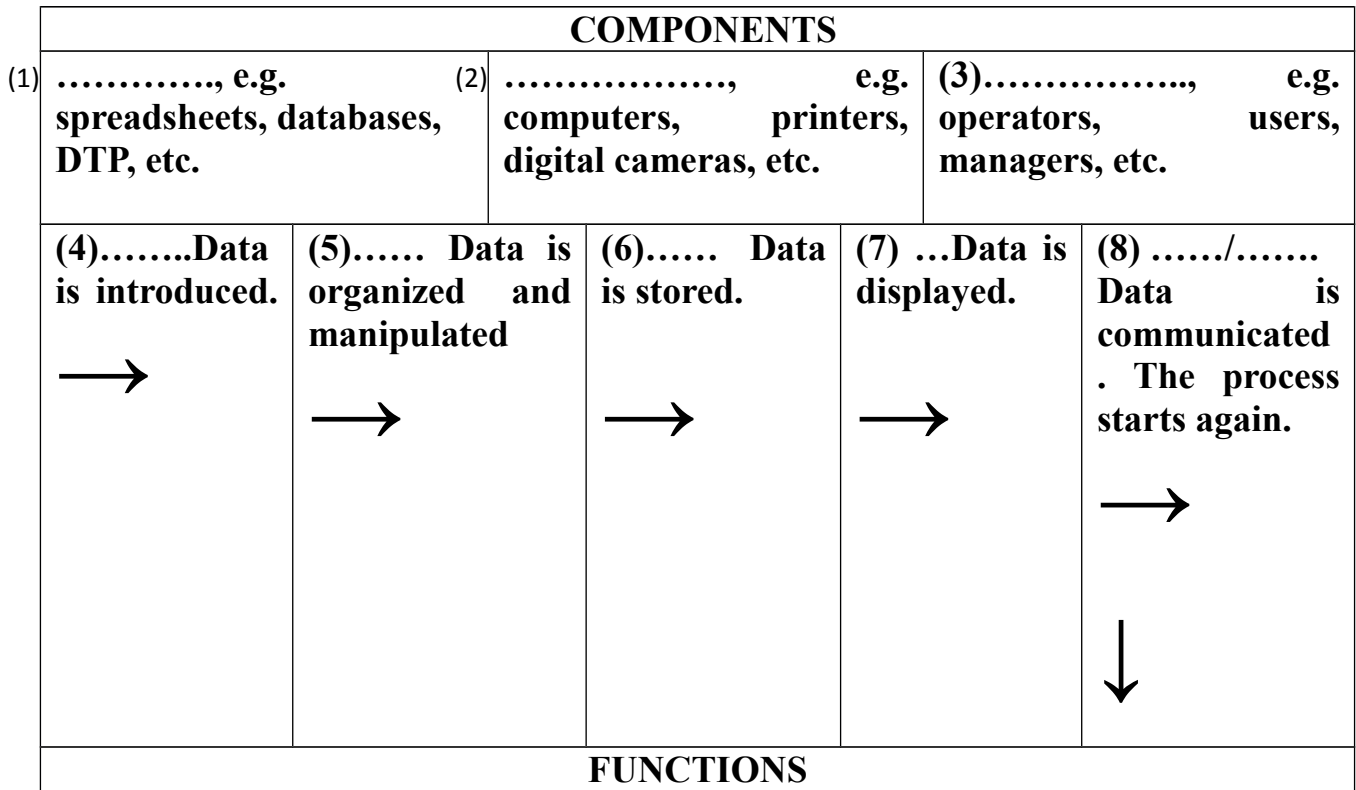
VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Answer the following questions.

1. What are ICT systems? 2. What components do ICT systems have? 3. What components perform the basic functions? 4. How are ICT systems classified? 5. What is typical for most of the devices used in ICT systems at present? 6. What can be said of call centres? 7. What possibilities does the digital television provide for users?

8. What is teletext? 9. What do telefaxes use? 10. Has radio adopted the digital technology?

Exercise 2. Fill in the diagram of components and functions of ICT systems with the correct words



Exercise 3. How would you define the following systems?

- the registration system of a university
- a robot at a car assembly line
- an unmanned spaceship
- a radio network
- the *CIA World Factbook*
- a video conferencing system

Exercise 4. Solve the clues.

- A new radio communication system.
- A system that integrates telephones and computer is acentre.
- A global system of networks of integrated services.
- A device used to send and receive exact copies of documents.
- Similar to interactive TV.
- Written information you get on your TV screen

DEVELOPING SPEAKING SKILLS

Exercise 1. Make a list of the ICT components you use at work or at home. What is their purpose? What are their components?

20. MOBILE PHONES

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

Mobile phones: definition and technology

Mobile phones, or cellular phones, are devices that enable communication to all types of telephones while moving over a wide area called the coverage area.

The term 'cellular' comes from the fact that the phone calls are made through base stations, communication towers or antennas, which divide the coverage area into cells. As you move from cell to cell, the calls are transferred to different base stations belonging to the same or a different telephone company. This capability of mobile phones is called roaming. The phone is said to be out of range when it cannot communicate with a base station.

A brief history

- 1G, First Generation phones started in the 1980s when Motorola introduced the first hand-held phones. They used analogue technology and the main drawback was the small number of channels that could be used at a time.
- In the 1990s, 2G mobiles introduced digital transmission methods that converted voice into binary information, increasing the number of channels, the speed of transmission between the phone and the base station and enabling a reduction in size. The most common standard, GSM, Global System for Mobile communications, started to be used at this stage. One of the features of this technology is the use of SIM cards, a type of a smart card that contains the user's information, the connection data and the phonebook. It also enables the user to change service provider without changing the handset.
- 3G phones offer a high-speed data transfer capability. Some of these phones are called smart phones and combine PDA capabilities with the usual functions of a digital phone. The new communication standard, UMTS, Universal Mobile Telecommunications System, enables the multimedia transmissions that are becoming common nowadays.
- New standards are being developed that will open the way to new 4G phones with an emphasis on multimedia, real-time television and radio.
- Mobiles have become an essential part of our lives and there are many uses for them.

Vocabulary list

cellular [ˈseljʊlə] – сотовая связь; сотовый; участок, обслуживаемый станцией

сотовой связи

to enable – позволять

coverage area – область покрытия

a base station – базовая станция

a cell – сота, ячейка

to be transferred to – передаваться
 capability – возможность
 to roam [rəʊm] – бродить, странствовать
 to be out of range – быть вне зоны действия
 a hand-held phone – карманный, портативный телефон
 a drawback [ˈdrɔ:bæk] – недостаток
 to introduce digital transmission methods – ввести методы цифровой передачи
 to convert – преобразовывать
 a reduction [rɪˈdʌkʃ(ə)n] – уменьшение
 GSM (Global System for Mobile communications) – глобальная система подвижной связи
 a smart card – смарт-карта, чип(овая) карта
 a handset – телефонная трубка
 a high-speed data transfer – высокоскоростная передача данных
 to become common – становиться распространенным
 an emphasis [ˈemfəsis] – подчеркивание, акцент, особое значение

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What are mobile phones? 2. Where does the term 'cellular' come from?
 3. What happens when you move from cell to cell? 4. What is called roaming?
 5. When is the phone said to be out of range? 6. What happened in the 1980s? 7.
 What technology did mobile phones use at that time? 8. What technology was
 introduced in the 1990s? 9. What is the most common standard? 10. The SIM card
 enables the user to change service provider without changing the handset, doesn't it?
 11. What can you say about 3G phones? 12. What does the new standard, UMTS
 enable to do? 13. Will 4G phones open the new way with an emphasis on
 multimedia, real-time television and radio? 14. What uses of mobile phones can you
 speak about?

Exercise 2. Complete this text about basic principles of mobile telephony with the correct words.

Mobile phones, also called (1), or cell phones for short, need a network of towers or antennas to transmit calls. In a cellular system, a city is divided into smaller sections or (2) where the (3) usually occupy a central position. When you are outside your service provider's (4) area, your telephone may become out of (5)..... unless your telephone allows (6)....., i.e. the ability to use another service provider's network.

Exercise 3. Read and decide if these sentences are *True* or *false*. If they are false, correct them.

1. 1G phones had a slower transmission speed than 2G.
2. 2G phones introduced analogue technology.
3. GSM started to be used in the 80s.
4. Smart phones can be used for other purposes, e.g. as a personal digital assistant.
5. People won't be able to watch live TV on 4G phones.
6. SIM cards enable users to keep important information.
7. UMTS, the standard used in 3G phones, has made video phones a commercial reality.

DEVELOPING SPEAKING SKILLS

Exercise 1. Mobiles can be very annoying for people around you if you don't follow certain rules. They can also be harmful to your health. Find some information and present it in class.

21. CHATTING AND VIDEOCONFERENCING

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

IRC and web chat

IRC (Internet relay chat) is a system that allows Internet users to meet in channels (or chat rooms) in order to have live conversations on the topic of the chosen channel.

To participate you need to install a chat client, a special type of software, on your computer to connect to the chat server, the computer where the meeting takes place.

Once you have logged into an IRC server or a web chat site, you have to choose a username or nickname that will identify you during the chat.

After choosing the channel, you can read the conversations, type and send messages. You can post messages to everyone in the channel or have private conversations with someone.

Channels are run by channel operators, 'chanops' or just 'ops' who control the content and the people who join and may ban users or ask them to leave the room.

Instant messaging

IM (instant messaging) programs allow Internet users to communicate in one-to-one conversations; they are a chat room for just two people.

With programs such as *ICQ (I seek you)* and *MSN Messenger* you can maintain a list of people, called a buddy list or contact list.

The program opens up a small window where the people engaged in the conversation type their messages.

The latest IVI programs also incorporate telephone, video and file-sharing facilities and are becoming an alternative to traditional video conferencing programs.

Video and voice calls

Video conferencing (video call) systems allow a live connection between two or more participants in separate locations using the Internet to exchange audio and video data. The users need a computer with broadband access, a webcam, a microphone and speakers. Some popular programs are *CV-SeeMe* and *Windows NetMeeting*.

The Net can also be used for online telephone conversations, either computer-to-computer or computer-to-phone, which require special software or an applet, a Java application that runs from the browser when you access a web page, and also a microphone, sound card and speakers.

This type of communication uses VoIP (Voice over Internet Protocol), which turns analogue audio signals, like the ones on the telephone, into digital data that can be sent via the Internet.

Virtual worlds

Internet users can also communicate in three-dimensional environments.

Instead of nicknames, people choose **Avatars** or **3D** characters in order to interact with other people.

A popular language used to create interactive simulations within the Net is VRML (Virtual Reality Modelling Language).

Vocabulary list

to log into – подключаться к

to run – запускать

to control the content – контролировать контент

to ban – запрещать

IM (instant messaging) – мгновенный обмен сообщениями

to maintain a list of contacts – поддерживать список контактов

to be engaged in a conversation – поддерживать разговор

to communicate in three-dimensional environments – общаться в трехмерных средах

a 3D character – трехмерный символ, персонаж

an Avatar – анимационный персонаж

to interact – взаимодействовать

VRML (Virtual Reality Modelling Language) – [язык моделирования виртуальной реальности](#); [язык VRML](#)

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What is IRC? 2. What do you need to install to participate in IRC? 3. What can you do after choosing a channel? 4. Who are channels run by? 5. What do the

latest IM programs incorporate? 6. What does videoconferencing system allow to do? 7. Can the Net also be used for online telephone conversations? 8. How can users communicate choosing Avatars or 3D characters?

Exercise 2. Solve the clues.

1. One of the systems used for chat rooms.
2. The protocol needed for online phone conversations.
3. The language used to build virtual simulations.
4. Avatars are three..... characters.
5. Video calls transmit and video data.
6. Another word for channel operators.
7. You must install a chat.....on your computer.
8. The conversation takes place on a server.
9. A type of Java program whose name sounds like a fruit.
10. A synonym of a buddy list is a list.
11. Chats can also take place on the..... .

Exercise 3. Complete the sentences below with words from the box.

Buddy	videoconferencing	nicknames
Chat room	messaging	avatars

- 1..... Always show respect for other people in a..... . Never send any unpleasant or threatening email messages.
- 2..... Most instant programs have what is called a list. Each user's screen shows a box with the of the people he/she chats with.
3. The company hopes to have virtual open-plan offices, where researchers from around the world can collaborate. Individuals would be represented by....., personalized electronic figures with perhaps a name badge or a picture of the owner's face.
4. Fear of flying is producing a surge of interest in , in which business people meet face-to-face even though they are hundreds or thousands of miles apart.

DEVELOPING SPEAKING SKILLS

Exercise 1. There are certain netiquette rules you should follow if you use chat rooms or other communication environments. Read them and comment.

THE TEN NETIQUETTE COMMANDMENTS

- Be polite. You're speaking to a human being not to a machine.
- Don't use CAPITAL LETTERS! This is considered as shouting.
- Have a look at the tone of the conversation in the room before you take part. You may not like that channel.
- Ignore those people who don't follow these rules.
- Don't believe all the things people might tell you. Some people lie just for fun.
- Don't give personal information (your real name, address, password, etc.).
- Protect your computer. Use a firewall and antivirus programs.

- Don't accept files from people you don't know. They might be or contain trojans.
- In short, follow the same rules as in real life.
- Enjoy your chat and have fun!

22. E-COMMERCE AND ON-LINE BANKING

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

Elements of e-commerce

E-commerce or online shopping is the process of buying and selling products and services using the Internet. It has similarities with traditional commercial activity.

A product or service, from plane tickets to books, is offered in an online shop, the seller's website. Customers select and order products, which are then paid for and delivered. The main difference is that most of the processes take place on the Web.

E-commerce websites use the following components:

- A shopping cart program, a web-based software application to keep a record of the products chosen by the customer.
- A secure socket layer (SSL) certificate, to verify that the credit card information has been securely transmitted; this is usually shown by a small padlock on the Web page.
- A payment gateway, an interface between the website and the bank that accepts the electronic payment.

How to buy on the Internet

- The first thing to do is to look for the product in a search engine or, even better, in a comparison engine or bargain finder, to find the lowest price.
- Most online shop websites are designed so that customers follow these steps to do their virtual shopping.
- You start by adding the items you want to buy to the shopping basket, or virtual shopping trolley.
- When you have selected the items that you want to buy, you proceed to the payment section by clicking on the checkout button.
- You may have to log in, provide your username and password, or sign up, by providing your personal data, billing, and shipping address, etc., if this is the first time you have accessed the site.
- You will be given an account, so you are recognized as a customer. You will be asked to enter payment details, e.g. credit card numbers, etc. Before the transaction is completed you will be asked to confirm the order and check that all the information is correct.
- Finally, you log out and leave the website.
- There are different types of electronic payment: credit cards or debit cards. A digital wallet, the electronic equivalent of a wallet for online shopping, holds credit card data and passwords for logging into websites. PayPal, Microsoft's Passport and Yahoo! Wallet are examples of digital wallets.

Types of e-businesses

- Companies whose activity is centered on the Internet are called dotcoms, after their web addresses. However, most e-commerce businesses are bricks and clicks, as they have both a physical and online presence.
- Although there are some examples of B2B commerce, business to business, e-commerce is mainly used for B2C, business to consumer, or even for C2C, consumer to consumer. Internet auctions, websites like eBay where people offer products and sell them to the highest bidder, are an example of C2C e-commerce.

Online banking basics

- Electronic banking is the general term given to the possibility of performing banking transactions through electronic communications, mainly the Internet. That's why many people prefer to use the terms online banking or Internet banking.
- Online services can be provided by traditional banks, brick-and-mortar banks, which through the use of these new technologies become brick-and-click banks. Banks that don't have physical branches or ATMs are called virtual or Internet banks.
- To use these services you need a computer with Internet access. Customers can also log in with a mobile phone or a PDA. The use of wireless networks to access financial institutions is known as wireless banking.
- Online banking services.

What do you use online banking for

- To pay bills online. I've got a list in my computer with all my payment recipients' names and account details. When I have to pay, I select the amount and the name of the payee. I can also schedule the payments, or fix the date for payments. The bank will transfer the funds, or send the money, to the selected account.'
- "I check account balances. I can access and view my accounts any time, from any PC. Also, I don't need to wait for the post to get written statements from the bank. I can see and then save online statements on the bank's website. It saves time and paper"
- To find online banking extremely convenient. I don't need to remember when my credit card expires or the date of a payment. My Internet bank sends short message notifications, warnings or other information services to my e-mail or mobile phone:
- "I trade stocks online. I contact an online broker to invest my money, and to buy and sell shares".

Online security

- Most online banks have introduced the concept of two-factor authentication, the simultaneous use of at least two different devices or layers of security to prevent fraud.
- When you open an Internet account, you are given a confidential PIN, personal identification number, and a password and username.

- For some transactions, customers are required to use a TAN, transaction authorization number, from a list provided by the bank. It can only be used once, and it acts as a second password.
- Security tokens are microchip-based devices that generate a number that has to be typed by the user or read like a credit card. They are becoming a common form of two-factor authentication.
- One of the best methods of identifying the user of a bank account is biometric authentication, the use of a physical trait, such as a fingerprint, to allow a person to log in. Some laptops have built-in fingerprint readers, which makes online banking easier and more secure.

Vocabulary list

to have similarities – иметь схожие черты, характеристики

to deliver – доставлять

a shopping cart program – электронная тележка

a secure socket layer (SSL) certificate – протокол, обеспечивающий защиту передаваемых данных с помощью шифров

to verify – удостовериться

a padlock – замок

a bargain – сделка

a finder – средство поиска

a shopping trolley – тележка для покупок

to proceed – перейти к

to select the item – выбрать позицию (товар)

to sign up – подписаться

billing – формирование, составление счетов

to enter payment details – вводить детали платежа

to log out – выйти (из Сети)

a digital wallet – цифровой кошелек; компьютерная программа, используемая для покупок в Интернете

a dotcom – Интернет-компания; компания-дотком

to be bricks and clicks – зд. обслуживать клиентов в офисах и виртуальной среде

B2B commerce – взаимодействие компания-компания

brick-and-mortar banks – банки, обслуживающие своих клиентов в офисах

a payment recipient – получатель платежа

the name of a payee – имя плательщика

to schedule ^[ˈʃedju:l] the payments – планировать оплату

a notification – уведомление

to trade stocks – продавать акции, фонды

a security token – право безопасного доступа

a two-factor authentication ^[ɔːθentɪˈkeɪʃ(ə)n] – двухфакторная авторизация

biometric authentication – биометрическая авторизация

built-in fingerprint reader – встроенный сканер отпечатков пальцев
keyring – брелок

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Read the text and answer the following questions.

1. What is e-commerce? 2. Does it have similarities with traditional commercial activity? 3. What is offered in an online shops and on websites? 4. What components does the commercial website use? 5. What is the first thing to do when you buy on the Internet? 6. Describe the steps in buying a product in an on-line shop. 7. What types of electronic payment do you know? 8. What types of e-businesses are centered on the Internet? How are they called? 9. What can you say about an on-line banking? 10. What do people use online banking for? 11. Is online security important for online banking? 12. Speak about security measures in an online banking?

Exercise 2. Solve the clues.

1. One of the programs used to help shoppers while ordering on the Internet is called a cart program.
2. The most common type of e-commerce.
3. The exchange of goods and services over the Web.
4. Type of a certificate used to make credit card transactions secure.
5. An..... shop is an Internet shop.
6. The interface needed to pay online is a payment.
7. The type of commerce that links two firms.
8. A type of e-commerce that some websites, e.g. eBay, have made popular.

Exercise 3. There are some drawbacks to e-commerce and people are not always happy with it. Complete the sentences with the correct words.

1. is great until you have a complaint. Unlike a shop you have nowhere to go.
2. There have been problems with both, web only businesses, and, high street names with a web presence. Computing experts say a large part of the problem lies with the software available for the customer support online.
 3. Since the National Consumers' League started tracking Internet fraud some years ago, one type of e-commerce has come top for complaints about fraud: Internet..... . Four out of ten buyers reported problems such as never receiving what they had bid for.
 4. If you want to reduce the risks while buying on the Web, use a as a way of holding securely credit card numbers, shipping and mailing..

Exercise 4. Find expressions which have the following meanings.

1. Banks that offer physical locations and online services.
2. The type of banking where you can use mobile phone networks to perform transactions.

3. Banks that only do business over the Internet, (*two possibilities*).
4. Banking services (transactions, payments, etc.) offered on the Internet, (*two possibilities*).
5. Banks that don't have a Web presence.
6. The general term that includes all sorts of banking that make use of ICT technologies.

Exercise 5. Read and choose the right alternative for these electronic banking transactions.

1. *Send/ Trade* Stocks
2. *Pay/Save* Bills
3. *Check /Trade* Account Balances
4. *Save Online Statements/Stocks*
5. Transfer *Short Message Notifications/Funds*
6. Schedule *Funds/Payments*
7. *Pay/Send* Short Message Notifications

Exercise 6. Complete this text with the correct words.

Most financial institutions offering Internet-based products should use (1)-.....authentication to reduce the risks of account fraud and identity theft.

At present, most authentication methodologies involve three basic factors:

- Something the user *knows* (e.g. a (2), the confidential number given by the institution)
- Something the user *has* (e.g. a (3), the keyring-like identification number generator)
- Something that shows who the user is, i.e. (4) authentication (e.g. a fingerprint).

Authentication methods that depend on more than one factor are more reliable; for example, the use of a (5), a TAN (something the user knows) to log in, and then a token (something the user has) to transfer funds.

DEVELOPING SPEAKING SKILLS

Exercise 1. Make a list of advantages and disadvantages an online banking and e-commerce may have. Discuss it in class.

23. HEALTH AND SAFETY

Read and translate the text. Use a dictionary if necessary.

Computer ergonomics

There are a number of health and safety problems that may result from continuous use of computers.

- Typing constantly at high speed may provoke repetitive strain injury or RSI, which causes pain in the neck, arms, wrists, hands and fingers.
- Bad work postures and sitting in uncomfortable chairs may cause backache and stress.
- Looking at the screen for long periods of time, and lights reflecting off the screen, can cause headaches and eye strain, pain and fatigue of the eyes.
- Cathode Ray Tube monitors can emit electromagnetic radiation which can be dangerous to health.

The study of how people interact safely and efficiently with machines and their work conditions is called ergonomics. In computing, ergonomics is about designing computer facilities so they are safe and comfortable. Here are a few tips.

1. Get an adjustable chair so you can change its height and angle.
2. Make sure your feet rest firmly on the ground or on a foot rest.
3. Ensure you have enough leg room under the desk.
4. Put the monitor at eye level or just below.
5. Sit at arms' length from the monitor (40-80 cm). Don't sit near the sides or back of CRT monitors; or use LCD screens, which are free from radiation.
6. Use a document holder, in line with the screen, to reduce awkward neck and eye movements between the document and the screen.
7. Position the keyboard at the same height as your elbows, with your arms parallel to the work surface. Try to keep your wrists straight and flat when typing.
8. Take regular breaks from the computer and look away from the screen at regular intervals.

Electronic rubbish

Irresponsible disposal of electronic waste, from old computers and mobile phones to hi-fi and video systems, can cause severe environmental and public health problems. For example, children or workers who come into contact with the toxic components of electronic products may suffer from skin and breathing problems.

- We should recycle or treat ICT equipment (e.g. plastics from mobiles can be used to make pens and rulers).
- Manufacturers should pay to finance the recycling programs.

The risk of using mobiles and in-car computers

- Frequent use of mobile phones has been the cause of concern and there is ongoing research into whether radiation emitted causes health problems.
- A serious risk is the use of mobiles and navigation systems in cars; this can distract the driver and cause accidents.
- Another health problem is Internet addiction, including obsessive game playing, gambling, etc.
- If you are an Internet addict, you should ask for help from specialists.

Vocabulary list

repetitive strain injury – (телесное) повреждение от постоянного напряжения

wrist – запястье
 posture [ˈpɒstʃə] – поза, осанка
 fatigue [fəˈti:g] – усталость, утомление
 cathode ray tube – катодно-лучевая трубка
 to emit – излучать
 to interact – взаимодействовать
 an adjustable chair – регулируемое кресло, стул
 angle – угол
 a document holder – держатель для документа
 awkward – неудобный
 irresponsible – безответственный
 environmental – связанный с окружающей средой
 the cause of concern – причина беспокойности
 addiction – зависимость
 obsessive [əbˈsesɪv] – чрезмерный, излишний, одержимый
 gambling – игра в азартные игры

Exercise 1. Answer the following questions.

1. Are there a number of health and safety problems that may result from continuous use of computers? 2. What can typing instantly provoke? 3. What is called ergonomics? 4. What is ergonomics in computing? 5. What are the useful tips to follow? 6. What can cause severe environmental and public health problems? 7. Who should pay to finance the recycling program? 8. List the risk of frequent use of mobile phones? 9. What do you know about Internet addiction?

Exercise 2. Complete the sentences with the correct words.

1. Experts believe the best way to reduce musculoskeletal injuries is through designing jobs to fit people instead of making people fit the job. It can mean everything from adjusting the height of a desk to buying a new chair or overhauling a production line.
2. The Safetype ergonomic keyboard may look strange, but its makers claim that it can prevent or RSI.
3. Visual problems, such as and irritation, are often reported by computer users. Causes of these problems include glare, poor lighting, and focusing the eyes on the screen for a prolonged period.
4. Some companies have begun to test ways to and dispose of
5. Road safety campaigners say motorists using while driving are six times more likely to crash.
6. When a person is spending so much time on the Internet that their lives are affected negatively, they are suffering from

DEVELOPING SPEAKING SKILLS

Exercise 1. Imagine you are designing an ICT classroom with 16 networked PCs, Internet access and peripherals. What should be taken into account. Think about room conditions, ergonomic devices, electrical safety (layout of cables and connectors, hotspots for a wireless network, etc).

24. FUTURE TRENDS

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

Smaller and faster

Nanotechnology, the science of creating and using materials or devices at molecular and atomic sizes, is going to represent a new technological revolution. These devices will fall in the range of 1 nanometre, which is equal to one billionth of a metre, to 100 nanometres nm).

Nanobots, robots formed from molecules or molecular components, will be used in medicine to control and diagnose diseases. For example, they will be injected and will move through blood vessels destroying cholesterol molecules or cancer.

Nanocomputers, molecule-sized computers, may have the power of 100 workstations but only be the size of a grain of sand. There will be two main types of molecular computers:

- Quantum computers, based on quantum mechanics, may be millions of times faster than current computers. They will be so fast because they will be able to examine all possible answers to a query at the same time. This capability is made possible by qbits, **quantum bits**, which can be 0 or 1, or something in between, simultaneously.
- DNA computers will use DNA biochips to perform the same functions as silicon microchips do today but at a much faster speed.

Computers everywhere: human-centred technologies

The relationship between people and computers will be closer.

Computers will be embedded or hidden, in a variety of items. For example, we'll have wearable computers that will be embedded in a belt or a piece of jewellery, etc.

User interfaces, the systems that facilitate communication between people and computers, will resemble human communication. There will be gesture interfaces based on facial-hand recognition systems.

ICT devices will be mobile and multimedia: we'll watch mobile TV programmes on our phones, which will also access the Internet and work as a mob office.

Computer chips can be injected under the skin. RFIV, radio-frequency identification tags, might be used to track or identify people or to store information, such as medical data, although there are concerns about privacy and personal safety.

In the near future we'll be able to swim in the immersive Internet, a technology that will change the two-dimensional world of the Internet into 3-D experience with three-dimensional sound and images and even the sense of touch.

By the year 2CM0 there might be intelligent robots, machines that will be able to think creatively. The processing power of computers may have reached 1.000.000.000 MPS (millions of instructions per second), the estimated speed of human thought.

ROBOTS, ANDROIDS, AI

Robots and automata

A robot is a computer-programmed machine that performs actions, manipulates objects, etc. in a precise and, in many cases, repetitive way.

Robots may be automata, or man-like machines, whose basic components are similar to a human body.

- They have mechanical links, joints, which connect their movable parts.
- Their heart and muscles are the electric or pneumatic motors or systems, the actuators, which create the movement.
- Robots also have hands, usually tools or grippers, called end effectors.
- They may be equipped with cameras or infrared controls, sensors, which transmit information to the central system in order to locate objects or adjust movements.
- Finally, robots depend on a computer system, the brain that directs the actions.

Uses for robots

The word *robot* comes from *robota*, meaning compulsory labour in Czech; similarly, robots are helpful in activities which are too dangerous, too boring or too precise for human beings.

Robots in industry

Robotic arms, telescopic or bending arms, are widely used in the automobile industry to paint, weld and assemble car parts.

Robots are also used in electronic assembly of microchips where precision of movements is essential.

Robots and health

Surgical robots, which help human surgeons, are programmed to assist in very delicate microsurgery operations or mimic the surgeons' movements in telesurgery operations.

ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is the science that tries to recreate the human thought process and build machines that perform tasks that normally require human intelligence. It has several applications.

Androids are anthropomorphic robots designed to look and behave like a human being. Most androids can walk, talk and understand human speech. Some react to gestures and voice inflection. Some 'learn' from the environment: they store information and adapt their behaviour according to a previous experience.

Expert systems is the term given to computer software that mimics human reasoning, by using a set of rules to analyze data and reach conclusions. Some expert systems help doctors diagnose illnesses based on symptoms.

Neural networks are a new concept in computer programming, designed to replicate the human ability to handle ambiguity by learning from trial and error. They use silicon neurons to imitate the functions of brain cells and usually involve a great number of processors working at the same time.

INTELLIGENT HOMES

Domotics

Domotics, from the Latin word *domus* plus robotics, also known as automation, involves the use of information technology applied to domestic appliances in order to create intelligent systems inside. Basic intelligent devices, traditional devices with an embedded processor, have been with us for a while, e.g. microwave ovens and washing machines with computerized controls.

Intelligent homes are a wider concept: all the systems and devices are connected in a LAN, local area network, where they communicate with each other and are controlled by a central computer sometimes installed in one of the machines.

Control devices and networking

Intelligent homes are controlled with different types of interfaces, devices that facilitate communication between the user and the system: physical switches, touch screens, IR (infrared) remote controls, computers either at home or at a distance, telephony.

The different elements perform one of these two functions: they are either command initiators, e.g. a brightness sensor that is programmed to send an instruction when it gets dark, or command receivers, e.g. a light that turns on when it receives an instruction sent by the sensor.

Household appliances, sound and video systems, optical and thermal sensors, etc. can be linked with wired and wireless systems. Wired LANs use different types of cables and also electrical wiring.

WLANs, wireless networks, use radio-frequency systems: Bluetooth, a short-range radio system used to communicate between portable devices (laptops, PDAs, mobile phones, etc.), is now frequently used to design PANs (personal area networks) inside the home.

Vocabulary list

- a nanobot – нанобот (нанотехнологический робот-наномашина (нанит), размеры которого измеряются в нанометрах)
- to diagnose diseases – диагностировать болезни
- a blood vessel – кровяной сосуд
- a grain of sand – песчинка
- a query [ˈkwɪ(ə)rɪ] – информационный запрос
- embedded – встроенный
- to facilitate communication – осуществлять связь
- to resemble – быть похожим, напоминать
- a recognition system – система распознавания
- a gesture [ˈdʒestʃə] interface – графический интерфейс
- immersive – иммерсивный; обеспечивающий полный эффект присутствия
- precise [prɪˈsaɪs] – точный
- automata [ɔːˈtɒmətə] – автомат; робот; промышленный робот; электронная игрушка
- pneumatic [njuːˈmætik] – пневматический
- a gripper – механизм захвата
- an end effector – рабочий инструмент манипулятора
- to adjust – регулировать, настраивать
- compulsory [kəmˈpʌls(ə)rɪ] – вынужденный, обязательный
- to weld – сваривать, приваривать
- assembly [əˈsembli] – сборочное производство
- a surgeon [ˈsɜːdʒ(ə)n] – хирург
- to defuse bombs – обезвреживать бомбы
- hazardous [ˈhæzədəs] – рискованный, опасный
- a planetary rover [ˈplænɪt(ə)rɪ ˈrəʊvə] – планетоход
- a vehicle [ˈviːɪk(ə)l] – средство передвижения
- artificial intelligence – искусственный интеллект
- an anthropomorphic robot [ˌænθrəˈpɒrəˈmɔːfɪk] – антропоморфный, человекоподобный робот
- a voice inflection – голосовая модуляция
- ambiguity – двусмысленность, неоднозначность

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Ask questions to the text in writing.

Exercise 2. Read these extracts and replace the words in *italics* with the correct words.

1. *A computer of this type* is a molecular computer that works biochemically. It 'computes' using enzymes that cause chain reactions.
2. *It* has the potential to revolutionize the way we live, from creating miniaturized 'Star Trek'-like electronic gadgets to delivering medicines to specific places within the human body.
3. Scientists at an Israeli institute have developed *a very small one* – so small that a trillion of its kind fit into a test tube.
4. The government plans to fund a study examining the feasibility of *molecule-sized robotic devices* that would position atoms to build complex substances and products.
5. *In a computer of this type*, data is processed by exploiting the strange qualities of quantum physics; the building blocks of computation are not transistors but caged atoms or qbits.

Exercise 3. Match the terms with their definitions.

- | | |
|-------------------|--|
| 1. quantum bits | a a microchip made with organic materials |
| 2. DNA biochip | b the speed at which the CPU processes instructions |
| 3. embedded | c the device or program used to interact with a computer |
| 4. user interface | d subatomic particles used in quantum computers |
| 5. MIPS | e fixed, integrated |

Exercise 4. Complete the article with the correct words.

Action Robot To Copy Human Brain

Scientists at Aberystwyth University are working on a machine which they hope will recognize objects with cameras that will work as (1), and retrieve objects with an arm that will be its (2)

Although the arm will have (3) that will link its muscles and an electric motor that will be the (4), this new (5) won't move like a human, i.e. it won't be like the (6) of science-fiction films: forget *Star Wars'* C3PO. It will be desk based: no walking, or climbing stairs.

The team hopes to discover how the brain performs 'multi-tasking' and to use that information to develop the (7)..... to create a robot that can think for itself.

Exercise 5. Solve the clues

1. A wireless standard used for PANs.
2. Touch screens, remote control and computers are different types of.....
3. The adjective which describes networks without cables.
4. A smoke sensor is an example of a command

5. The automatic operation of a system or process.
6. The term domotics comes from domus and
7. The adjective used to describe homes and devices that use IT technology.
8. A light switch can be used as a command
9. LANs where the devices are connected with cables or electrical wiring are ...
10. Personal Area Network.

Exercise 6. Read the text and answer the questions below.

'Smart' homes not far away

Picture this scenario: it is a Friday night in the middle of winter and you are driving to your holiday home in the mountains for the weekend. On your way there, you send your second residence a text message which will activate the heating, so the place is nice and warm by the time you arrive. Your main residence meanwhile, may be vacant, but you can send it an SMS to turn the lights on and off a few times giving the impression to potential burglars that someone is there. You can also monitor what is happening inside the house on your mobile phone - cameras inside the house will send real-time images direct to your phone. If disaster strikes, and the washing machine leaks while you are not there, your house is so clever that it will automatically turn off the water at the mains and alert you that a plumber may need calling outside. He says that in the future the house will respond to voice commands.

1. Which of the areas are improved in this 'smart' home: security, safety, comfort and economy, assistive technology? Which one is not?
2. What operations is the system able to perform to improve those areas?
3. What interface is used to connect the user to the LAN? What might be used in the future?

25. IT PREFIXES

Common prefixes

We can form new words by using prefixes and suffixes, e.g. micro-process-or
prefix + root + suffix.

Prefixes come before the root word and usually change its meaning. Here are some common ones in ICT.

Negative prefixes meaning 'not':

non- Non-volatile memory retains its content when the power is turned off.

un- An unformatted disk has not been 'initialized', it doesn't allow data to be stored.

Prefixes of location: **trans-** (= across) Data transmission can be wired or wireless.

inter- (= between) The Internet consists of millions of computers interconnected in a global network.

intra- (= within) An intranet is a private network, restricted to a company's internal use.

extra- = outside, in addition to. An extranet links a company with its customers and suppliers.

tele- (= over a distance) Teleconferencing enables users in different places to talk to and see each other.

Prefixes of size:

super- (= large, better) A supersite offers links to other websites on a certain topic

semi- (= half, partly) A semiconductor is neither a good conductor nor a good insulator (e.g. silicon, used to make computer chips).

micro- (= small) A microbrowser is designed to display web pages on PDAs and mobiles. Prefixes of size are also used in units of memory like *megabyte* and *gigabyte*.

Another common prefix is **re-** in words like *reprint*, *rewritable* and *reboot*, to start the computer again.

Verb prefixes

Prefixes used to form verbs which mean 'to cause to be something':

en- encrypt: to change data into a secret code so that only someone with a key can read it.

up- update: to modify data in a file and thus ensure the file reflects the latest situation

upgrade: to add or replace hardware or software in order to expand the computer's power
upload: to send files to a central, often remote computer; compare with 'download'

Prefixes that mean 'the opposite of an action' or 'to reverse an action':

de- decrypt: to convert secretly coded (encrypted) data back into its original form.

decompress: to restore compressed data back to its original size;

debug: to correct errors in a program or system;

defragment: to reorganize data stored on disk by putting files into contiguous order.

un- uninstall: to remove hardware or software from a computer system

The prefixes e- and cyber-

The **e-** prefix means 'electronic'; **cyber-** describes things relating to computer networks.

e- The term **e-learning** refers to the use of ICT to provide education and training.

An **e-zine** is a magazine or newsletter published online.

E-commerce is the buying and selling of products or services over the Internet.

cyber- The electronic space in which online communication takes place is called **cyberspace**.

Cyberslacking means using a company's Internet access for activities which are not work-related, e.g. emailing friends, playing games, etc.; it is also called 'cyherloafing'.

VOCABULARY EXERCISES

Exercise 1. Use the correct words to complete these sentences.

1. Medical researchers in many countries exchange information through email and
2.memory (e.g. ROM or flash memory) is able to hold data when switched off.
3. Blogs and web portals are examples of.....; they offer news, opinions and web links.
4.are used for making integrated circuits and computers.
5. I'll post the agenda for next week's meeting on the company's
6. A home network is two or more computers to form a local area network.

Exercise 2. Complete these definitions with the correct words.

1.:	a disk that is completely blank, so information can't be recorded onto it
2.:	a network that allows communication between a company and the people it deals with
3.:	the process of sending data over a communication channel
4.:	to restart the computer, without switching it off completely
5.:	a web browser designed for small screens on hand-held devices

Exercise 3. Complete these sentences with the correct words and make any necessary changes.

1. The program ran so slowly, I had to un..... it.
2. Your financial information is fully en..... and cannot be accessed.
3. Messages encrypted using a public key can only be de..... by someone with the corresponding private key.
4. The computer compresses and de..... a colour image in less than a second.
5. Once you've written a program, you have to test it and de..... it to remove all the errors.
6. In cyberspace, 'up.....' means to send a file.
7. You can easily us..... your files by adding or deleting information.
8. To de..... your hard disk you need a disk optimizer, a program that will reorder your files.
9. There are minimum system requirements for your PC to be suitable for Windows 7.0.

Exercise 4. Complete this text with the correct words.

The term 'cyber' first appeared in the word 'cybernetics', coined by Norbert Wiener in 1948 as the science of communication and control. In the 1960s new 'cyber' words emerged, such as *cybermen* and *cyborg*, referring to a being that is part robot, part human. In 1984 William Gibson popularized the term (1) in his novel *Neuromancer*. He used it to describe a futuristic, virtual world of computers, but now it refers to the Internet. Other common words are *cyberworld*, *cybercafe*, and *cyberphobia* (a fear of computers). Companies are now worried about (2): employees using the Net to do things that have nothing to do with their jobs, e.g. chat with friends.

The e- prefix is often added to activities that have moved from the physical world to the electronic alternative, e.g. *email* and *e-shopping*. Other well-known examples are: (3)..... magazines that are available on the Internet; (4), doing business electronically on the Net; and (5) providing instruction via optical discs, the Web or satellite TV.

26. IT SUFFIXES

Common suffixes

Suffixes change the class of the root word. For example, by adding the suffix -er, the verb ***publish*** becomes the noun ***publisher***. Suffixes can tell you if a word is a noun, adjective, verb or adverb.

Suffixes for jobs:

-er *manufacturer* The two major manufacturers of processor chips are Intel and AMD.

webmaster

-eer *engineer* Greg is a software engineer, which means he writes computer programs.

auctioneer

-or *animator* He worked as a computer animator on Toy Stars.

operator

-ant *IT consultant* She's a computer consultant and specializes in e-commerce, data protection and IT strategies.

IT assistant

-ian *technician* A computer technician installs, troubleshoots and upgrades hardware and software.

electrician

-ist *typist* Anyone who works as a typist may develop a problem with their hands.

Scientist

Other common suffixes in ICT:

Word families

It is useful to know

how to build up
word families by
adding suffixes.

Look at these
examples:

Nouns -ion, -ment, -ics, -ity	Verbs -ize, -ise (to make)	Adjectives -able, -ible (able to be)	Adverbs -lly
compression, management, robotics, electricity (activity, state)	synthesize (music - to make it with a synthesizer)	programmable (keyboard), convertible (format)	
magnet, magnetism	magnetize	magnetic,	magnetically,
recorder, recording	record	magnetized	digitally
digitizer, digitizing	digitize	recordable, recorded	
		digital, digitized	

Adding a suffix may change the pronunciation. Look at how the stress changes in these words: **photograph** **photographer** **photographic** **photographically**

We love 'wares'

The suffix **-ware** refers to products of the same type. In computing, software refers to programs executed by a computer, as opposed to the physical devices on which they run - the hardware. It is commonly used to form jargon terms for classes of software.

- **freeware**: available free of charge, but protected by copyright: it differs from 'free software', which can be changed and distributed subject to licence
- **shareware**: distributed similarly to freeware, except that it requires payment after a trial period
- **malware**: designed to infiltrate or damage a computer (e.g. viruses, trojan horses, spyware)
- **spyware**: designed to monitor the actions of your computer and send this data via the Net
- **adware**: devised to display advertisements; some includes spyware
- **groupware**: enables a group of people connected to a network to work on the same project

VOCABULARY EXERCISES

Exercise 1. Which IT professionals are described here?

- a. a person who designs and maintains software applications;
- b. a person who gives expert, professional advice;
- c. a person who uses graphics software to make or edit animated pictures;
- d. a person who is employed to type letters, reports and other documents;
- e. a person or enterprise that produces goods in large numbers, using machines;
- f. a specialist in the technical details of computers.

Exercise 2. Complete each sentence using the word in brackets and the correct suffix.

1. IBM's BlueGene is the most supercomputer (POWER)
2. Most library databases are via the Internet (ACCESS)
3. I'll email my report to you as an (ATTACH)
4. This book will show you how to..... your small business (COMPUTER)
5. An optical disc allows data to be deleted and new data to be recorded on it (ERASE)
6. The growth of the Internet has increased the need for effective data (SECURE)
7. The combination of and new textile materials has made it possible to create musical jackets and smart shirts that can read our heart rate (ELECTRON)
8. Bluetooth is a technology designed to connect computers, mobile phones and other devices, replacing direct cable links (WIRE)
9. Aircraft flight..... is used to train pilots (SIMULATE)

Exercise 3. Look at the word families and complete these sentences with the correct word.

Magnet	digit
Word families	
record	

1. From kitchen magnets to computer disks, plays a central role in the technology of everyday life.
2. Hard disks are storage devices.
3. A video is used to convert analogue video into digital video files.
4. Sound and pictures can be stored....., as on a CD.

5. My digital voice has a storage capacity of 4 GB.
6. Blu-Ray Disc is a newoptical disc format developed by nine electronic manufacturers.

Exercise 4. What type of software do these descriptions refer to?

1. software that transmits data about your Web surfing habits without your consent;
2. also known as 'try before you buy' software;
3. short for malicious software;
4. software that periodically pops up advertising material;
5. collaborative software;
6. programs that you don't have to pay for.

27. IT COMPOUNDS

Compound nouns

Compound nouns consist of two or more words used together as a single word, e.g. *hard drive*.

In a compound there is a headword and one or more modifiers.

ink-jet printer
modifier head

Modifiers can refer to different things:

- material, e.g. **silicon chip** = a chip made of silicon;
- use or function, e.g. **search engine** = a program used to find information on the Web;
- activity or profession, e.g. **software engineer** = a person who designs software;
- place, e.g. **web portal** = a site on the Web that acts as a gateway to other sites.

Compound nouns are written in different ways:

- as two separate words, e.g. **control panel** = a utility that lets you configure and adjust a system;
- as two words joined with a hyphen, e.g. **self-test** = an automatic examination of a device;
- as one word, e.g. **clipboard** = a holding place for text or graphics you've just cut or copied.

Unfortunately there are no rules. For example, you may see *clip art*, *clip-art* and *clipart*. Some compounds change over time, for example two words – *web site* – become hyphenated after a time, and then eventually end up as one word – *website*.

The two parts may be:

1. noun + noun

address bus = a set of wires that identifies locations, addresses, in the main memory

bandwidth = the rate at which data flows through a cable or network

mail merge = a tool that combines a standard letter with a mailing list to create personalized letters

2. adjective + noun

broadband = high-speed connection, e.g. cable or ADSL Internet access

shortcut = a small file, 1KB in size, that links to a real file stored elsewhere

smart card = a plastic card that contains a small chip

3. verb or verbal

noun + noun

scrollbar = part of a window that lets you move through a document noun +

noun **recording head** = a mechanism that transfers data to a disk

4. verb + particle

add-on = a hardware or software module that can be added to a computer
set-up / setup = the way in which a program or device is configured

Compound nouns normally have the main stress on the first part and a secondary stress on the second part, e.g. screen saver.

Compound adjectives

Compound adjectives are made up of two words, normally with hyphens between them. The second part is often a past participle.

A **menu-driven** program lets you select a command from a menu.

A **voice-activated** product is activated by the user's voice.

Object-oriented programming is based on objects and their effects on each other, rather than on a series of instructions.

Other common patterns include:

– noun + present participle

Space-saving PCs take up very little desktop space.

– noun + adjective

A hands-free device does not require the hands for operation.

A **stand-alone** computer or business can operate on its own.

VOCABULARY EXERCISES

Exercise 1. Which compound do these definitions refer to?

1. a small piece of silicon which is used in computers.
2. a site that offers email, news, forums, web searching, online shopping and links to other sites.
3. a utility used to adjust computer settings such as fonts, sound and networks.
4. the read/write head of a disk drive.
5. a computer bus used by the CPU to communicate memory locations.

Exercise 2. Complete these sentences with a compound.

1.enables you to combine two files, one containing names and addresses and the other containing a non-specific letter intended for multiple recipients.
2. A USB headset is a useful, the ideal accessory for your computer games and music.
3. The printer'sdidn't identify any errors.
 4. Because the Web has no central organization, every Web surfer needs a
– a special site that locates other sites based on words or phrases you type in.
 5. They are seeking a to help write and test a new operating system.

Exercise 3. Think of compounds for the following.

1. the configuration of hardware and software;

2. a bar that allows you to select the portion of the document you want to see;
3. an area that holds the things you copy, ready to be pasted anywhere else;
4. a type of data transmission that provides fast Internet access;
5. a special file which redirects to another file or program;
6. a small card with an embedded microchip;
7. the amount of data that can be transmitted along a channel.

Exercise 4. Complete these sentences with a compound adjective.

1. A.....-..... telephone allows people with limited mobility to dial and answer the phone with just the sound of their voice.
2. A fax machine is a - device, so it does not require any other device to function.
3. A-..... application is operated by making choices from menus instead of giving instructions on a keyboard.
4. In some countries it is obligatory to use a-..... car kit when you are using a mobile phone while driving.
5. An- language like C++ lets the programmer concentrate on individual units (e.g. a piece of text) and give each object functions which can be changed easily.
6. They've launched a new-..... computer, an entire PC embedded inside a keyboard.

28. IT COLLOCATIONS

What a collocation is

A collocation is a pair or group of words that are often used together. You need to learn them in order to sound natural in English. For example, in computing we say 'attach a file', not 'enclose a file'.

New collocations are particularly common in ICT.

Some types of collocations

Verb + noun

The easiest way **to connect to the Internet** is by using a DSL modem.

ADSL modem can **transmit data** at high speed.

Your ISP will probably give you a CD with instructions on how **to install the software** on your PC.

Once you are online, you can **access the Web** or **send and receive emails**.

You may like **to burn CDs**, i.e. copy your favourite songs or important files onto CDs.

Verbs with particles

Can you show me where the microphone **plugs into the computer**?

If you want to **log onto your account** you will need your user ID and password.

Computer criminals are getting better at **hacking into** other people's computers.

Adjective + noun

High-speed networks and multimedia phones allow customers to view live TV.

To send **outgoing mail** and retrieve incoming mail, you need to configure the email settings.

Most teenagers use **instant messaging** to chat with friends.

Electronic commerce – from a PC, digital TV or mobile phone – offers competitive prices.

Wireless hotspots provide Wi-Fi Internet access in airports, hotels and other places.

Users can interact with **a virtual environment** through the use of VR displays and data gloves.

Typical **interactive TV** uses are voting in polls, video on demand and shopping from home.

Adverb + adjective

Don't send **highly sensitive information** via email or fax unless it is encrypted.

This movie is **freely available** on the Internet, so it can be downloaded free of charge.

Phrases

When you chat in a chat room, you are interacting in **real time** since it is immediate. A USB device is a good example of **plug and play**; you install it and use it immediately. To **drag and drop**, just click on the object and drag it to a different location.

VOCABULARY AND COMPREHENSION CHECK EXERCISES

Exercise 1. Match each word on the left with its partner on the right.

- | | |
|--------------------|-------------------------|
| 1. high-definition | a. Internet radio |
| 2. read and write | b. disc |
| 3. play | c. videos and music |
| 4. tune in to | d. television |
| 5. broadband | e. data |
| 6. optical | f. your favourite sites |
| 7. browse | g. compatible |
| 8. fully backward | h. access |

Exercise 2. Answer these questions using collocations.

1. What sort of locations or access points can be used to surf the Net without wires?
2. What feature allows an electronic device to be used as soon as it is connected to a computer?

3. If you are *gaining illegal or unauthorized access to computer data*, what are you doing?
4. If you want to move a picture to a new location, what do you do?
5. What expression is used to refer to personal, confidential or classified information?

Exercise 3. Read these statements by computer users and complete them with suitable collocations.

1. 'I have a program that monitors both incoming and mail and also blocks spam.'
2. 'With a webcam you can add video to online chats and messaging. Simply the software included, plug the webcam your PC, and start having video conferences.'
3. 'This software enables you to burn and DVDs containing any data files.'
4. 'I use a media player to audio and video files from the Web; I can play them directly.'
5. '*NetMeeting* allows us to perform video conferencing in time, without any delay.'
6. 'We have decided to make the material available on the Web.'
7. 'I often log my Internet bank account to make payments; I never forget to log off.'

Exercise 4. Complete the collocations in this text.

Vast connections

Connecting to the (1) using DSL lines, cable TV and satellite increases bandwidth dramatically, making the Web more useful. Increased speed has ignited an explosion of (2)..... commerce, video on demand, telecommuting, collaborative scientific projects, video conferencing and (3).....environments.

Internet2 shaping the future

Internet2 is not a single network, but a consortium of hundreds of (4) networks linked by fibre-optic backbones that span the United States and link to other countries. The network transmits (5) at speeds up to 2.4 gigabits per second - 45,000 times faster than a 56 Kbps modem – allowing scientists to test their laboratory discoveries in the real world.

The next-generation network went (6) in February 2009, linking a number of universities around the world. When it is in commercial use, services will be available like (7) television, virtual 3-D videoconferencing, and much more.

A new kind of Web

While PCs were once the primary means of accessing the Internet, we're now seeing Internet-enabled devices such as PDAs and cell phones that send and receive (8) and access the (9) Soon, everything from your car to your refrigerator will be connected to the global network, all communicating with each other wirelessly.

Учебное издание

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