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INTRODUCTION TO COMMUNICATION SYSTEMS

ЗАТВЕРДЖЕНО
методичною радою
академії
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Навчальний посібник призначено для студентів 1-2 та старших курсів вузів зв’язку.

Автентичні текстові матеріали, граматичні та комунікативні вправи сприятимуть розвитку іншомовної термінологічної компетенції студентів цих навчальних закладів, навичок мовлення в межах професійного спілкування, підвищуватимуть мотивацію студентів у процесі вивчення іноземної мови за фахом.

СХВАЛЕНО
на кафедрі іноземних мов
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Unit I
Text 1
History of the cellular mobile radio and GSM

The idea of cell-based mobile radio systems appeared at Bell Laboratories (in USA) in the early 1970s. However, mobile cellular systems were not introduced for commercial use until the 1980s. During the early 1980s, analog cellular telephone systems experienced a very rapid growth in Europe, particularly in Scandinavia and the United Kingdom. Today cellular systems still represent one of the fastest growing telecommunications systems.

But in the beginnings of cellular systems, each country developed its own system, which was an undesirable situation for the following reasons:

- The equipment was limited to operate only within the boundaries of each country;
- The market for each mobile equipment was limited.

In order to overcome these problems, the Conference of European Posts and Telecommunications (CEPT) formed, in 1982, the Group Special Mobile (GSM) in order to develop a pan- European mobile cellular radio system (the GSM acronym became later the acronym for Global System for Mobile communications), the standardized system had to meet certain criteria:

- Spectrum efficiency;
- International roaming;
- Low mobile and base stations costs;
- Good subjective voice quality;
- Compatibility with other systems such as ISDN (Integrated Services Digital Network);
- Ability to support new services.

Unlike the existing cellular systems, which were developed using an analog technology, the GSM system was developed using a digital technology.

In 1989 the responsibility for the GSM specifications passed from the CEPT to the European Telecommunications Standards Institute (ETSI). The aim of the GSM specifications is to describe the functionality and the interface for each component of the system, and to provide guidance on the design of the system. These specifications will then standardize the system in order to guarantee the proper inter-working between the different elements of the GSM system. In 1990, the phase I of the GSM specifications were published but the commercial use of GSM did not start until mid-1991. The most important events in the development of the GSM system are presented in the table 1.

Year	Events
1982	CEPT establishes a GSM group in order to develop the standards for a pan-European cellular mobile system
1985	Adoption of a list of recommendations to be generated by the group
1986	Field tests were performed in order to test the different radio techniques proposed for the air interface
1987	TDMA is chosen as access method (in fact, it will be used with EDMA) Initial Memorandum of Understanding (MOU) signed by telecommunication operators (representing 12 countries)
1988	Validation of the GSM system
1989	The responsibility of the GSM specifications is passed to the ETSI
1990	Appearance of the phase 1 of the GSM specifications
1991	Commercial launch of the GSM service
1992	Enlargement of the countries mat signed the GSM- MOU> Coverage of larger cities/airports
1993	Coverage of main roads GSM services start outside Europe
1995	Phase 2 of the GSM specifications Coverage of rural areas

Table 1: Events in the development of GSM

From the evolution of GSM, it is clear that GSM is not anymore only a European standard. GSM networks are operational or planned in over 80 countries around the world. The rapid and increasing acceptance of the GSM system is illustrated with the following figures:

- 1.3 million GSM subscribers worldwide in the beginning of 1994;
- Over 5 million GSM subscribers worldwide in the beginning of 1995;
- Over 10 million GSM subscribers only in Europe by December 1995.

Since the appearance of GSM, other digital mobile systems have been developed. The table 2 charts the different mobile cellular systems developed since the commercial launch of cellular systems.

Year	Mobile Cellular System
1981	Nordic Mobile Telephony (NMT), 450>
1983	American Mobile Phone System (AMPS)
1985	Total Access Communication System (TACS) RadioCom 2000 C-Netz
1986	Nordic Mobile Telephony (NMT), 900>
1991	Global System for Mobile communications North American Digital Cellular (NADC)
1992	Digital Cellular System (DCS) 1800-1990 Personal Digital Cellular (PDC) or Japanese Digital Cellular (JDC)
1995	Personal Communications Systems (PCS) 1900-Canada>
1996	PCS-United States of America>

Table 2: Mobile cellular systems

Memorize the following words and word-groups:

- adoption – утверждение; принятие
- cellular – сотовый
- compatibility – совместимость
- coverage – зона действия; покрытие
- enlargement – расширение, увеличение
- equipment – оснащение, оборудование
- guidance – руководство; управление
- inter-working – межсетевое взаимодействие
- to introduce – вводить; представлять
- launch – запуск
- market – рынок
- to meet criteria – отвечать критериям
- responsibility – ответственность
- roaming – роуминг (использование Вашего телефона в сетях другой компании)
- undesirable – нежелательный

Exercises

Exercise 1. Answer the following questions.

1. Where did the idea of cell-based mobile radio systems appear?
2. Do cellular systems still represent one of the fastest growing telecommunications systems today?
3. Why was an undesirable situation in the beginnings of cellular systems?
4. What can you say about the most important events in the development of the GSM system?

Exercise 2. Give English equivalents of the following.

Мобильная сотовая система, голосовое качество, цифровая технология; сети; абонент; стандартизированная система.

Exercise 3. Make the following sentences negative (Past Indefinite).

1. Each country developed its own cellular system. 2 Readers were invited to explore the new site. 3. The network with leased fiber formed a bi-directional, self-healing fiber optic cable system. 4. The software fault was found in SIM cards manufactured by one of Sonera’s subcontractors. 5. Nokia supplied GSM switching equipment last month. 6. The network operators made a lot of money from the traffic in August. 7. This cell-based mobile system appeared in 1973.

Exercise 4. Put the Infinitive in brackets in the Future Indefinite Tense.

1. It also (limit) foreign ownership of TT to 45%. 2. Data voice and multimedia traffic (flow) over the Global One fiber-optic backbone at speeds of up to 1.6 Tbps. 3. The operators also (use) the partnership to develop new products and services. 4. France Telecom has announced the price, at which its shares in US operator Sprint (to be sold). 5. Under the revised rules, the fee for terminating Internet access calls (to be reduced) then in two more steps. 6. These specifications (to standardize) then the GSM system.

Text 2
Satellites: the sky's the limitation?

The question is: "what went wrong?" It is a problem that has been puzzled over by those in the satellite industry following the financial difficulties of Globalstar.

Satellites have always represented the more glamorous side of the telecomms industry. Sharing some of the excitement of the first walks in space, the launch of the early communications satellites appeared to be taking telecomms to the "final frontier" of borderless communications.

A case in point is Iridium. While few could find fault with the technology behind Iridium's satellite constellation the design of the company's end-user terminals left much to be desired. The size of the handsets coupled with the fact that they could not be used inside buildings meant that they paled in comparison to conventional cellular handsets.

The satellite industry is often seen as a series of polarities. The first most important distinction to make is between the more "old-fashioned", government-backed, satellite operators and the "new" independently financed operators. Companies such as Inmarsat were reliant on large geostationary satellites (GEOs). GEO satellites sit at about 36,000 km above the earth's surface, with the satellite's speed matching the earth's rotational speed.

While GEOs have proven popular with broadcasters because they are ideally suited to multicast of information, they have proven to be less reliable for point-to-point communications because of high latency. As GEOs are so far from the earth's surface, any signal routed from one ground station to another via a GEO suffers from a round-trip delay (known as latency). Thus, the rise of the Internet-which is dependent on point-to-point communications - largely bypassed the GEO operators.

Instead, low earth orbit (LEO) operators were widely regarded as the way forward. Companies such as Globalstar, Iridium, Skybridge and Teledesic based their entire strategies around LEOs. LEO satellites sit at 290 km to 1,600 km above the earth's surface, offering much lower latency for point-to-point communications. LEOs move rapidly in relation to the earth's surface, and thus ground stations must switch from one satellite to the next to maintain a connection.

A compromise between the two are medium earth orbiting (MEO) satellites. Few operators have opted to launch MEO satellites.

Significant operators in the global satellite industry

Satellite operator	Constellation	Launch date	Type of services
Inmarsat	9 GEOs	1982 (3 more in 2004)	Voice, data, IP
Eutelsat	18 GEOs	1983 (5 more in 2002)	TV, radio and IP
Intelsat	19 GEOs	1964 (19 more in next 3 years)	Voice, Internet, TV, radio
PanAmSat	21 GEOs	1983	Voice, data, broadcast
Ellipso	2 GEOs	2000-2001	GMPCS
Thuraya	2 GEOs	2000-2001	Mobile telephony and GPS
Europe*Star	2 GEOs	2000	Broadcast, voice, data
Loral Cyberstar (formerly Orion)	3 GEOs	1994	Global IP multicast
New Skies (former Intelsat subsidiary)	5 GEOs	Spun off in 1998	Internet and multimedia
Astrolink	4 GEOs	2003 (2 planned at later date)	2-way broadband access
Hughes Spaceway	2 GEOs	2002	Multimedia and Internet
SES-Astra	7 MEOs	2002	GMPCS
New ICO (ICO-Teledesic)	10 MEOs	2003	Mobile telephony, PCS
Iridium	66 LEOs	1999(new services 2001)	Mobile telephony, PCS
Globalstar	48 LEOs	1999	Mobile telephony, PCS
Teledesic ICO-Teledesic)	288 LEOs	2004	‘Internet in the sky’
Skybridge	80 LEOs	2004(GEO services 2001)	Internet access, IP

As can be seen from the table the majority of satellite operators remain GEO-based.

Memorize the following words and word-groups:

- to bypass – обходить
- a case in point – основной вопрос, обстоятельство
- constellation – совокупность
- end-user terminal – терминал конечного пользователя
- excitement – волнение; стимул
- fault – недостаток, дефект, ошибка
- frontier – граница, рубеж
- geostationary satellite – геостационарный спутник
- glamorous – чарующий
- handset – телефонная трубка
- latency – скрытое состояние
- multicast – групповая передача; мультивещание
- to opt – выбирать; делать выбор
- to pale – тускнеть
- point-to-point communication – прямая связь
- to prove – доказывать
- to puzzle over – разобраться, разгадать
- to route – прокладывать маршрут

Exercises

Exercise 1. Read the text and ask problem questions.

Exercise 2. Translate the following sentences into Russian, paying attention to different functions of the infinitive.

1. To know English means first of all to be able to speak English. 2. It is necessary to provide communications where terrestrial networks could not reach. 3. There are many things to be done. 4. They were run on a near-cooperative basis to serve communities of interest in the global (Intelsat), European (Eutelsat) and maritime (Inmarsat) communications. 5. To illustrate the services provided by the presentation layer, consider a telephone conversation between a French speaking person and a Spanish speaking person. 6. The market has started to show some movement. 7. To say the least, competitive dynamics do not seem to be fully at work yet. 8. On awarding the licences, the ART announced a possible rescheduling of the payments to be made by the operators.

Exercise 3. Insert the prepositions.

1. The system has already been used … sending video news footage half away … the world. 2. The satellite will provide improved capacity … the Atlantic West ocean region. 3. E-mail allows users to prepare messages and send them … highlighting addressees from a directory … a screen. 4. The cc: Mail software automatically groups the messages … batches ready for efficient

transmission … the Inmarsat-C satellite network. 5. TST's encryption box is designed for use … telex machines. 6. Orbcomm will be the first … the so-called "little LEO" satcom systems to enter operation.

Keys*:* over, of, into, for, in, around, with, on, by.

Exercise 4. Define the tense-forms of the verbs and translate the sentences.

1. The terminal's principal distinguishing feature is a unique high-speed data interface that supports a wide variety of data applications. 2. New communication technology and competition from LEO and MEO satellite systems will compel all satellite communication companies to build products that are smaller and less expensive. 3. The service lowered the cost of calls across borders in the Nordic region. 4. I completed the forms. 5. Branding won't play a prominent role for telecomms operators.

Unit II
Text 1
Local Area Network

ITS' local area network (LAN) allows to quickly respond to new programs and new technologies. This **LAN interconnects** every office and laboratory within **ITS.** Wide area network (WAN) and Internet connections provide access to sponsors, research collaborators, and other organizations.

The **LAN** provides electronic mail, client-server computing, and peer-to-peer services for all ITS personnel, using TCP/IP and NFS applications. Currently, the LAN operates as an IEEE 802.3 10 Base-T Ethernet. This Ethernet supports over 160 heterogeneous computers including PCs, Macintoshes, and UNIX workstations.

Over 45,000 feet of hybrid copper/optical cabling integrates ITS' facilities in a physical star topology. Nearly 160 **LAN wall outlets** connect to either of two central wiring closets, which are interconnected with redundant fiber optic backbone cables. All outlets are capable of supporting 100-MHz data rates via either Category 5 twisted-pair or multimode optical fiber. This arrangement allows easy reconfiguration of the network, and the delivery of new high-speed services to any part of the Institute as the requirement arises.

Now more than ever, moving vast amounts of information quickly across great distances is one of our most pressing needs. From small one-person entrepreneurial efforts, to the largest of corporations, more and more professional people are discovering that the only way to be successful in the '90s and beyond is to realize that technology is advancing at a break-neck pace and they must somehow keep up. Likewise, researchers from all corners of the earth are finding that their work thrives in a networked environment. Immediate access to the work of colleagues and a "virtual" library of millions of volumes and thousands of papers affords them the ability to incorporate a body of knowledge heretofore unthinkable. Work groups can now conduct interactive conferences with each other, paying no heed to physical location the possibilities are endless.

A network is probably best defined as two or more devices with the capability to share resources and information. No matter how large or how small the network is, there are certain rules (protocols and standards) that must be followed to ensure that the network works correctly and that it will work with other network components. The most basic of these rules is an outline for communication between two devices that was established by the International Organization for Standardization (ISO). The ISO developed a model called the seven-layer model that specifies seven distinct functions that must occur for a device to communicate with another device. This model is also referred to as the Open Systems Interconnection (OSI) model because it defines these seven layers with respect to the communication process. The OSI model does not follow any individual vendor's established protocols and standards.

Local-area networks (LANs) are communications systems that are used to link the terminals, computers, word processing stations, and other devices located within a compact area. LANs typically use a star, bus or ring configuration, and they can be classified into high-, medium-, and low-speed categories. Some low-speed LANs designed for use with personal computers use special cables, while other low-speed networks use telephone wires and digital controllers. Regardless of the type of LAN used at a local site it must often be coordinated with the communications elements that link geographically dispersed processing centers.

Except LAN there exist other networks:

- MAN (Metropolitan Area Network);
- WAN (Wide Area Network);
- GAN (Global Area Network).

In an area where the formerly distinct technologies of computing and telecommunications have so clearly converged, the new technology presents both opportunities and problems. And this convergence of technologies demands an "interconnection" also between the various groups mentioned above.

Memorize the following words and word-groups:

- access - доступ
- at a break - neck pace - ускоренным темпом; с головокружительной быстротой
- backbone cable - магистральный кабель
- controller – устройство управления; контроллер
- to converge – сводить воедино
- Ethernet – Этернет (локальная компьютерная станция)
- to interconnect – взаимосоединять
- itinerary – план маршрута
- to link – соединять
- local network – локальная сеть
- multimode – мультирежим
- network – сеть, компьютерная сеть
- outlet – вывод
- outline – схема; план
- peer – одинаковое по состоянию устройство (в сети)
- peer – to peer service – услуга связи между одинаковыми по состоянию устройствами (между элементами сети одного уровня)
- to share – использовать вместе; разделять
- site – местоположение
- to thrive (throve; thriven) – процветать; преуспевать
- twisted pair – сплетенная (скрученная) пара; двужильная пара

- wiring closet – коммутационный центр (в системах с кольцевой топологией)

* * * * *

TCP (Transmission Control Protocol) – протокол управления передачей (данных)

IP (Internet Protocol) – протокол межсетевого взаимодействия

Exercises

Exercise 1. Answer the following questions.

1. What does local area network allow? 2. What do wide area network and Internet connections provide? 3. Why is it possible for the LAN to provide electronic mail, peer-to-peer services? 4. What data rates are all outlets capable of supporting? 5. What can work groups conduct now? 6. How is a network best defined? 7. What model is called the seven-layer model? 8. What are local area networks? 9. What categories can the local area networks be classified into?

Exercise 2. Change the following sentences from active voice to passive voice:

1. This ethernet supports over 160 heterogeneous computers. 2. This LAN interconnects every office and laboratory within ITS. 3. The International Organization for Standardization established these rules. 4. This model defines these seven layers with respect to the communication process.

Exercise 3. Put general questions to the following sentences and translate them.

1. A robot must obey the orders given by human beings. 2. In the beginning, of course, robots couldn't talk. 3. The only thing that could save them was selenium. 4. We can come out here, at exit 13A. 5. We can find a way to stop him. 6. I must get back to the shadow or the sun will kill me. 7. There should be a better explanation. 8. I can work in any temperature. (From "I, Robot" of Isaac Asimov)

Exercise 4. Find the sentences in which the verbs <u>to have</u> and <u>to be</u> are translated as должен.

1. Computers have already penetrated almost into all spheres of modern economy. 2. The students of our Academy have at their disposal the computing center. 3. The general purpose of this unit is to perform different arithmetic operations. 4. For a digital computer information has to be in the form of digits or numbers. 5. The first programmed computer was built in 1939. 6. This personal computer has been constructed at our lab. 7. You have to remember the names of the scientists who have contributed to the designing of computers. 8. The lecture was to begin at 9 o'clock. 9. Fortran is still widely used programming language. 10. They have to clarify some details and to put down all necessary data.

Text 2
The Virtual Local Network

The CRONUS Virtual Local Network has the addressing related features. These features include a method for mapping between Internet Addresses and Local Network addresses. The Virtual Local Network (VLN) is a facility, which provides interhost message transport to the Cronus Distributed Operating System. The VLN consists of a 'client interface specification' and 'implementation'; the client interface is expected to be available on every host. Client processes can send and receive datagrams using specific, broadcast, or multicast addressing as defined in the interface specification (l local network (PLN)). This additional level of abstraction is defined to meet two major system objectives: * COMPATIBILITY. The VLN defines a communication facility, which is compatible with the Internet Protocol (IP) developed by DARPA; * SUBSTITUTABILITY. Software built above the VLN is dependent only upon the VLN interface and not its implementation. It is possible to substitute one physical local network for another in the VLN implementation, provided that the VLN interface semantics are maintained. The compatibility goal is motivated by factors relating to design and its development environment. A large body of software has evolved, and continues to evolve, in the Internet community fostered by DARPA. For example, the compatibility goal 2 permits design to assimilate existing software components providing electronic mail, remote terminal access, and file transfer in a straightforward manner. In addition to the roles of such services in this system, they are needed as support for the design and development process. The substitutability goal reflects the belief that different instances of the cluster will utilize different physical local networks.

The substitutability issue will also be faced by other organizations as local network technology advances, and the transfer of existing system and application software to a new physical local network base becomes an economic necessity. The precise representation of the VLN data structures and operations can be expected to vary from machine to machine, but the functional capabilities of the interface are the same regardless of the host …|.| |-----------------------------| | Transmission | User | | | Control | Datagram | … | | Protocol | Protocol | | |-------------------------------------| | Internet Protocol | | (IP) | |-------------------------------------| | | .

The hosts belonging to a cluster are directly attached to the same physical local network, but the VLN hides the peculiarities of the PLN from other software. A VLN is viewed as a network in the Internet, and thus has an Internet network number. The PLN could possess its own network number, different from the network number of the VLN it implements, or the network numbers could be the same. Different numbers would complicate the gateways somewhat, but are consistent with the VLN and Internet models network.

The VLN interface will have one client process on each host, normally the host's IP implementation. The structure of messages which pass through the

VLN interface between client processes and the VLN implementation is identifical to the structure of internet datagrams constructed in accordance with the Internet Protocol. Any representation for Internet datagrams is also a satisfactory representation for VLN datagrams, and in practice this representation will vary from host to host. The VLN definition merely asserts that there is ONE well-defined representation for Internet datagrams, and thus VLN datagrams, on any host supporting the VLN interface. The argument name "Datagram" in the VLN operation definitions below refers to this well-defined but host-dependent datagram representation. The VLN guarantees that a datagram of 576 or fewer octets (i.e., the Total Length field of its internet header is less than or equal to 576) can be transferred between any two VLN clients. Larger datagrams may be transferred between some client pairs. Clients should generally avoid sending datagrams exceeding 576 octets unless there is clear need to do so, and the sender is certain that all hosts involved can process the outsize in conjunction with Cronus object management.

In order to reduce the number of times datagram text is copied as the datagram passes through the protocol hierarchy at the sending and receiving hosts. When a message is passing down (towards the physical layer) it is successively "wrapped" by the protocol layers. Addition of the "wrapper" – header and trailer fields – can be done without copying the message text if the header and trailer can be linked into the message representation. In the particular, when an IP implementation is the client of the VLN layer a linked structure is also desirable to permit 'reassembly' of datagrams (the merger of several 'fragment' datagrams into one larger datagram) inside the IP layer without copying data repeatedly. At the VLN interface, a special interpretation is placed upon the Destination Address in the Internet header, which allows VLN broadcast and multicast addresses to be encoded in the Internet address structure.

Memorize the following words and word-groups:

- abstraction – абстракция, отвлечение, абстрагирование
- addressing related features – особенности, связанные с адресацией
- to assert – утверждать, заявлять, отстаивать
- belief – убеждение, понимание
- broadcast addressing – общедоступная адресация
- cluster – группа; пакет; кластер
- community – общность; община; общественность
- compatibility – совместимость
- consistent – совместимый, согласующийся
- datagram – даннограмма
- dependent – фиксированный
- destination address – адрес назначения; адрес терминала, который вызывают

- to evolve – развивать; развертывать
- feature – особенность; характерная черта
- field – поле, сфера; часть записи данных
- to foster – способствовать
- gateway – межсетевой интерфейс
- header – заголовок
- hide (hid, hidden) – прятать; закрывать; скрывать
- hierarchy – иерархия
- host – центральный компьютер; главный компьютер
- interface – интерфейс; стык; согласование
- interhost – сервер; межсетевой компьютер
- internet protocol – протокол межсетевого взаимодействия; интернет-протокол
- issue – спорный вопрос, предмет обсуждения; результат, итог
- layer – уровень, слой
- physical layer – уровень физического канала (связи)
- mapping – картирование; прокладка маршрута
- merger – объединение (банков, предприятий и т. п.)
- multicast addressing – групповая адресация (в сетях)
- octet – восьмерка; байт (8 битов)
- outsize – размер больше стандартного
- peculiarity – специфичность, особенность
- precise – точный, определенный
- reassembly – повторная сборка
- regardless of – независимо от
- substitutability – заменяемость
- trailer – конечная отметка (обозначение); заключительный знак (трейлер)
- wrapped – окутанный; охваченный

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DARPA (Defense Advanced Research Projects Agency)

Exercises

Exercise 1. Answer the following questions.

1. What do the addressing related features include? 2. What is the Virtual Local Network? 3. What does the VLN consist of? 4. What is software dependent upon? 5. How is the VLN viewed? 6. What is the structure of messages which pass through the VLN interface between client processes and the VLN implementation identical to? 7. What datagram can be transferred between any two VLN clients? 8. What should clients avoid? 9. When is a datagram text cop-

ied in order to reduce the number of times? 10. What allows VLN broadcast and multicast addresses to be encoded in the internet address structure?

Exercise 2. Give the Past Indefinite Tense and Past Participles of the following verbs. Translate them:

To include, to expect, to send, to receive, to build, to provide, to evolve, to possess, to vary, to link, to foster, to enhance.

Exercise 3. Make the following sentences interrogative, paying attention to the Future Indefinite Tense.

1. Different instances of the cluster will utilize different physical local networks. 2. A general distinction will be made between these services designed for the wider consumer market. 3. In the wireless multimedia age, standard voice telephony will be enhanced by the use of data, streaming video, and graphic images. 4. The use of wireless local area networks (LANs) will also enable corporations to provide employees with access to a whole range of services. 5. Existing software components will provide electronic mail, remote terminal access, and the file transfer in a straightforward manner. 6. The obligation to provide interconnections will be based on an acceptable EU benchmark. 7. We shall have to establish the necessary technical conditions in around 1,200 locations. 8. New equipment will take time to be delivered and installed. 9. In practice this representation will vary from host to host.

Exercise 4. Translate the following sentences with a modal verb *can:*

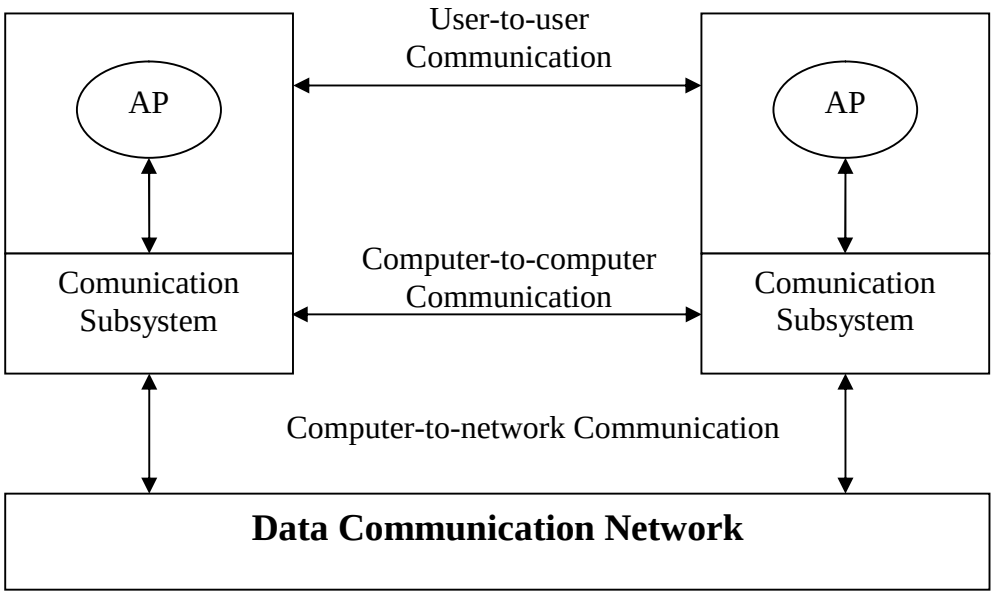
1. You can't stay here after this. 2. You can no longer enter the control room and engine room. 3. He can control the solar station perfectly. 4. We can't let him continue this nonsense. 5. I can tell you all the robot circuits are involved. 6. He can't really describe it. 7. Can you see the light from our torches? 8. He can't communicate with all six subsidiaries at the same time. 9. I can't understand everything, because my own mind is so different. 10. He can't tell us the truth if he knows the truth would hurt us.

(From "I, Robot" of Isaac Asimov)

Exercise 5. Find the sentences with a modal verb *can* ***in the text and translate them.***

Unit III
Text 1
Computer Communications Requirements

Although in many instances computers are used to perform their intended role in a stand-alone mode, in others there is a need to interwork and exchange data with other computers. In financial applications, for example, to carry out funds transfers from one institution computer to another, in travel applications to access the reservation systems belonging to various airlines, and so on. The general requirement in all of these applications is for application programs running in different computers to cooperate to achieve a specific distributed application function. To achieve this, three basic issues must be considered. These are shown in diagrammatic form in Fig. 1.



AP=Application process

FIGURE 1. Computer communication schematic

The fundamental requirement in all applications that involve two or more computers is the provision of a suitable data communications facility. This may comprise a **local area network** (LAN), if the computers are distributed around a single site, a **wide area network** (WAN), if the computers are situated at different sites or an **internetwork** if multiple interconnected network types are involved. Associated with these different network types is a set of access protocols, which enable a communications path between two computers to be established and for data to be transferred across this path. Typically, these protocols differ for the different network types. In addition to these access protocols, the communication subsystem in each computer must provide additional functionality. For example, if the communicating computers are of different types, possibly with different word sizes and character sets, then a means of ensuring the transferred data is interpreted in the same way in each computer must be incor-

porated. Also, the computers may use different file systems and hence functionality to enable application programs, normally referred to as **application processes (APs)**, to access these in a standardized way must also be included. All of these issues must be considered when communicating data between two computers.

Memorize the following words and word-groups:

- access protocol – протокол доступа (в сетях)
- application process – прикладной процесс
- associated with – соединённый с; действующий с
- carrier – предприятие связи
- communication facility – способ связи
- to exchange data – обмениваться данными (информацией)
- funds transfer – передача капитала (фондов)
- to incorporate – объединять, включать
- in many instances – во многих случаях
- internetwork – соединение сетей, объединенная сеть
- to interpret – интерпретировать, переводить
- issue – обстоятельство
- path – тракт, канал
- set – набор
- stand – alone mode – режим отдельной позиции (установки)
- wide area network – сеть связи между удалёнными пунктами

Exercises

Exercise 1. Answer the following questions.

1. Where are computers used? 2. What is the general requirement in all of these applications? 3. How can the provision of a suitable data communications facility be understood? 4. What do access protocols enable? 5. What additional functionality must the communication subsystem in each computer provide? 6. May the computer use different file systems?

Exercise 2. Suggest the word – combinations equivalent in their meaning to those given in Russian:

Специфическая функция распределённого применения; подсистема связи; сеть с многократным взаимодействием; программы, выполняемые в разных компьютерах; данные, которые следует передавать по этому каналу.

Exercise 3. Define the function of Participle II, translate the sentences:

1. The standards established for use in the computer industry were concerned primarily with either the internal operation of a computer or the connec-

tion of a local peripheral device. 2. Such systems are known as closed systems. 3. The complete communication subsystem is broken down into a number of layers. 4. Public carriers have started to provide more extensive distributed information services. 5. Early attempts at implementing the software were often based on a single, complex, unstructured program.

Exercise 4. Use these sentences to make questions. Begin your question with the word(s) in brackets:

1. The current system of Internet addressing should be replaced by Internet protocol version 6. (What?) 2. Network operators can only store traffic data for limited periods. (How long?) 3. A number of alternative carriers have entered into a commercial partnership to exchange voice and Internet traffic. (Why?) 4. The combined coverage of the networks will include Belgium, Denmark, Finland, France, Germany and the Netherlands. (What countries?) 5. The recommendations have resulted in compatibility between the equipment from different vendors. (Where?)

Text 2
The open systems interconnections

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. The aim is to allow an application process in any computer that supports a particular set of standards to communication freely with an application process in any other computer that supports the same standards, irrespective of its origin of manufacture.

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 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.

Both the network-dependent and application-oriented (network-independent) components of the OSI model are implemented as a number of layers.

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.

Consequently, the implementation of a particular protocol layer is independent of all other layers.

Memorize the following words and word-groups:

- 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

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

1. The equipment from one manufacturer can be interchangeable with equipment from any other manufacturer. 2. The initial payment must be made as planned, but later payments may be spread out over time. 3. You can have full and secure access to all the network facilities that you have at your desk. 4. Operators can be rendered in the form of subscriber numbers, penetration levels and growth in either numerical or percentage form. 5. A pan-Nordic cellular service has to enable Norwegian customers to make calls to and from the Nordic countries. 6. This operator is to provide broadband services to corporations and carriers through its pan-European, trans-Atlantic and metropolitan area networks.

Exercise 3. Translate the following sentences into Russian, paying attention to different functions of the infinitive.

1. To cater for such services, the standard bodies have formulated standards concerned with control of the exchange of information between systems. 2. To overcome this problem, the International Standards Organization has adopted a layered approach for the reference model. 3. The open systems interconnection environment adds additional application-oriented protocols to allow end systems to communicate with one another in an open way. 4. To fulfill this condition was hopelessly out of my power. 5. The decision by Tele 1 Europe to change its name to Song Networks was made in accordance with proposals put forward by the Board of Directors. 6. Equipment to be supplied includes mobile switching centers, transit switching layer equipment. 7. This model of phone equipped with video screen is expected to be delivered by end of this month. 8. The first question to be faced in the establishment of the reference model is to provide a framework for the coordination of standards.

Exercise 4. Speak on:

International standards organization reference model.

Text 3
The OSI seven-layer model

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 con-

cerned 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. Essentially, it builds on the services provided by the latter to provide the application-oriented layers with a network-independent message interchange service.

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. However, in practice the resulting protocol message units of the layer are passed by means of the services provided by the next lower layer. The basic functions of each layer are summarized in Fig 2.

The application layer provides the user interface, normally an application program/process, to a range of networkwide 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.

The transport layer offers a number of classes of service which cater for the varying quality of service provided by different types of network.

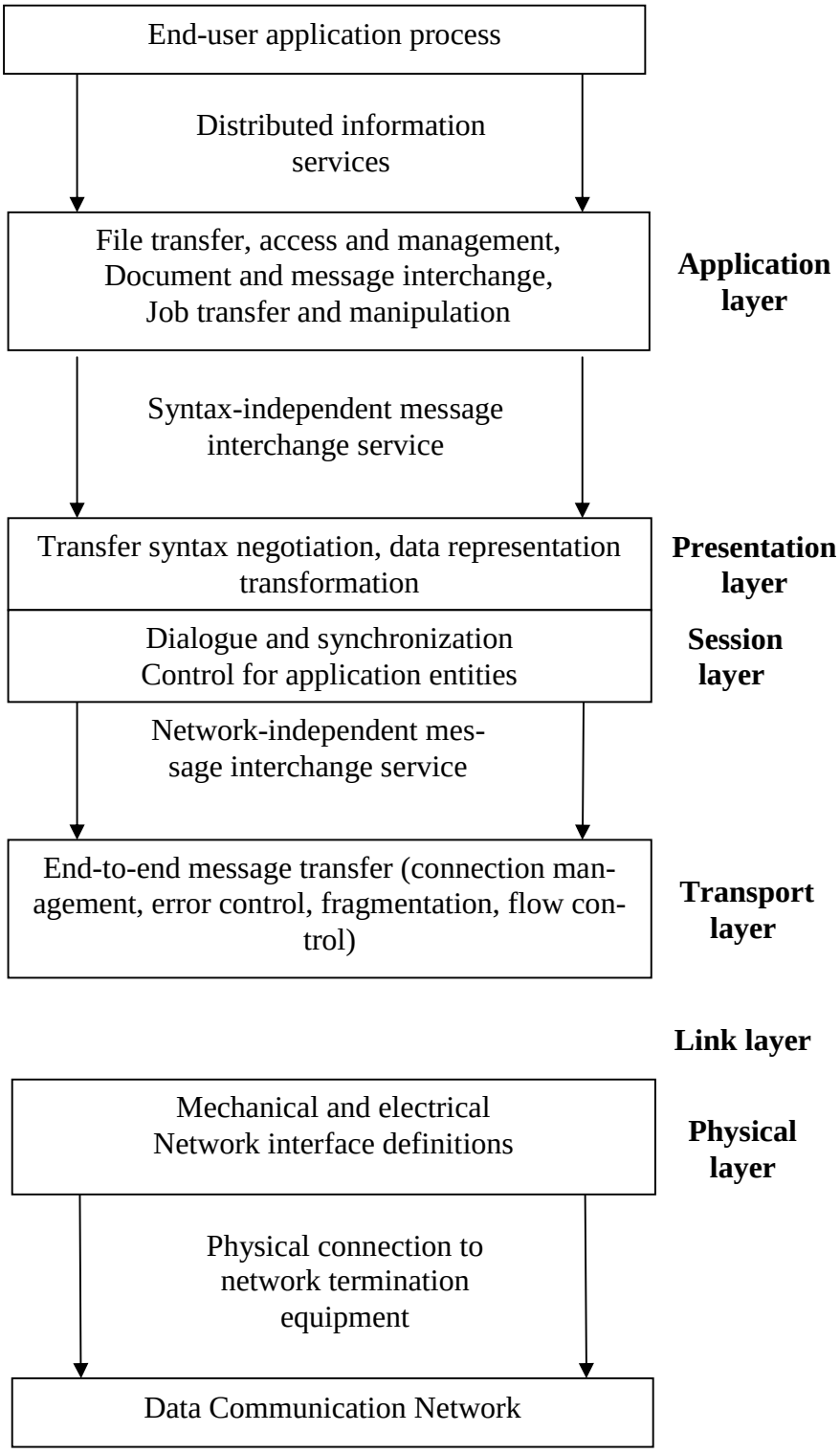


FIGURE 2. Protocol layer summary

Memorize the following words and word-groups:

- to build on – основывать
- to cater for – обслуживать
- conceptually – умозрительно

- convention – конвенция, соглашение
- entity – реальность
- framing – установка в рамку; синхронизация
- 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 изображения (подачи) данных
- representation – представление, изображение
- set – набор; устройство
- session layer – сеансный уровень
- transaction – обработка запроса; трансакция
- transfer – передача; передавать
- transport layer – транспортный уровень
- unit – устройство; блок; модуль

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 services does the transport layer build on? 5. What is the operation principle of each layer? 6. What does the application layer provide? 7. What is the presentation layer used for? 8. Is there any difference between the presentation layer and the session layer? 9. What can you say about the transport layer?

Exercise 2. State the function of the Present Participle Passive (<u>being done</u>).

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. Put the Infinitives in brackets in the Present Indefinite Tense (Passive):

1. A satcom link (to use) now for most radio outside broadcasts because of the high standard of sound that (to demand). 2 The Spaceway system (to plan) to provide coverage in four main regions: North America, Asia Pacific, Latin

America and Europe. 3. If errors (to detect) in a frame then the frame (to discard) simply. 4. A set of standards (to associate) with each layer. 5. Operators (to face) also with the issue of what to do with strong local brands when implementing their own global branding strategies. 6. Brands (to use) to create an image for companies, but companies must live up to this image. 7. Swedish-based subsidiary will acquire the part of Sonera Sverige's business that (to devote) to providing fixed-network services.

Exercise 4. Mind the meanings of 'time'.

1. The experiment was repeated many times. 2. The power radiated as light is almost three times as great as the power radiated at heat. 3. At the same time this process is repeated twice. 4. One knows that iron molecules are magnets at all time. 5. They studied the reaction very carefully because it lasted over a long time. 6. Cable lines shall be laid within minimum time. 7. This phenomenon is known from ancient times. 8. Large turbines have an economy of three or four times that of the units in small plants. 9. The distance is measured by the travel time. 10. The goods were not delivered in time.

Exercise 5. 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 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)

Unit IV
Text 1
Today's astonishing computers

A little over two decades ago computers were small, not very reliable and comparatively slow in operation. Since then several generations of complex electronic computing equipment have been developed, each was significantly better than the one before it.

Almost every day a new use is found for these astonishing devices to help man.

Computer, as we know, is a complex of electronic device that can store and process vast quantities of information. Following instructions, computing equipment will perform calculations such as addition, subtraction, multiplication and division, and provide the answers to the most complicated problems in a tiny fraction of time.

There are two main types of computing equipment – digital and analogue. They work differently and yield different results.

The digital computer deals with numbers, or coded alphabetic characters, and performs with them required calculations. In its functional aspects the digital computer can be compared to the adding machine, except that this electronic device solves problems of a much more complex nature than the desk-type adding machine. In the digital computer the method of representing numbers and all other information is based on the use of binary digits (abbreviated as "bits"), which are represented by electronic signals.

The digital computer can perform a much broader range of functions than the analogue computer. Its applications include all forms of automatic control in science and industry and first of all in space exploration, in automatic piloting, navigation, etc.

The analogue computer, as its name implies, produces the analogues or parallels of the process to be described or the problem to be solved. It relates physical changes and variables, such as changes of shaft position, changes of voltage, etc., in the form of mathematical equations. It can be used in industrial automatic process, guided missiles, radar and various other systems where the effects of physical variables must be mathematically coordinated. In fact the analogue computer can control most processes which can be described by equations and functions.

Both the digital and the analogue computers must be "programmed". This means they must be set up in such a way that they can produce a result from the information fed into them, and the information itself must be organized so it can be handled by the machines.

These devices working by electronic impulses perform operations at fantastic speed and with great precision.

Memorize the following words and word-groups:

- analogue computer – аналоговый компьютер
- astonishing – удивительный, необыкновенный
- as its name implies – как указывает название
- by means of – посредством, при помощи
- computing equipment – вычислительное (счётное) оборудование
- to deal with – иметь дело с чем-л.; заниматься
- desk-type adding machine – настольная счётная машина, настольный калькулятор
- digital computer – цифровой компьютер
- except that – за исключением того, что
- guided missile – управляемая ракета
- in fact – фактически
- mathematical equation – математическое уравнение
- to mean – значить, означать, подразумевать
- meaning – значение
- means – средство
- to operate – действовать, работать, управлять
- problem to be solved – проблема, которую нужно решить
- to process information (data) – обрабатывать информацию (данные)
- process to be described – процесс, который нужно описать
- shaft – луч света
- subtraction – вычитание
- variable – переменная величина
- to yield results – давать результаты

Exercises

Exercise 1. Answer the following questions.

1. What kinds of computers were over two decades ago? 2. What is a computer? 3. What operations can a digital computer perform? 4. Do digital and analogue computers work differently? 5. What is the difference between digital and analogue computers? 6. Is the word “bit” an abbreviation? 7. Does an analogue computer perform as broad range of functions as a digital one? 8. What are the main fields of analogue computers application? 9. How can physical processes be described mathematically?

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 cal-

culations 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.

Exercise 3. 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.

Exercise 4. Form Participle II from the following verbs:

To develop, to process, to compare, to mean, to set up, to provide, to perform, to include, to feed, to describe.

Exercise 5. Supply the correct pronouns in these sentences.

1. When I saw the doctor she told me to go back and see … again next week. 2. My lawyer told me, … would ring me when he had information I wanted. 3. The artist, Rembrandt, painted several pictures of … wife. 4. My daughter works as a journalist and … has been very successful. 5. My friend works as an engineer at a large Institute, … is famous for his invention.

Text 2
Computer components and their functions

The computers of various machines differ in design and operating principles, but most have the common functions.

The essential constituent parts necessary to perform these functions in a general-purpose computer are as follows:

(1) Input unit whereby data (in the form of numbers) and operating instructions can be supplied to the machine. Input devices change human language into machine language or, in technical words, into the machine coding system. This is very simple in principle, but in practice, especially in business data processing applications where input volume is large and arrives from many sources. The problem to be solved by the operator arises not only from the conversion of human language into machine language, but also from a conversion of the language of one machine to another machine.

So we get data into the machine. Once we have data inside the machine, what do we do with them? Let us assume that we have operated upon these data and are ready to bring them out. And now we need special devices to perform the same functions as the input devices, but in reverse.

(2) Output devices, the function of which is to convert machine language into human language. A typical output device may be an electric typewriter activated by the electric impulses supplied by the machine which causes the type keys to strike the ribbon and paper; the carriage to return and so forth. Output devices are also used for displaying the results of the calculations. The input and output devices are called peripherals. In practice, input and output usually represent one physical unit or section which is the transducer through which the system communicates with the external world. In one direction it processes some physical medium, such as paper or magnetic tape, punched cards, etc., which has been prepared in a language intelligible to the machine. In the opposite direction it provides information, which has been prepared by the machine system, in a form what is intelligible to the operator.

(3) Storage, or memory, is the nerve center of the machine. It is the section in which the initial data, intermediate results, final results, and the statement of the problem are stored. It also accepts the results that have been computed by the arithmetic section. The properties of the information storage device or memory are central to the good functioning of an electronic computer. The capacity, the performance, the recall time, and the reliability of the information storage device are of the vital importance for the solution of problems.

(4) The operations unit or arithmetic section performs the arithmetic operations, such as, addition, subtraction, multiplication, division, square, rooting, etc. To do arithmetic is the main job of the operations unit in a scientific computer. In addition to arithmetic, the operations unit of a data processing machine should be capable of performing sorting operations and of doing a certain number of logical operations, such as comparing different quantities, classifying transactions, selecting accounts and so forth. It is in the arithmetic section that the actual solution of the problem is done.

(5) Control unit or just control is the mastermind of the machine. Control is a section that interprets the instructions, the machine has been given, and causes the other parts to perform the appropriate functions at the appropriate time. The control unit is really the central executive of the machine. It controls the operations of all the other units of the computer, but it does so purely on the basis of instructions that have to be supplied to the machine by either its builder or its user.

Memorize the following words and word – groups:

- to accept information – принять информацию
- and so forth – и так далее
- appropriate – соответствующий
- to arise from – проистекать из (от)
- to arrive from many sources – поступать из многих источников
- to be activated (by) – приводиться в действие чем-либо

- to be capable of performing… - быть способным выполнить…
- to bring out – выводить
- carriage – каретка
- constituent parts – составные части
- to convert – преобразовывать
- to display the results of the calculations – вывести на экран результаты вычислений
- to get into – входить, вводить
- intelligible (to) – понятный (для), доступный
- performance – эффективность; исполнение
- peripheral – внешнее устройство; периферийное устройство
- physical medium – физическая среда (посредник)
- punched card (tape) – перфокарта (лента)
- recall time – время выдачи (информации)
- ribbon – лента (пишущей машинки) [‘rib n]
- storage capacity – ёмкость памяти
- such as – такой как
- transaction – обработка запроса; трансакция
- transducer – преобразователь
- whereby – посредством чего

Exercises

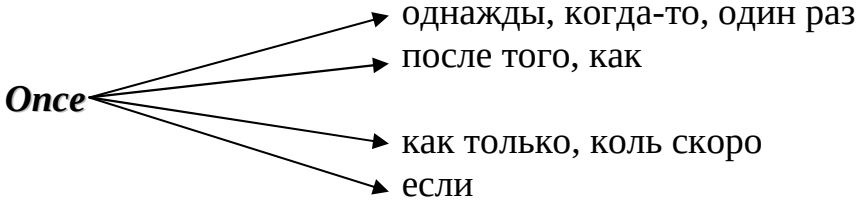
Exercise 1. Answer the following questions.

1. Do the computers of various machines differ in design? 2. What are the essential constituent parts of a general – purpose computer? 3. What problem do operators face when they deal with the conversion of human language into machine language? 4. What is the function of output devices? 5. How is a typical output device activated? 6. How are the input and output devices called? 7. Where are the intermediate and final results stored? 8. What is of the vital importance for the solution of problems? 9. What does an arithmetic section perform? 10. What is the main job of the operations unit in a scientific computer? 11. Should the operations unit of data processing machine be capable of performing sorting operations? 12. What operations should they be capable of doing? 13. What does the control unit execute? 14. What controls the operations of all the other units of the computer?

Exercise 2. Find in the text the word-combinations corresponding to their Russian ones given below:

блок ввода; в обратном направлении; устройство вывода; как следует ниже; физическая среда; разные величины; способный выполнять; блок управления; обработка данных; соответствующие манипуляции.

Exercise 3. Translate the following sentences taking into account different meanings of "once":



1. Once assembled, such networks can represent a substantial body of knowledge. 2. Once we have data inside the machine, what do we do with them? 3. ARC group predicts that this will expand further once these devices are equipped with wireless technology. 4. Once we discussed this problem. Don't you remember? 5. Once the machine has been designed and built, once it has been programmed, it's sufficient to push a button and let it proceed. 6. Once you get past the mystique that has been built up around robots you will find that they are not so hard to control. 7. A subroutine may be used many times but written only once. 8. Once the switch is open no base current is flowing.

Exercise 4. Choose the correct form of a participle from those given in brackets.

1. Information (being processed, having been processed, processing) by the computer now is very important. 2. (Executing, having been executed, being executed) a computer program is much like performing an experiment. 3. The problem (being solved, solving, having solved) by the operator is connected with the conversion of human language into machine language. 4. A microprocessor is the tiny processor (using, being used, used) in the microcomputers. 5. Computation is (emerging, emerged) as a major new approach to science. 6. A typical output device may be an electrical typewriter (activating, having activated, activated) by the electric impulses (supplied, supplying) by machine. 7. (Changing, being changed, having been changed) into machine language information can be introduced into the computer. 7. The investigator can interact directly with the computer, (modified, modifying) various aspects of a phenomenon as new results are (obtaining, obtained). 8. The microcomputers were the first computers (used, having used, using) a single microprocessor chip as the processor. 9. There are two kinds of numbers (containing, contained) in addresses: permanent or constant numbers and temporary numbers.

Exercise 5. Put the Infinitives in brackets in Present Indefinite, Present Continuous Tenses in the Active Voice. Translate the sentences into Russian:

1. They (to do) many operations on the computer. 2. Each of processors (to carry out) a part of work. 3. A computer (to store) information which it (to receive). 4. She (to discuss) some questions with her instructor now. 5. During process they (to exchange) the data. 6. Don't make so much noise! I (to compile) a program. 7. She always (to compare) her results with mine. 8. Owing to the computer we usually (to process) a great deal of information.

Exercise 6. Reproduce the text in your own words.

From the history of computer

The educated man of 200 years ago did not need to know anything about science. The educated man of 25-30 years ago did not need to know anything about computers. But educated man of today needs to have some significant knowledge of science and a little significant knowledge about computer.

The word computer comes from a Latin word which means to count.

When Charles Babbage, a professor of Mathematics at Cambridge University, designed the first computer in 1833 he could not imagine the situation we find ourselves in today. The mathematical program for his machine had been composed by Lord Byron's daughter.

The first programmed computer which operated successfully was built in 1939 by H. H. Aiken, professor of Harvard University.

Computers are used more and more often in the world today, for the simple reason that they are far more efficient than human beings. They have much better memories and they can store much information. No man alive can do 500,000 sums in one second, but a computer can.

Nowadays computers greatly increase man's thinking capabilities of planning, analyzing, computing and controlling. They penetrate almost into all spheres of our modern society.

Unit V
Text 1
Multilingual Word-processing

The advantages of computerized typing and editing are now being extended to all the living languages of the world. Even a complex script such as Japanese or Arabic can be processed

By Joseph D. Becker

The personal computer has become a familiar fixture in the office and even in the home. It is useful in many ways, and yet for all its novel applications it is probably most useful to the greatest number of people when it serves the function of a type-writer. In that role it enables the user to see text displayed on a screen, so that words can be reviewed and revised before they are ever committed to paper. The kind of computer program underlying such an ability is known as word-processing software.

So far computers have largely been limited to the processing of words in the English language. That is not surprising: most computers have been developed in English-speaking countries, and English is the principal language of international commerce. Yet there is no technical reason for word-processing to be confined to English. Indeed, it is possible for word-processing software to handle not only French, German, Italian, Russian, Spanish and other European languages but also more complex scripts such as Arabic, Chinese, Hebrew, Japanese and Korean.

In effect, therefore, the fascinating diversity of mankind's written symbols must be made to coexist in the computer. At first it hardly seems possible. Arabic script, for example, flows from right to left in curlicues. Thai and other scripts, originally from ancient India, have letters that sometimes step around their neighbors and thus get out of phonetic order. Occasionally a letter even surrounds its neighbors. Korean groups its letters in syllabic clusters. (The Korean alphabet was designed from scratch by a group of scholars in 1443). Chinese, the most ancient of living writing systems, consists of tens of thousands of ideographic characters. Each character is a miniature calligraphic composition inside its own square frame. It seems the developers of the computer and of word-processing software were coddled by the English language, which happens to have the simplest writing system of all: unadorned alphabetic letters laid out one after the other.

Memorize the following words and word-groups

- cluster – группа, скопление; пакет
- to be confined – быть ограниченным
- to coddle – нежить

- curlicue – причудливая завитушка, узор
- diversity – многообразие
- fascinating – очаровательный
- fixture – что-то твёрдо установленное
- to handle – обрабатывать
- Hebrew – иврит (древнееврейский язык)
- limit to v. – ограничивать
- multilingual – многоязыковый
- novel – новый, непривычный
- review v. – пересматривать, анализировать
- revise v. – проверять, исправлять
- scratch – каракуля, закорючка
- script – текст
- software – программное обеспечение
- syllabic – слоговой
- Thai – тайский
- type-writer – пишущая машинка
- unadorned – неукрашенный
- underlying – основной, лежащий в основе
- word-processing – обработка текста

Exercises

Exercise 1. Answer the following questions

1. Is the personal computer useful to the greatest number of people? Why? 2. Where can the user see text displayed? 3. What is known as word-processing software? 4. What language have computers been limited to the processing of words in? Why? 5. What languages is it possible to handle now? 6. How does Arabic script flow? 7. What writing system is the most ancient? 8. Can a complex script such as Chinese, Japanese or Arabic be processed?

Exercise 2. Find in the text the sentences corresponding to their Russian equivalents given below.

1. Такая программа для компьютера известна как система текстовой обработки. 2. Арабский текст идет справа налево причудливыми завитушками. 3. На первый взгляд это кажется, вряд ли возможным. 4. Все же нет причин для того, чтобы текстовая обработка ограничивалась только английским языком. 5. В этом случае пользователь имеет возможность видеть текст на экране, причем текст, прежде чем он будет напечатан, может быть откорректирован.

Exercise 3. Ask questions to which the following statements may serve as answers. Pay attention to the Present Perfect Tense.

1. Most computers have been developed in English-speaking countries. 2. Several important new features have been added to produce a valuable information tool for the telecoms industry around the world. 3. This facility has been optimized to present results in a meaningful way. 4. The personal computer has become a familiar fixture in the home. 5. Sonera of Finland has detected a software fault in some of the SIM cards. 6. Only 30 faulty cards have been reported. 7. So far computers have largely been limited to the processing of words in the English language. 8. SBC has not yet been granted permission to offer long distance voice services. 9. SBC has announced plans to wire homes and small businesses with high-speed optical fiber.

Exercise 4. Analyze the following sentences having modals or their equivalents. 1. Even these stable relationships can't be regarded as ballast against future changes in the market, however. 2. Satellite operators are beginning to realise that they must work hand-in-hand with terrestrial operators in order for their services to be commercially viable. 3. From the "Databank" page users can select one, two or up to five operators or countries, along with the timeline of the statistics required. 4. Users can type in the name of the operator or organization required, or can search according to lists of entries for each European country. 5. Network operators must be compensated for any extra investments they have to make. 6. Finnish operator Sonera is to sell part of the business of its Swedish-based subsidiary to Tele 1 Europe of Sweden. 7. You can have full and secure access to all the network facilities that you have at your desk. 8. It's a case of where egos dare… 9. How dare you illustrate this example?

* * * * *

Along with – вместе с

Text 2
Practical problems in multilingual word-processing

How can computer software originally designed to handle only English text be broadened to encompass the full diversity of the world's writing systems? The many challenges of the task can be divided into three basic realms. There must be a way for text to be represented in the memory of a computer; there must be a way for text to be typed at the keyboard of the computer; there must be a way for computer to present text to the typist; I shall refer to these realms as encoding, typing and rendering. By rendering I mean both the display of text on the screen of a computer and the printing of text on paper.

Encoding is governed by single, basic fact: the computer can store only numbers. Indeed, it can store only binary numbers, consisting of strings of 0's and 1's. Hence text is represented in a computer by storing a binary code number for each letter. In the case of the English language the American Standard Code for Information Interchange, abbreviated ASCII, assigns the binary code number 01000001 to the letter A, 01000010 to B, 01000011 to C and so on.

Thus when you type an A on a computer keyboard, the computer is really being instructed to store the code number 01000001. When the computer comes to display or print a letter encoded as 01000001, its instructions cause it to draw a symbol you recognize as an A. As long as the input and output instructions are consistent, you have the illusion that the letter A itself was stored.

Computers generally store information in units of bytes, where each byte is a group of eight bits. It therefore seems a sensible strategy to store text as one byte per character. The trouble is, there are only 2^8, or 256, ways in which eight 0's and 1's can be combined in a byte. The living scripts of the world have far more letters than that. A two-byte coding scheme, in which each letter would be identified by two successive bytes, would yield 2^{16}, or 65,536, possible codes; a three-byte coding scheme would yield 2^{24}, or well over 16 million, codes. But employing two or three bytes per letter where only one byte is needed would waste space in the computer's memory. The answer is to arrange for the encoding to expand to two or three bytes per letter only when necessary. This can be done by setting aside a few bytes as signals to the computer and putting those signals into encoded text.

(By Joseph Becker)

Memorize the following words and word-groups

- as long as – пока
- to assign – определять
- to be governed – регулировать
- challenge – проблема, сомнение
- consistent – совместимый, согласующийся
- to draw – добывать
- to encode – кодировать
- to encompass – заключать (в себе), касаться
- keyboard – клавиатура
- to refer to – ссылаться на, подразумевать
- rendering – перевод; изложение, передача
- sensible – разумный, заметный
- to set aside – не учитывать
- string – ряд, серия
- typist – машинистка
- to yield [ji:ld] – приносить, давать, производить

Exercises

Exercise 1. Answer the following questions.

1. What can the many challenges of the task be divided into? 2. What is meant by rendering? 3. How is encoding governed? 4. What units do computers usually store information in? 5. What problems do the developers of software face when they deal with multilingual word-processing software?

Exercise 2. Write down questions to which the following statements may serve as the answers paying attention to Present Continuous Passive.

1. The network is being built to exploit the pent-up. 2. The computer is really being instructed to store the code number 01000001. 3. The consideration – of Japan Telecom, J-Phone Group and Airtel of Spain – is being financed by a combination of Vodafone's existing resources and placement of new Vodafone shares. 4. This principle of functioning is being widely used nowadays. 5. The advantages of computerized typing is now being extended to all the living languages of the world. 6. The roll out of next-generation network technologies is being accelerated by demand for high-speed Internet connections.

Exercise 3. Translate the sentences with modals and their equivalents.

1. He'll have to change his mind when he sees that. 2. How dare you take these results? 3. They were to discuss the problem again. 4. Robot DV-5 has to carry out mathematical problems. 5. He was able to destroy one of the robots. 6. There may have been a mistake. 7. As the psychologist of the company, you must find out how the device works. 8. I needn't tell you how important our work is. 9. We cannot let the delivery ship leave the station. 10. You have to be responsible for this situation. 11. He may be a very good man.

(From "I. Robot" of Isaac Asimov)

Exercise 4. Find Participle II in the text and state its function. Translate the sentences into Russian.

Unit VI
Text 1
Switching

In the old days, one telephone was connected to another telephone at switchboards operated by humans. 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. The automation of the switchboard came early in the history of telephony with Almon B. Strowger's invention in 1892 of an electromechanical automatic switch and the creation of his Automatic Electric Company.

Now electromechanical switching is totally obsolete and today's telephone system utilizes electronic switching systems. However, the Strowger system, known as step-by-step in the Bell System, was a thing of great mechanical ingenuity. But that is not possible with today's computerized electronic systems. Electromechanical switching was inflexible.

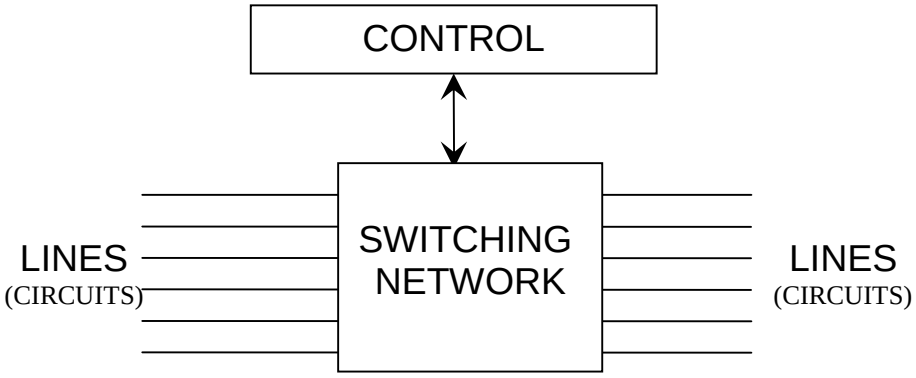


FIGURE 3. Switching System.

In general, a switching system consists of two major functional parts, as shown in Fig. 3: (1) the switching network itself where one telephone call is connected to another and (2) the means of control that determines the specific connections. 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.

In the past, the switching network utilized electromechanical technology to accomplish space switching. This technology progressed over time from the automated Strowger switch to the Bell System's crossbar switch. The first

crossbar switching system was installed in 1938, and crossbar switching systems were still in use in the early 1990s.

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.

Yesterday's switching systems were controlled by hard-wired electromechanical relays. Today's switching systems are controlled by programmable digital computers thereby offering great flexibility. The use of a digital computer to control the operation of a switching network is called electronic switching or stored-program control. The intelligence of stored-program control, coupled with the capabilities of modern signalling systems, enables a wide variety of functional services.

Memorize the following words and word – groups:

- to accomplish – выполнять
- by reordering the time sequence – при повторном установлении последовательности времени
- cord – электрический шнур; изолированный провод
- coupled with – связанный с; спаренный с
- crossbar switch – координатный коммутатор
- to digitize – превращать в цифровую форму; дискретизировать
- ingenuity [, in(d)zi'nju:iti] – изобретательность, мастерство
- jack – гнездо; клеммное гнездо
- obsolete [óbs li:t] – устарелый, вышедший из употребления
- path – канал; путь; тракт
- plug – вилка (телефонная)
- sample – образец
- to share – разделять; использовать
- signalling – передача сигналов; сигнализация
- sleeve – рукав; патрубок
- space switching – коммутация с пространственным разделением каналов; пространственная коммутация
- step-by-step connection – декадно-шаговое соединение
- stored-program control – микропрограммное управление
- switch – переключатель; коммутатор
- switchboard – телефонный коммутатор
- switching – коммутация
- time switching – коммутация с разделением времени

- tip – оконечность; верхняя часть
- to utilize [ˈju:tilaiz] – использовать

Exercises

Exercise 1. Answer the following questions.

1. How was one telephone connected to another telephone in the old days? 2. What did human operators use to make the connections? 3. What was used for signalling purposes? 4. When did the automation of the switchboard come? 5. What system does today's telephone system utilize? 6. Why was the electromechanical switching inflexible? 7. How many parts does a switching system in general consist of? 8. How can calls be connected? 9. What techniques do modern digital switching systems utilize? 10. What is the method to deal with digital signals? 11. What is called stored-program control?

Exercise 2. Translate the following definitions and memorize them.

Space switching: Physically connecting wires to create an electrical path.

Time switching: Connecting calls by reordering the time sequence of digitized samples.

Exercise 3. Complete the following sentences using parts from the right-hand column. Translate them.

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

Exercise 4. 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, should a fault develop during a transaction, the dialog may be restarted at an agreed (earlier) synchronization point. 11. These things cannot be compared.

Exercise 5. Change the following statements into common questions, paying attention to modals and their equivalents.

1. The principal service will be to provide remote businesses and customers with fast access to terrestrial networks. 2. Our representative will be able to provide a status report within seconds. 3. E-mails and faxes can be sent. 4. There must be a universally understood language, which must be defined to allow the agreed transfer language to be negotiated. 5. Complex systems can be constructed by interconnecting a large number of simple components.

Text 2
Signalling

A variety of signals are sent over the telephone network to control its operation, an aspect of POTS known as signalling. The familiar dial tone, busy signal, and ring-back tone are signals presented to the calling party. Ringing is accomplished by a 20-Hz signal that is on for 2 s and off for 4 s. In addition to these more audible signals that tell us when to dial, whether lines are busy, and when to answer the telephone, other signals are sent over the telephone network itself to control its operation.

The telephone network needed to know whether a trunk is idle or not, and the presence or absence of DC indicated whether a local trunk was in use or idle. Long-distance trunks used in-band and out-of-band tones to indicate whether a circuit was idle or not. A single-frequency tone of 2600 Hz, which is within the voice band, was placed on an idle circuit to indicate its availability. The telephone number was sent as a sequence of two tones at a rate of 10 combinations per second, a technique known as multifrequency key pulsing (MFKP). Signalling today is accomplished mostly by common channel interoffice signalling (CCIS).

With common-channel signalling, a separate dedicated data channel is used solely to carry signalling information in the form of short packets of data. Common-channel signalling is known as signalling system 7 (SS7). It offers advanced 800-service such as time of day routing, identification of the calling party, and various software defined network features. In addition to new features and services, common-channel signalling offers more efficient assignment of tele-

phone circuits and operation of the telephone network. Although first used for long-distance networks, common-channel signalling is being quickly installed at the local level.

Signalling has been integrated into a modern telecommunications network, depicted in Fig. 4 and when coupled with centralized data-bases, provides many of the features associated with today's intelligent network. The database, known as a service control point (SCP), contains the information needed to translate 800-numbers to the appropriate telephone location, among other items. The signalling information is sent over its own signalling links from one signalling processor to another, located at nodes called signal transfer points (STP). The signalling processors determine the actual switching of the customer circuits, performed by switching systems at service switching points. The bulk traffic carried over transmission media can be switched in times of service failures or to balance loads by digital cross-connect systems (DCS). The signalling links connect to the local network at a signalling point of interface (SPI), and the customer circuits connect at a point of presence. Today's signalling systems add much functionality to the network.

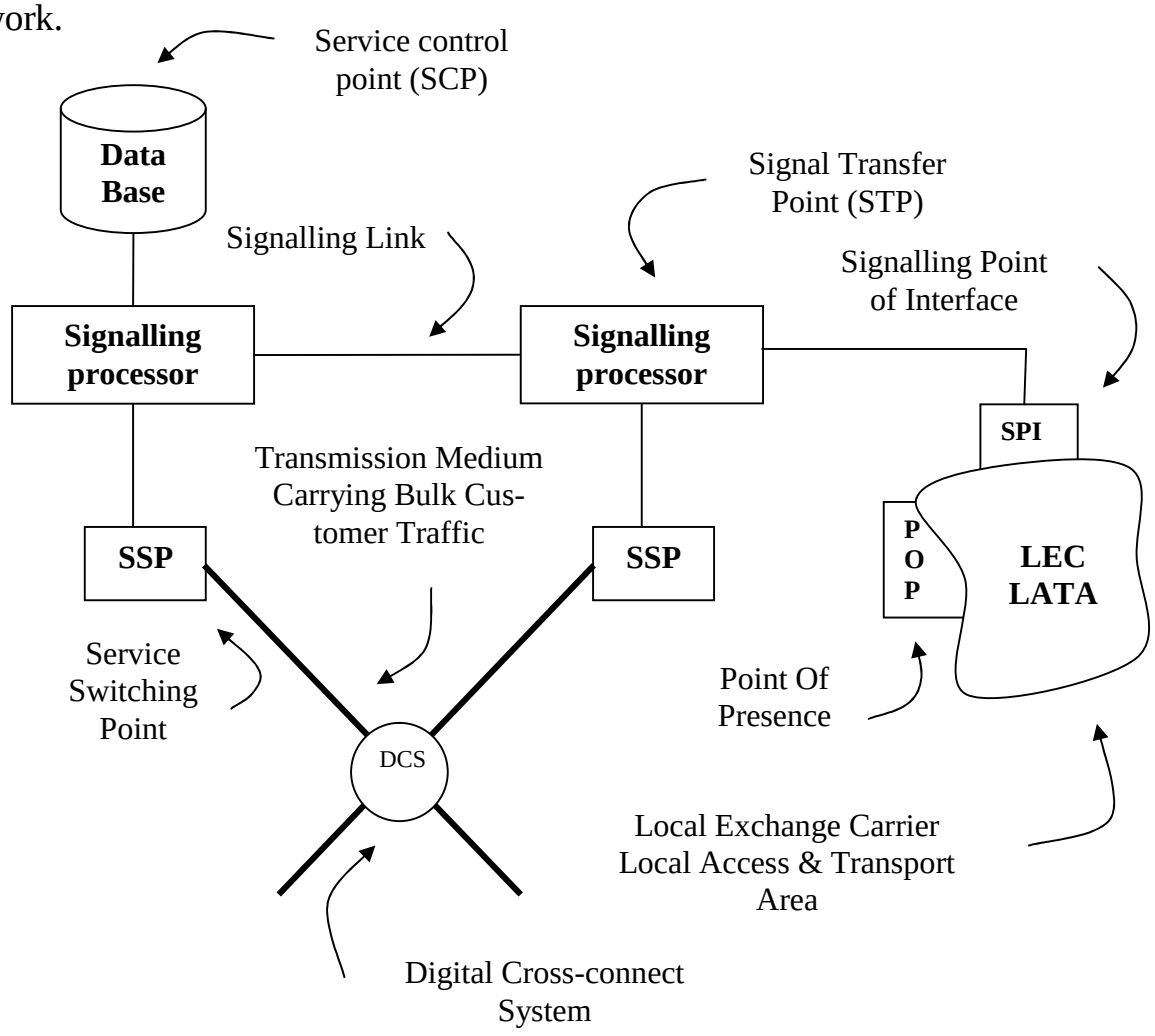


FIGURE 4. Intelligent Network

Memorize the following words and word-groups:

- assignment – предназначение; присвоение
- availability – коэффициент готовности; готовность
- bulk traffic – массовый информационный поток
- calling party – абонент, который вызывает; корреспондент
- common-channel interoffice signalling – сигнализация отдельным (общим) каналом между телефонными станциями
- common-channel signalling – сигнализация отдельным (общим) каналом
- coupled with – включенный с
- day routing – выбор дневного направления связи
- dedicated data channel – канал, предназначенный для передачи данных
- to depict – описывать, изображать
- dial-tone – тональный сигнал готовности; гудок
- digital cross-connect system – цифровая коммутационная система
- failure – неудача; недостаток; отсутствие
- functionality – функциональность, работоспособность
- idle – свободный, незанятый
- in-band tone – тональный сигнал в диапазоне (полосе)
- intelligent – интеллектуальный
- item – единица информации
- multifrequency key pulsing (MFKP) – многочастотная кнопочная импульсация
- node – узел
- out-of-band tone – тональный сигнал вне диапазона (полосы)
- ring-back tone – ответный сигнал
- signalling – передача сигналов
- single-frequency tone – тональный сигнал отдельной частоты
- service control point – пункт эксплуатационного контроля
- trunk – магистральная линия связи

* * * * *

POTS (Plain Old Telephone service) – традиционная услуга телефонной связи

DC – (direct current) – постоянный ток

Exercises

Exercise 1. Translate the following definitions and memorize them.

Common channel signalling: Uses a separate dedicated path to carry signalling information in the form of short packets of data.

Point of presence (POP): the point where the connection is made from the local service provider to the interexchange carrier.

Exercise 2. Answer the following questions:

1. In which way are signals sent? 2. What signals are presented to the calling party? 3. What can you say about the former telephone network? 4. What is signalling today accomplished by? 5. What is a separate dedicated data channel used for? 6. What does it offer? 7. Has signalling been integrated into a modern telecommunications network? 8. How is the signalling information sent? 9. What do signalling processors determine?

Exercise 3. Put questions to the words in bold type.

1. **The line** has been engaged since 10 o'clock. 2. We have classified these control operations into **four basic categories**. 3. **These control operations** have been classified into four basic categories. 4. The address of the next instruction has been found **in the program counter**. 5. A large engineering department at Thompson – CSF has now supplied **some 90,000 km of microwave links of varying capacities**. 6. Over 14,000 km of troposcatter links have been installed **in Europe, Africa and Latin America**.7. Thompson – CSF has built **several thousand centralized supervisory** systems. 8. Recent years **have seen** a growth in North American interest in using this technology.9. **A wide variety of transmission media** have been used in providing telephone service. 10. The **transmission** media and systems used for long-distance telephone service have progressed over the decades.

Exercise 4. Put the Infinitives in brackets in the Present Perfect Tense, paying attention to the Active or Passive Voice:

1. You (to get) the wrong number. 2. We (to make) a trunk call this evening. 3. Terrestrial microwave radio (to use) to carry telephone signals from towers located about 26 mi across the country. 4. He (to receive) the money order at the Post-Office this morning. 5. These standards (to validate) in accordance with these techniques.

Exercise 5. Translate following sentences into Russian.

1. An internet journalist is in doubt whether these Inmarsat Mini-M satphones can take up to 5 minutes to transmit a single image. 2. Whether or no it is possible to design such system, I cannot say. 3. Audible signals tell us whether the line is busy. 4. The network control center isn't sure whether it can establish ground communication with all eight new satellites. 5. Manager asked whether I had sent e-mail massages.

Unit VII
Text 1
Idle Channel Noise

Idle channel noise is the noise when there is no signal applied to the voice channel, which is different from the quantization distortion caused by the ADC/DAC process. This noise can be from any circuit element in the channel, in addition to the PCM codec-filter. Noise may be coupled in from other circuits including, but not limited to, hybrid transformer interfaces, power supply induced noise, digital circuitry, radio frequency radiation, and resistive noise sources.

The PCM codec-filter itself has many opportunities to contribute to the idle channel noise level. The input high-pass filter often is third order, whereas both the input and the output low-pass filters are typically fifth-order elliptic designs. The potential for noise generation is proportional to the order of the filter. The ADC and DAC arrays have many components that are controlled by sequencing digital circuits. The power supply rejection capability of PCM codec-filters once dominated the noise level of the channel. The power supply rejection ratio of these devices has been improved to a level where the device is virtually immune to power supply noise within the allowable power supply voltage range. This performance was attained by differential analog circuit designs in combination with tightly controlled matching between on-chip components.

Noise measurements require a different decibel unit as they usually involve some bandwidth or filter conditioning. One such unit commonly used (especially in North America) is decibels above reference noise (dBrn). The reference noise level is defined as 1 pW or —90 dBm. Telephone measurements typically refer to dBrnC, which is the noise level measured through a C-message weighting filter (a filter that simulates the frequency response of the human ear’s noise sensitivity). European systems use a related term called dBmp, which is the dBm level noise measured through a psophometric filter.

The idle channel noise of the voice channel directly impacts the dynamic range, which is the ratio of maximum power the channel can handle to this noise level.

The term dynamic range is similar to signal-to-noise ratio for linear circuits. The signal-to-noise plus distortion ratio for a companded channel is generally limited by the nonlinear companding except at very low-signal amplitudes.

Memorize the following words and word-groups:

- array – массив; совокупность
- to attain – достигать
- bandwidth – ширина полосы (частот)
- codec – кодек (устройство кодирования и декодирования видеосигналов)

- companded channel – канал, имеющий расширенный динамический диапазон
- companding – компадирование (сигналов)
- conditioning – согласование
- to be coupled – соединяться; включаться; быть сопряженным
- to dominate – преобладать
- high-pass filter – фильтр высоких частот
- idle channel noise – шум свободного канала
- to impact – ударять(ся)
- in (adv.) – указывает на длительность процесса
- noise – шум
- psophometric filter – псофометрический фильтр
- rejection – отклонение
- power supply – электропитание
- signal-to-noise ratio – отношение сигнала к шуму
- virtually – фактически
- tightly – прочно; основательно
- weighting filter – утяжеляющий фильтр
- whereas – тогда как; несмотря на то, что

* * * * *

ADC (Analog to-Digital Converter) – аналогово-цифровой преобразователь
DAC (Digital to-Analog Converter) – цифро-аналоговый преобразователь

Exercises

Exercise 1. Answer the following questions.

1. What is called idle channel noise? 2. What can this noise be from? 3. What can you say about the PCM codec-filter? 4. Are the input high-pass filters third order or fifth-order designs? 5. What level has the power supply rejection ratio of these devices been improved to? 6. Why do noise measurements require a different decibel unit? 7. How is the reference noise level defined? 8. What is the term dynamic range similar to?

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

Translate the sentences.

1. The gain through the channel may be different if the amplitude of the signal is changed. 2. Gain tracking performance is dominated by the IC fabrication technology. 3. The telephone ringer is connected in parallel across the telephone line. 4. The public switched network can be used to transmit and switch any signal that remains within its baseband, namely about 4kHz. 5. When a specific digit is pushed, a unique combination of two sinusoidal tones is transmitted

over the line to the central office. 6. With analog multiplexing signals are combined by time-division multiplexing. 7. Many pairs of wire are placed together in a cable.

Exercise 3. Put in the verbs in the Present Perfect (have done) or Past Perfect Tense (had done)

Example: The match is over. We have won.

My uncle had no car at that time. He had sold his old one.

1. I spoke to Nick at lunch time. Someone (tell) him the news earlier. 2. It was six o'clock. All the shops (close). 3. The rain began after we (come) from the Academy. 4. I am waiting for my brother. I (not see) him since spring. 5. It isn't raining now. It just (stop). 6. They (leave) the city before the war began. 7. You can have the article. I (finish) with it. 8. At last the committee were ready to announce their decision. They (make up) already their minds.

Exercise 4. Write the two sentences as one. Use *when* ***and the Past Perfect Tense in either the first or the second part of the sentence.***

Example: He gave the book to me. He read it.

He gave the book to me when he had read it.

1. I passed all my exams well. I invited my friends to my party. 2. The students did the experiment in physics. They wrote a report on it. 3. The manager signed the letter. He typed it on his word processor. 4. We completed the forms. We handed them in. 5. I went to bed. I switched off TV. 6. He wrote an urgent message. He sent it via modem.

Text 2

Linear PCM Codec-Filter for High-Speed Modem Applications

The original PCM codec-filters were developed to facilitate the digital switching of voice signals in the central office of the PSTN. The signal processing in the digital domain consisted of simply moving digitized samples of voice from one time slot to another to accomplish the switching function. As such the A/D and D/A conversion processes could be nonlinear, and companding was employed.

With the advent of the personal computer, the facsimile machine, and most recently the Internet, the need to transmit data originating at the subscriber over the PSTN at the highest possible rates has grown to the point where the theoretical limits as defined by Shannon's law are being approached. For data transmission the signal processing is in a sense the inverse of that which spawned the original PCM codecs in that the initial signal is data that must be modulated to look like a voice signal in order to be transmitted over the PSTN. At data rates above 2400 b/s the modulation is done using sophisticated digital signal processing techniques, which have resulted in a whole new class of linear PCM codec-filters being developed.

Codec-filters for modems must be highly linear with a signal to distortion much greater than 30 dB. This linearity and signal to distortion is required to

implement the echo cancellation function with sufficient precision to resolve the voltages corresponding to the data points in the dense constellations of high-speed data modems.

Sigma-delta conversion technology is based on coarsely sampling a signal at a high rate and filtering the resulting noise. The transmit and receive signal paths are the inverse of each other.

The second-order modulators basically consist of two integrators and a comparator with two feedback loops.

Memorize the following words and word-groups:

- advent – приход
- to approach – подходить; приближаться
- codec – кодек (устройство кодирования и декодирования видеосигналов)
- comparator – компаратор
- dense constellation – плотная совокупность
- distortion – искажение
- domain – область; домен
- echo cancellation – гашение эхо-сигнала
- feedback loop – цикл обратной связи
- integrator – интегратор
- the inverse of – противоположность
- sigma-delta – дельта сигма (Δ S или C)
- to spawn – быть переполненным; являться средоточием чего-либо
- sufficient – достаточный
- time slot – интервал времени; промежуток времени

* * * * *

PCM (Pulse Code Modulation) – кодо-импульсная модуляция
PSTN (Public Switched Telephone Network) – коммутированная телефонная сеть общего пользования

Exercises

Exercise 1. Answer the following questions.

1. What did the original PCM codec-filters deal with? 2. What did the signal processing in digital domain consist of? 3. When has the need to transmit data over the PSTN grown? 4. How is the modulation done at data rates above 2400 b/s? 5. Why is this linearity and signal to distortion required? 6. What is sigma-delta conversion technology based on? 7. What do the second-order modulators basically consist of?

Exercise 2. Give the Infinitive of each of these Past Participles:
developed, employed, grown, approached, used, done, defined.

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

1. She entered the Academy in order to become a specialist in engineering. 2. I took out the key in order to open the door. 3. We hurried in order to get back in time. 4. I'll look through these articles in order to discover the key to the problem. 5. In order to raise this point I have taken part in the discussion. 6. He has written the formula from the text-book in order to show it to me. 7. In order to reduce its size we used new technologies.

Exercise 4. Make the following sentences interrogative:

1. We have been looking for this address all the afternoon. 2. I have been working on this model engine for two weeks. 3. My brother has been writing letters for an hour. 4. I have been watching television since 2 o'clock. 5. Radio ffn has also been using the Inmarsat-A HSD equipment for outside broadcast work. 6. This increase in data requirement has been driving our market direction for six months. 7. He has been working on his program since morning.

Exercise 5. 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.

Unit VIII
Text 1
Telecommunications Network Synchronization

Today's telecommunications network comprises customer premises equipment and telephone central offices interconnected by suitable transmission facilities. Although analog technology still exists in the customer loop, digital time-division multiplex (TDM) technology is more prevalent in the central office switching and transmission systems.

A digital switch located within the interoffice network terminates TDM signals originating from many other offices. It performs a combination of time-slot interchange and space switching to accomplish the interconnect function amongst the individual channels of the multiplexed signals. In order to accomplish this function without impairments, the average rates of all of the TDM signals terminating on the switch have to be synchronized to within some achievable bound. Furthermore, the reference clock of the switch itself must also be synchronized to the common rate of the incoming signals. These synchronization requirements are also applicable to a digital cross-connect system since it realizes the channel interconnection function in a similar manner.

Synchronous multiplexers, such as synchronous optical network (SONET) and synchronous digital hierarchy (SDH) terminals, used in fiber optic systems, generate the high-speed output signal by interleaving the time slots of the lower speed input signals. Again, to accomplish this function properly, the rates of the incoming lines and that of the multiplexer clock have to be synchronized. Primary rate multiplexers (known as channel banks) also employ synchronous time interleaving of the 64-kb/s tributary signals, often generated by other network elements (digital switches and signalling transfer points, for example) within the same office. For unimpaired information transfer in this case, the network elements that terminate these 64-kb/s signals have to be synchronized in both frequency and phase (bit and byte synchronization!).

Network synchronization is the background technology that enables the operating clocks of the various network elements throughout the network to be synchronized. Robust and accurate synchronization networks are essential to the proper functioning of these elements and the reliable transfer of information between them. The growth of data services and the deployment of SONET and SDH transmission equipment has further emphasized the need for such networks.

Memorize the following words and word –groups:

- accurate – точный, правильный
- amongst – среди, между
- bound – предел

- channel bank – группа каналов; аппаратура мультиплексирования
- cross-connect system – система с перекрестным соединителем (соединительным звеном)
- customer loop – абонентская линия (двухпроводная)
- customer premises equipment – аппаратура, установленная в помещении пользователя
- digital hierarchy terminal – цифровой иерархичный терминал
- digital time-division multiplex technology – цифровая мультиплексная технология с временным разделением каналов
- to emphasize – подчеркивать, придавать особое значение
- impairment – ослабление; искажение
- interleaving – расслаивание; уплотнение импульсных сигналов; чередование
- originating – начальный
- prevalent – распространенный
- reference clock – эталонный тактовый генератор
- robust – трудный; грубый
- to terminate – согласовывать терминальное оборудование
- tributary signal – подчиненный сигнал

Exercises

Exercise 1. Answer the following questions.

1. What does today's telecommunications network comprise? 2. What technology is more prevalent in the central office switching and transmission systems? 3. What does a digital switch perform? 4. Why do the average rates of all the TDM signals have to be synchronized to? 5. Are these synchronization requirements also applicable to a digital cross-connect system? 6. How do synchronous multiplexers generate the high-speed output signal? 7. What is network synchronization? 8. What has emphasized the need for such networks?

Exercise 2. Define the function of <u>to be</u> in the following sentences, translate them.

1. The goal of synchronization distribution network is to provide reference clocks. 2. A small amount of side tone is desirable because it makes the telephone seem live and natural. 3. One method of achieving synchronization in the interoffice network is to designate a single primary reference source as a master clock for the entire network. 4. This strategy is expensive to implement now. 5. A wide variety of intelligent features was easily available when humans operated the telephone network and its switchboards. 6. All of these services are wanted by all telephone users. 7. A combination of the two techniques is typically employed in practice. 8. A hierarchy multiplexing was created with 12 baseband channels forming a group. 9. Thus, devices other than just a telephone

can be used on the telephone network. 10 Communication satellites located in orbit 22,300 mi above the Earth's equator have been used to carry telephone signals. 11. Human operators were replaced by automated electromechanical switching systems.

Exercise 3. Make the following sentences interrogative (Present Indefinite)

1. A two-wire local loop connects the telephone instrument to the central office. 2. Microwave radio also carries telephone calls across oceans and continents by communication satellites. 3. Geosynchronous communication satellites suffer a serious shortcoming. 4. Technological advances include colour multiplexing in which a number of light signals at different frequencies are carried on the same fiber strand. 5. Long-distance transmission systems and local carrier systems all utilize separate paths for each direction of transmission. 6. The telephone network carries not only voice signals but also facsimile and data signals. 7. However some people consider their telephone number to be very private and personal and also do not want it transmitted to others.

Exercise 4. Give degrees of comparison of the following adjectives:

wide, synchronous, many, thick, good, large, suitable, common, numerous, considerable, bad, early, reliable, essential, various, little, small.

Text 2
Characterization of Synchronization Impairments

The synchronization performance of a telecommunications signal is typically determined from measured values of the deviations in time between when the signal transitions actually occur and when they are ideally expected. The master clock that provides the ideal time positions should be significantly more accurate than the signal under test. The measurement yields the raw phase error signal, also known as the time delay or simply phase, in units of time as a function of elapsed time. Postprocessing of this raw data is, however, necessary to extract useful parameters that help define the underlying synchronization impairment model.

The current synchronization impairment model used for the telecommunications signal is based mainly on the source of the impairments. It refers to the higher frequency components of the phase (error) oscillations as jitter and to the lower frequency components as wander, with 10 Hz being the demarcation frequency. Jitter is produced mainly by regenerative repeaters and asynchronous multiplexers, and normal levels of it can readily be buffered and filtered out. However, excessive jitter is a potential source of bit errors in the digital network. Wander, on the other hand, has many causes. These include temperature cycling effects in cables, waiting time effects in asynchronous multiplexers, and the effects of frequency and phase quantization in slave clocks which employ narrowband filters in their servocontrol loops. Since it contains very low-frequency components, wander cannot be completely filtered out, and hence is

passed on. Excessive wander adversely affects the slip performance of the network and can also lead to an unacceptable rate of pointer adjustments in SONET and SDH multiplexers. Furthermore, wander on an input reference signal compromises the holdover performance of a slave clock during reference interruptions.

Although jitter and wander are adequate descriptors of synchronization impairments in the existing digital network, a more comprehensive model is necessary to characterize the phase variations caused by the newly introduced SONET and SDH equipment, and to appropriately specify the limits on timing noise at network interfaces. Recently, there is renewed interest to adapt the traditional noise model used with precision oscillators and clocks in time and frequency metrology to the telecommunications applications.

Maximum time interval error (MTIE) and time variance (TVAR) are two parameters for specifying the synchronization performance of telecommunications signals that are defined to capture the essential features of the traditional model. MTIE is effective in characterizing peak-to-peak phase movements, which are primarily due to systematic components, whereas TVAR is useful in characterizing the stochastic power-law noise components of the phase noise.

Memorize the following words and word-groups:

- adversely – неблагоприятно
- buffer – буфер, разделительный (буферный) каскад
- to capture – захватить
- demarcation frequency – разграничительная частота
- deviation – отклонение
- to filter out – отфильтровать
- holdover – резервный
- jitter – искажение сигнала, искажение строчек (в факсимильной связи)
- master clock – тактовый генератор
- on the other hand – с другой стороны
- to pass on – передавать
- peak-to-peak phase – фаза полного размаха
- raw data – необработанные данные
- reference interruption – прерывание опорного сигнала
- servocontrol loop – линия с автоматическим управлением
- slave clock – вторичный генератор
- slip performance – скользящий характер
- synchronization impairment – ослабление синхронизации
- synchronization performance – эффективность синхронизации
- time variance – изменение времени
- transition – переход
- wander – блуждание

Exercises

Exercise1. Answer the following questions.

1. How is the synchronization performance typically determined? 2. What does the master clock provide? 3. What is the current synchronization impairment model based on? 4. Is jitter produced by regenerative repeaters and asynchronous multiplexers? 5. What do slave clocks employ? 6. What are two parameters for specifying the synchronization performance of telecommunications signals?

Exercise2. Put the Infinitive in brackets in the Past Indefinite Tense paying attention to the Passive or Active Voice. Translate the sentences.

1. AT & T (to replace) all its analog multiplexing in the late 1980 s. 2. Analog multiplexing (to accomplish) by A-type channel banks. 3. Each baseband telephone channel (to shift) in frequency to its own unique 4 kHz channel. 4. These networks (to design) originally to guarantee satisfactory slip performance for end-to-end connection. 5. The path redundancy (to provide) by dual feeds. 6. The telephone receiver (to invent) in 1876 by Thomas Watson. 7. Microwave radio (to carry) telephone calls terrestrially from microwave tower to tower across the country. 8. Thomas Watson (to apply) for the first ringer patent in 1978. 9. The high-impedance ringer (to invent) in 1890 by John J. Carty.

Exercise 3. Complete the sentences using Present Continuous or Present Simple. Put in the verbs on the right

1. Normally we _____ work at nine o'clock, but we _____ at eight this week because we are very busy just now.	1. start start
2. Usually he _____ two newspapers, but not the same ones every day. On Sundays he _____three or four.	2. read buy
3. I _____ letters and telegrams now. A telegraph boy usually _____ them at this time every day.	3. Look through deliver
4. A computer _____ a sequence of reasonable operations. I_____ a program for the computer at this moment.	4. Perform Compile
5. My friend _____ the blank. He _____ silly mistakes too often.	5. Fill in make
6. The new systems _____ the boundaries of the Inmarsat options now.	6. Extend

Exercise 4. Insert the prepositions.

1. The development of digital switching exchanges and cross – connect equipment in telecommunications systems created the necessity … robust synchronization distribution networks. 2. As newer transport technologies such as asynchronous transfer mode are introduced, the distribution … accurate synchronization references will be more complicated. 3. Path redundancy is achieved … providing primary and secondary reference sources at the slave clocks. 4. The output reference timing signals are generated using the data ac-

quired … the normal (synchronized) mode. 5. Personal satellite communications traffic is on the increase, as small low-cost easy-to-use hardware comes on …the market. 6. Data is written … the small capacity (8-16 bytes) receive buffer in the pointer processor … the rate of the incoming line.

Keys: into, at, for, during, of, to, by.

Unit IX
Text 1
Private Branch Exchanges

The Private Branch Exchange (PBX) is a smaller version of the switching system (or switch) found at the telephone company's Central Office. International terminology differentiates between attendant-operated switches and automatic systems, where switching of internal calls (at least) is accomplished automatically in response to the dialed digits. The former is a Private Manual Branch Exchange (PMBX), the latter a Private Automatic Branch Exchange (PABX). Since virtually all systems sold today are PABXs, the term PBX is equivalent.

The PBX is located on the premises of the customer, and serves anywhere from 50 to thousands of lines. It mimics the functionality of the central office switch in that it provides dialtone to users, and connects calls to other users located on the customer's premises, or to the public-switched telephone network. Calls being placed to subscribers outside the PBX must be proceeded by a special access code, traditionally 9, for a nontoll outside line.

A PBX has its own numbering plan, normally with three- to five-digit station numbers. Each telephone served by the PBX has an individual extension number, and can be directly dialed from any other phone served by the PBX. Outside calls coming into the PBX from the local exchange are answered by a PBX operator and transferred (extended) to the desired station (extension). Many recent PBXs substitute an automated attendant for the traditional operator; these are not yet well received by the public.

Direct Inward Dialing (DID) allows calls coming in from the local exchange over special DID trunks to be connected directly to an extension without intervention by an operator or auto-attendant. Callers dial a standard seven-digit phone number corresponding to the particular PBX and extension number. Obviously, DID requires a signalling arrangement between the CO and the PBX for transferring the inbound number. It also requires that all of the numbers reachable by DID be unique in the exchange numbering scheme. Thus, a company with 1000 PBX stations would only require one telephone number from the outside, provided the incoming calls were extended by an attendant (automated or manual). With DID, the same company would require 1000 telephone numbers. The convenience of DID comes at a price; available numbers are used up at a faster rate, resulting in more frequent need for new area codes.

A modern PBX is similar to its larger cousin at the telephone company central office in that it is a digital switch complete with central control, program and call store, line and trunk interfaces, and many of the same features. Various options, such as dual-central control, backup power, and custom calling features, are available. Diagnostic software continuously monitors the PBX and reports problems to the attendant or service personnel. The PBX differs from a CO switch primarily in its capacity to serve lines and process calls. A PBX typically serves fewer than a thousand stations and can process between 50,000 and

100,000 busy hour call attempts, whereas a modern digital central office switch will serve between 20,000 and 80,000 lines with over a million busy hour call attempts. It is important to note that some very large PBX installations that serve tens of thousands of stations are actually CO switches.

Memorize the following words and word-groups:

- attendant-operated switch – обслуживающий коммутатор с установлением связи
- extension number – дополнительный номер
- inbound – прибывающий, входящий
- intervention [intχ(:)‘ven□χn] – вмешательство, участие
- inward [‘inwχd] dialing – автоматическое внутреннее набирание номера
- manual – ручной
- to mimic – подделывать, имитировать
- nontoll – без дополнительной платы
- premises (pl.) – помещения
- private branch exchange – ведомственная (внутренняя) телефонная станция с внешними линиями связи
- reachable – досягаемый
- service personnel – обслуживающий персонал

* * * * *

CO (Central Office) – Центральная телефонная станция

Exercises

Exercise 1. Answer the following questions.

1. What is the Private Branch Exchange? 2. How does international technology differentiate? 3. Where is the PBX located? 4. What must calls being placed to subscribers outside the PBX be proceeded by? 5. What numbering plan has a PBX? 6. What does Direct Inward Dialing allow? 7. What’s the difference between the PBX and the CO?

Exercise 2. Analyze the functions of ing-forms. Translate the sentences into Russian.

1. These systems operate by routing all lines to each telephone instrument, where the user selects the line desired by pressing a button. 2. The cadence of both the ringing tone and the flash were used to differentiate an internal call from an outside call. 3. Feature telephones are multiple key sets that have programmable buttons for accessing features such as paging, call transfer, speed dialing, automatic redial of busy numbers, and hands-free calling. 4. The basic idea of guiding light through thin glass fibers is quite old. 5. Today’s transmis-

sion medium of choice is optical fiber utilizing digital, time-division multiplexing of the voice circuits.6. This device includes both antialiasing and reconstruction switched capacitor filters. 7. Multiplexing is the means by which a number of communication signals are combined together to share a single communication medium. 8. The number is encoded as digital data and sent in a short burst, using phase shift keying, during the interval between the first and second ringing signal.

Exercise 3. Give degrees of comparison of the following adjectives:

Numerous, expressive, good, small, automatic, various, similar, little, available, modern, far, important, thin.

Exercise 4. Analyze the following complex sentences, translate them.

1. In this way the system operates much the same as a modern electronic key system, except that there is no need for a separate Key Service Unit. 2. Hybrid key systems are systems that in some ways resemble a Private Branch Exchange. 3. The time required for the radio signals to travel back and forth between and satellite and the Earth stations creates a round–trip delay of about 0.5s, which is quite annoying to most people. 4. British Telecom is one of the few service providers that can truly lay claim to a total end-to-end global network. 5. The man whom I got the information from is the logistics director of the Company. 6. From the satellite calls are beamed to land-earth stations that act as gateways to the world's terrestrial telecommunication networks. 7. You can dial and connect to any telephone on Earth from Mini-M terminal, wherever you are. 8. A MiniSat terminal is being used by journalists who have to travel regularly into remote areas outside the convectional cellular coverage.

Exercise 5. Put the Infinitives in brackets in the Present Indefinite Tense (active):

1. Using the Inmarsat network, the Planet phone (to provide) a truly global mobile connection for voice, fax and data communication. 2. Slips (to occur) infrequently when there are no synchronization disruptions. 3. There (to be) two main methods of multiplexing: time-division multiplexing and frequency-division multiplexing. 4. They (to deliver) easy-to-use, economical services to businesses around the world. 5. Communication capabilities (to include) a built-in 10 Mbps Ethernet link and an infra-red connection. 6. The chief executive of the Company (to say) the system will be operational soon.

Text 2
Centrex

Centrex is a service provided by the local exchange carrier that mimics the functionality of a key system or PBX with station lines provisioned from the telephone company's central office switch. This is done through software that, in essence, partitions the CO switch to give each Centrex customer their own virtual PBX or key system. With a Centrex arrangement each extension is connected directly to the CO switch. The Centrex customer has a numbering plan

similar to that of a PBX, and places calls to other extensions within the Centrex group exactly as a PBX user would. Calls from outside the Centrex group are handled as calls coming into a DID-equipped PBX in that a caller dials a seven-digit number to reach a Centrex group subscriber. Even though the users are served directly by the central office, an access code (such as 9) must be dialed for an outside line, further mimicking the functionality of a PBX. Thus, the Centrex user sees a system that provides service that is indistinguishable from that provided by a PBX.

CPE for Centrex service is virtually identical in functionality and appearance to that for PBX applications, although the signalling is often quite different. Centrex CPE can range from simple single-line analog telephones to ISDN sets. Such CPE is in some cases proprietary to the vendor of the central office switch that is providing the service, and is normally leased to the customer by the local exchange carrier as a part of the Centrex service contract.

Advantages of Centrex include reliability that is virtually the same as that of the central office, (which is normally less than 2 hours of total unavailability over 40 years), software that is always up to date (assuming that the CO software is up to date), and virtually unlimited call-handling capacity. Additionally, the customer does not have to provide floor space, power, or cooling for KSUs or PBX cabinets, nor is maintenance of any of this equipment required. Since it is provisioned from the CO, a Centrex system can span multiple locations within an exchange. Disadvantages include high cost and lack of control. Centrex is priced on a per-line, per-month basis based under contract with the local exchange carrier, whereas a PBX that is purchased has a fixed cost based on the purchase price of the hardware and installation. Also, some electronic PBX sets can only be used within a few thousand cable feet of the CO. An additional disadvantage is reliance on the telephone company for additions or changes to the service.

Memorize the following words and word – groups:

- appearance – внешний вид
- indistinguishable – неразличимый
- in essence [‘esns] – в сущности
- to lease – арендовать, выделять
- local exchange carrier –предприятие местной связи (в США)
- to partition – разделять, делить
- proprietary – составляющий чью- либо собственность, патентованный
- to provision – обеспечивать
- reliance – уверенность
- to span – заполнять, перекрывать
- vendor – поставщик

CPE (Customer Premises Equipment) – аппаратура, установленная в помещении пользователя.

ISDN (Integrated Services Digital Network) – цифровая сеть интегрированных услуг.

KSU (Key Service Unit) – устройство связи с клавиатурой.

Exercises

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

Exercise 2. Choose the proper verb form and translate the sentences.

1. The solution to this problem …… the development of electronic simulated key systems that operated in conjunction with the PBX software. 2. Major enhancements to digital PBXs …. automatic call distribution, voice mail .3.These capabilities …. use of an auxiliary processors. 4. Most current PBX systems … the capability for remote diagnosis and setup. 5. This allows advanced support or administration from a remote site without … a technician to the PBX location. 6. Connection ….by analog twisted pair copper or direct digital carrier interface.

Keys : include , may be, was, provide , having to send , may require .

Exercise 3. Speak about the advantages of Centrex. Use the words given below:

local exchange carrier; connected directly to; reliability; to span multiple locations within an exchange; virtually unlimited call - handling capacity.

Exercise 4. Translate the sentences paying special attention to Present Indefinite Tense (Passive).

1. The program is loaded on one of the two PCs which are then connected by cable, over a local area network. 2. Interest is calculated according to the average interest rate and the average outstanding capital. 3. Users are also provided with a choice of practical information from the program's man menu. 4. This information is collected and transferred by phone line, radio or satellite link. 5. All the firms are involved in the final stage of the project, introducing electronic data interchange to their operators. 6. Security is enhanced by Secure Terminal Unit encryption, achieved through a hardware upgrade and built-in software. **7**. Only the differences are matched thereby minimising the amount of data transferred. 8. Incoming or outgoing messages are displayed on the same screen. 9. A computer program is designed for easy operation, with on-line help and pull-down menus and tables.

Exercise 5. Make the following sentences interrogative paying attention to modal verbs with the Infinitive Passive:

1. Simulation modelling must readily be used with the powerful PCs of today. 2. All costs including communication tariffs, terrestrial links (e.g. telex, modem or datanet lines), and software can be stored in the program*s databases for instant retrieval as required. 3. Data terminal support may be provided by

digital telephone sets or data terminals. 4. Access to distance education and the internet can be offered by this new Telstra service. 5. Satcom-M and Satcom-B can be accessed around the world by simply selecting the access code «222». 6. I want a screen that can be seen not just by me but one or two people looking on from either side.

Text 3
Voice Processing

Customer Premises Equipment that combines computing and communications to manage voice calls automatically are known as voice processing systems. These include three classes of equipment comprising voice processing: voice mail, automated attendant, interactive voice response.

A voice mail system stores messages in digital form on some type of computer memory. These may be stand-alone systems (often utilizing a personal computer for processing and message storage), which can be connected directly to the central office. Integrated voice mail systems are combined with a PBX for greater functionality, provided the PBX is designed for integration of external peripherals. Voice mail systems are sized by number of simultaneous callers (ports) and hours of storage.

The automated attendant is the most misused and maligned of the voice processing technologies. The system answers the telephone and offers the caller a menu of choices such as “dial 1 for sales, 2 for service, 3 for engineering”. A properly designed system can save time for callers.

Interactive voice response (IVR) or audiotex systems prompt the user to enter information such as an account number via DTMF dialing. This information is passed to a host computer for processing and a voice synthesizer reads the information back to the caller. Banks and credit unions use IVR technology to enable customers to obtain their account balances without waiting for an agent.

Recent voice processing systems combine all three technologies. For example, a customer-service system may offer a menu of choices from an automated attendant, ask the caller to enter his or her customer number using IVR, and allow the caller to leave a message for a support specialist on voice mail.

Memorize the following words and word-groups:

- to malign [mə’lain] – злословить
- to misuse [’mis’ju:z] – неправильно употреблять
- peripheral – внешнее устройство; периферийное устройство
- to promt – побуждать
- simultaneous – одновременный
- storage – память
- voice response – голосовой ответ (отклик)

DTMF (Dual Tone Multifrequency) dialing – набирание номера с многочастотной сигнализацией

Exercises

Exercise 1. Answer the following questions:

1. What does Customer Premises Equipment combine computing and communications for? 2. What are known as voice processing systems? 3. How does a voice mail store messages? 4. What are integrated voice mail systems combined with? 5. What is the function of the automated attendant? 6. What does Interactive Voice Response deal with? 7. Do recent voice processing systems combine all three technologies?

Exercise 2. Find in the text 3 sentences containing Present Indefinite Passive.

Exercise 3. Translate these sentences into Russian paying attention to Future Indefinite Passive:

1. Greater innovation will be seen in the way in which existing data services are offered. 2. More accurate forms of location positioning will be adopted in the future. 3. Frequently used messages will be coded for automatic transmission at less cost. 4. This satellite will be moved to a new orbital location at 11.5 degrees east. 5. The new joint venture will be called Rydex Marine Technologies.

Exercise 4. Outline the main ideas of the text and write an abstract.

Unit X
Text 1
Analog Telephone Instruments

The most common CPE found in any country is telephone. Equipped with a rotary dial or dual tone multifrequency (DTMF) keypad for signalling, a transmitter, and receiver, it is present in almost every home or office in most countries. It is used for placing voice calls over a single line to any other telephone in most of the world. The analog telephone set is the embodiment of plain old telephone service (POTS).

Customers would define the functionality of such a unit in terms of how it operated in the normal scenario of placing or receiving a telephone call. The telephone has a handset (usually with integrated speaker and microphone), an alerting device (ringer), a signalling device (rotary dial or keypad), and the switch hook (contained in the handset cradle in this instance). Other capabilities include automatic loop compensation, hybrid functions, and the ever present line powering.

The ringer is bridged across the loop to the CO when the handset is in the cradle; picking up the handset disconnects the ringer and connects the hybrid across the line. The hybrid divides the two-way conversation signals on the loop into two one-way paths: one from the CO to the receiver, the other from the transmitter to the CO. A small portion of the transmitted energy is fed back into the receiver; this function is called *side tone*, and allows the speaker to hear what they are saying.

Alerting devices include the traditional electromechanical ringer (mechanically and electrically tuned to the ringing frequency) or loudspeakers, which sound a ringing tone. Loop compensation is a circuit that automatically adjusts to the loop resistance; this replaces the older manual compensation, which had to be adjusted at installation.

Line powering means that the telephone set is powered by battery from the CO over the copper local loop. It is a feature that has existed since the telephone was invented.

Memorize the following words and word – groups:

- to adjust – настраивать
- to bridge – согласовать; перемкнуть; замыкать
- cradle – телефонный рычаг (контакты, активируемые телефонной трубкой)
- dial – номерной диск; дисковый номеронабиратель
- dual tone multifrequency – набирание номера с многочастотной сигнализацией
- embodiment – объединение, слияние, интеграция

- keypad – клавишный номеронабиратель
- line powering – питающая линия (провод)
- loop – двухпроводная линия
- to pick up – снять сигнал, выделять
- plain old telephone service – традиционная услуга телефонной связи
- ringer – звонок (телефонный)
- scenario – сценарий
- side tone – побочная тональность
- switch hook – телефонный рычаг

Exercises

Exercise 1. Answer the following questions.

1. What is the most common Customer Premises Equipment (CPE) found in any country? 2. How is a telephone instrument equipped? 3. What is the embodiment of plain old telephone service? 4. What is integrated in a handset? 5. In which way is the ringer bridged to the CO? 6. What divides the two-way conversation signals on the loop into two one-way paths? 7. What do alerting devices include? 8. How is the telephone set powered?

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

1. The required protective circuitry is often provided by readily available integrated circuit devices. 2. The testing, certification, and documentation requirements may be met through the use of commercial laboratories that specialize in such services. 3. A key telephone system may be connected directly to incoming calls. 4. In general, no modifications may be made, and all repairs must be performed by certified technicians using original equipment parts. 5. Decisions might not have to be changed to satisfy registration requirements. 6. Thus, it is seen that customer premises equipment may be classified by function as well as by type. 7. Voice is digitally encoded before it leaves the set. 8. Integrated circuit devices are placed inside the equipment and connected directly behind the network interface.

Exercise 3. Translate the following sentences into Russian paying attention to different functions of the infinitive.

1. There is nothing to be said for all those crackles and hisses, that one used to get during live radio broadcast. 2. Compaq has introduced its first handheld PCs to be aimed at the professional market. 3. Most customers do not want to be seen while speaking on the phone. 4. To be the first with the news, journalists are seeking ever faster means of communicating the news. 5. Users view the files available and select those to be duplicated. 6. Spot beams allow satellite power to be concentrated in areas of heaviest demand. 7. The older manual compensation had to be adjusted at installation. 8. There are many things to be done.

Text 2

Integrated Services Digital Network Modems and Interface Cards

The term ISDN modem is a misnomer. Because no modulation or demodulation takes place, an ISDN modem is not actually a modem at all. Sometimes called a digital modem, these devices are Terminal Adapters with a built in NT-1. Such modems also include a POTS telephone jack so an analog telephone may be used to place a call using one of the B channels. It is a bidirectional interface that takes asynchronous data from a computer or terminal through a standard serial interface and performs the appropriate conversion necessary to produce a properly formatted synchronous ISDN channel. It is called a modem because of the appearance and operational similarity it has with the familiar computer modem. Personal computers equipped with these cards are ISDN compatible and do not require an external Terminal Adapter.

It is important to note that although conventional modems are available for use at a variety of different speeds over analog lines of various quality, an BRI ISDN modem operates at 128 kb/s, which is the data rate for 2 ISDN B channels, or 64 kb/s if a voice call is being placed at the same time on the same ISDN line. The term ISDN modem has been applied to this device by the vendors in an effort to avoid confusion on the part of ISDN users who may not understand or care about the technology, but simply want a device that performs the same function as a modem, that of connecting their computer to another computer or to an information service. The use of an ISDN modem may show only marginal improvement over its high-speed analog counterpart due to the built-in limitation of the serial port in some personal computers. Many of these are limited to 38.8 or 57.6 kb/s.

Memorize the following words and word – groups*:*

- to avoid confusion – избежать беспорядка
- bidirectional – двунаправленный
- card – карточка, перфокарта
- compatible – совместимый
- counterpart – счётчик
- formatted – форматированный
- interface – интерфейс
- marginal – предельный
- misnomer – неправильное название
- properly – должным образом [ˈpropəli]
- serial port – серийный многоразрядный вход; серийный порт
- terminal adapter – адаптер терминала

* * * * *

ISDN [Integrated Services Digital Network] – цифровая система интегрированных услуг
NT-1 [Network Termination type 1] – конечная нагрузка сети типа 1 (обеспечивает функцию взаимосвязи открытых систем уровня 1)
BRI [Basic Rate Interface] – простой интерфейс (в сетях ISDN)
kb/s [Kilo Bit per second] – килобит в секунду

Exercises

Exercise 1. Ask problem questions to the text.

Exercise 2. Put the Infinitives in brackets in the Present Perfect Tense (Active):

1. The Company (to sign) a marketing agreement with Econocruise, a leading supplier of electronic vehicle. 2. The Company (to establish) a customer service center. 3. Project managers (to do) cost/benefit analyses for each participant, based on quantifiable figures. 4. They already (to influence) operator's decisions to invest in extra satcoms equipment. 5. All (to see) the possibilities of the new technology applied. 6. A Californian company (to launch) a program called Powersync, to synchronise selected files between portable and office computers. 7. Faced with numerous technical obstacles, many mobile operators (to appeal) to their governments for support. 8. As modems (to move) into the consumer market, sales volumes (to result) in more innovation and lower prices.

Exercise 3. Put the Infinitives in brackets in the Present Perfect Tense (Passive): 1. Cost benefit figures (to publish) now for all the participating companies. 2. The size of presentation files (to reduce) by 95 per cent so that you can now fit them on a diskette. 3. Plans (to submit) to European Commission by the Director. 4. A modulated analog signal (to transmit) over facilities designed for voice. 5. The incoming call (to answer) already by an automatic attendant on PBX.

Exercise 4. 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.

Exercise 5. Make the following sentences interrogative, translate them.

1. BRI may be used for providing Centrex service. 2. Additional resources, such as FAX servers or order entry systems, can be accessed as needed. 3. Similar to the telephone set itself, modems can be equipped with numerous features, such as the ability to dial outbound and answer inbound calls. 4. A modem con-

verts data (in binary form) into a modulated analog signal, which can be transmitted over facilities designed for voice. 5. Installation, configuration, or modification of this wiring must be carried out in accordance with Part 68. 6. Whereas a standard analog telephone is powered from the central office battery, an ISDN telephone (voice terminal) must be powered at the customer premise.

Text3
Facsimile

Facsimile (fax) machines are CPE that convert text or graphical information, originated on a sheet of paper or in a computer, into signals that can be interpreted at the receiving end by a sister machine, the result being the same or a very similar image or display.

Although fax systems resemble data communications, they are very different. The fax system transmits images, not characters; hence, there is no way for the fax system to operate on the content of the information transmitted. On the other hand, any image, no matter what the source, can be transmitted with equal efficiency.

The ITU-T divides facsimile standards into four groups:

Group1. Frequency modulated analog encoding, 6-minutes per page transmission time, 100-lines-per-inch (lpi) resolution. Group 1 fax is slow.

Group2. Amplitude modulated analog encoding, 2–3 minutes per page transmission time, 100-lpi resolution, 2100-Hz carrier frequency using amplitude, phase, or vestigial sideband modulation.

Group3. Compressed digital encoding using analog modems for transmission, 1 minute or less per page transmission time, 200-lpi resolution, 4800—9600 b/s data rate. Group 3 is the current standard product.

Group4. Compressed digital using ISDN or other digital transmission, less than 1 minute per page transmission speed, 200–400 lpi resolution, data rates up to 64 kb/s.

The major changes in the facsimile market come from its integration into computers and word processing systems, and its coupling with scanners. Fax modems accept input directly from the word processing software, by appearing to be a printer. This allows transmission of computer-generated documents without the necessity of an intermediate paper copy, providing faster output and better image quality. On the receiving side, direct fax input to the computer allows storage of the image in the memory, permitting scanning for conversion into character and graphic form, editing, retransmission, and other functions. The overall picture is one of increasing seamlessness between data and image communications.

Memorize the following words and word – groups:

- carrier frequency – несущая частота

- compressed digital encoding – уплотненное (сжатое) цифровое кодирование
- editing – редактирование; проверяющий
- facsimile – факсимиле; точная копия
- hence – следовательно; в результате
- lines-per-inch resolution – разрешающая способность строк на дюйм
- to originate – брать начало, происходить
- overall picture – полное изображение
- to resemble – походить, иметь сходство
- seamlessness – цельность
- vestigial sideband modulation – модуляция с частично приглушенной боковой полосой
- word processing – обработка текста

* * * * *

ITU [International Telecommunication Unit] – Международный союз электросвязи.

Exercises

Exercise 1. Answer the following questions.

1. What is the function of facsimile? 2. What is the difference between fax systems and data communications? 3. How many groups does the ITU-T divide facsimile standards into? 4. What allows transmission of computer-generated documents without the necessity of an intermediate paper copy? 5. Does direct fax input to the computer allow storage of the image in the memory?

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

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

Exercise 3. Make the following sentences interrogative, translate them.

1. Piezoelectric transducers and small loudspeakers are replacing electromechanical ringers in today's telephones. 2. More and more users are discover-

ing benefits of global mobile communication. 3. We are seeing a lot of interest from industries that require larger volumes of data transfer as well as high quality voice services. 4. The need for greater mobility is driving the development of smaller and lighter terminals. 5. With 46 satellites in orbit, Iridium is entering the final phase of creating the world's global satellite telephone service. 6. The company is investing in satcoms to allow it to offer a Just-In-Time delivery service. 7. These computers are being tested in conjunction with a radio data communications system. 8. The company is currently developing software to provide this option to users.

Exercise 4. Translate the sentences paying special attention to modal verbs and their equivalents.

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.

Text 4
Online address book

Another important features of the new-look website include the "Links Directory', which lists thousands of Internet URLs relating to European telecomms. Users can type in the name of the operator or organization required, or can search according to lists of entries for each European country. This should take much of the guesswork out of trying to find the presence on the web of a telco, mobile operator, regulator or other industry organization.

As part of its mission to provide a gateway to the telecomms world on the Internet, www.pnewire.com also now includes a full 'Diary' section for industry events, many of which are just a click away for further information and contact with the organizers. Event organizers are invited to send details for inclusion.

From a housekeeping perspective, the site's online registration facility is important for you as readers. It enables us to keep our circulation list up to date and removes the need to for readers to fill in forms on paper. Likewise, the 'Bookshop' simplifies the process of buying PNE reference books online via a secure payment option reliant on 'World Pay'.

Memorize the following words and word-groups:

- click – щелканье

- diary – записная книжка, календарь
- directory – каталог, справочник
- entry [‘entri] – внесение, вход, введение
- gateway – межсетевой интерфейс
- guesswork – работа вслепую, догадки
- inclusion [in’klu:$_{3}$эn] – включение
- new-look – радикальное изменение, перелом (в чем-л.)
- online – оперативный (диалоговый), непосредственная обработка; в реальном времени
- option – выбор ,опция
- to remove – устранить
- secure [si’kjuэ] – безопасный
- to simplify [‘simplifai] – упрощать
- telco (Telephone Company) – предприятие телефонной связи, телекоммуникационная компания
- web – сеть
- website – место нахождения в сети, “страничка”

* * * * *

PNE (Public Network Europe) – Европейская сеть общего пользования;

Exercises

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

Exercise 2. Translate the following sentences into Russian paying attention to the tense form.

1. The new website takes maximum advantage of the unique attributes of the Web. 2. It is Web’s facility to allow data to be stored. 3. Advertising information can be found in the “Contacts” section of the website. 4. Many markets in other continents have also become more and more open to advanced telecommunications solutions of this type. 5. Nokia will deliver core network infrastructure.

Exercise 3. Insert the prepositions.

1. Electronic mail is a way … sending messages and letters directly … your computer to another computer. 2. You can send a letter … your hundreds of friends all around the world … a few seconds. 3. The “Databank” contains digital subscriber statistics … more than 40 countries. 4. Subnetworks are arranged in three stages so that each call passes … three subnetworks. 5. The pan-Nordic cellular service lowers the cost of calls … borders in the Nordic region.

Keys: *from, across, for, of, to, through, in.*

Exercise 4. Read and discuss the problems of the present-day scientific research and technology.

Internet facts

The prototype for the Internet was created in the sixties by the US Defence Department. To ensure that communication could be kept open in the event of a nuclear attack, it created a computer network known as Arpanet – the Advanced Research Project Agency Network.

The first attempt to connect two computers and allow them to communicate with one another was made by researchers at the University of California.

The first people to coin the term “internet” were two scientists, Vinton Cerf (known as “father of the internet”) and his collaborator, Bob Kahn, who in 1974 devised a means by which data could be transmitted across a global network of computers.

An Oxford graduate, Tim Berners-Lee, set up the first “www server” (a server receives and sends messages) to store the archive of the European Particle Physics Laboratory in Switzerland.

Unit XI
Text 1
Ethernet Networks

The term ethernet describes a collection of hardware, software, and control algorithms that together provide a technique for interconnecting dozens of nodes, spread over hundreds of meters, at aggregate rates ranging from 1 to 100 Mb/s. These nodes are typically computer work stations or peripheral devices that are part of a community of users that frequently exchange files, messages, and other types of data among each other. Shielded coaxial cables and unshielded twisted pairs have been used for the physical interconnection.

The primary hardware element used in an ethernet network is the *network interface card* (NIC). These cards are attached to a computer bus at one end and to a *media attachment unit* (MAU) at the other end via an attachment unit interface (AUI) cable. A MAU is an active device that includes transceivers and other elements matched to the nature of the physical transmission medium. Some vendors consolidate two or more of these elements into a single package thereby rendering certain elements, such as AUI cables, unnecessary. *Repeaters* are sometimes used to regenerate signals, to ensure reliable communication. The NICs perform a number of control functions in software, chief amongst these is the execution of a random access protocol for exchanging packets of information.

Nodes attached to an ethernet network exchange packets of information by broadcasting on a common communication channel. Simultaneous transmission by two or more nodes results in a detectable collision that triggers a collision resolution protocol. This decentralized protocol induces a stochastic rescheduling of the retransmission instants of the colliding nodes. If the overall traffic on the network is below a certain threshold, eventual delivery of all new and previously collided messages is guaranteed. The value of the threshold establishes the maximum aggregate information transfer rate that can be sustained. This threshold is influenced by the span of the network, the length of the packets, latency in collision detection, and the dynamics of the external traffic, as well as the rate at which bits can be transported over the physical medium. The aggregate information transfer rate can never exceed the bit transfer rate on the physical medium.

Memorize the following words and word-groups:

- aggregate – совокупный, общий
- attachment – присоединение, соединение
- collision resolution protocol – протокол разрешения конфликтных ситуаций
- detectable collision – обнаруживаемая конфликтная ситуация
- interconnecting dozens – взаимосоединенное множество

- node – узел
- package – пакет
- stochastic rescheduling – вероятностное перепланирование очередности обслуживания
- shielded coaxial cable – экранированный коаксиальный кабель
- span – интервал, промежуток времени
- spread – расширение, протяженность
- to sustain – поддерживать, испытывать
- threshold – порог
- transceiver – (transmitter and receiver) – приемник-передатчик
- to trigger – приводить в действие
- unshielded twisted pair – неэкранированная скрученная пара проводов

Exercises

Exercise 1. Answer the following questions.

1. What does the term ethernet describe? 2. What are nodes? 3. Have shielded coaxial cables and unshielded twisted pairs been used for the physical interconnection? 4. In which way are cards attached to a computer? 5. What does a media attachment unit include? 6. How do some vendors consolidate two or more of these elements? 7. What are repeaters sometimes used for? 8. Where do the NICs perform a number of control functions? 9. How do nodes attached to an ethernet exchange packets of information? 10. What establishes the maximum aggregate information transfer rate? 11. What is this threshold influenced by?

Exercise 2. Put the Infinitives in brackets in the Past Indefinite Tense (Passive):

1. Such a transmitter (to replace) soon by the use of loosely packed carbon, invented in 1878 by Henry Humming. 2. The frequency-division multiplexing (to accomplish) in hierachial stages. 3. A market opportunity (to fill) soon by electronic key systems. 4. The 64 kbits/sec bandwidth (to design) never for sending live images but the quality of the compressed signals was impressive. 5. The pictures (to capture) by a digital video camera. 6. This processor (to design) to optimise the operating system and its associated applications. 7. Ground communication with new satellites (to establish) successfully by the network control center. 8. This part of the system (to design) to provide additional service in the areas of the highest traffic density. 9. Spaceway (to expect) to enter service in June.

Exercise 3. Read and translate the sentences paying special attention to the grammar.

1. This results in a frame of data either being repeated or deleted at output of the buffer. 2. The speed of light being extremely great, we cannot measure it

by ordinary means. 3. With satellite communications there are no security worries about the transmissions being intercepted. 4. The images were edited before being dispatched to news rooms throughout the country. 5. The interaction of high-speed, high capacity computers with their environment is often continuous, with many input and output devices operating simultaneously the ongoing internal computation. 6. There being no alternative, we have to take this implicit concept for granted. 7. The irreversible effects being well known, only brief discussion is required.

Exercise 4. Analyze the fallowing 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.

Text 2
Historical Development of Ethernet

Ethernet evolved from a random access protocol that was developed at the University of Hawaii in the 1970s for use in the packet-switched Aloha broadcast radio network. The Aloha network was meant to serve many users that generated infrequent and irregularly spaced bursts of data. Techniques, such as synchronous time-division multiplexing, that require nodes to access a common channel only during precoordinated, nonoverlapping intervals of time, are ill suited to serving many bursty users. This drawback motivated the development of the Aloha random access protocol, in which users access a common channel freely and invoke a collision resolution process only when collisions occur.

Spurred by the success of Aloha, efforts were undertaken to make the protocol more efficient. Early refinements included the use of a common clock to avoid partial collisions (slotted Aloha) as well as the development of hybrid protocols that combined elements of random access with reservations (reservation Aloha). Another series of refinements became possible in the context of limited span local area networks (LANs) that use low-noise communication links, such as coaxial cables, for the transmission medium. In such environments, a node can accurately and quickly sense ongoing transmissions on the cable. This first led to the development of carrier sense multiple access (CSMA) in which nodes withhold transmissions whenever they sense activity on the channel, thereby re-

ducing the occurrence of collisions and improving efficiency. The next refinement for the LAN environment was based on a node's ability to detect a collision in less time than is required for a complete packet transmission. Early collision detection allows the colliding users to abort the transmission of colliding packets, thereby reducing the duration of collisions and further improving efficiency.

The topology of an Ethernet network may differ from the Aloha packet radio network. The Aloha packet radio network was configured with a controller node at the center of the network. In contrast, in some types of ethernet networks, nodes attach to a common communication channel and directly monitor it for carrier sensing and collision detection, as well as to transmit and receive packets. There is thus no central controller in some ethernet networks.

Memorize the following words and word-groups:

- to abort – потерпеть неудачу
- aloha – Алога (метод распределения каналов в радиосвязи)
- burst of data – пакет данных
- bursty users – резко возросшее число пользователей
- collision detection – обнаружение коллизий (соприкосновений)
- collision resolution – разрешение конфликтных ситуаций; разрешение коллизий
- drawback – недостаток; препятствие, помеха
- infrequent – редкий; не часто случающийся (встречающийся).
- to invoke – обращаться; призывать
- multiple access – групповой доступ
- occurence of collisions – появление коллизий (соприкосновений).
- refinement –усовершенствование
- to sense –распознавать
- spurred – побуждаемый
- to withhold –задерживать, останавливать

* * * * *

CSMA (Carrier Sense Multiple Access) – групповой доступ с контролем сигнала-носителя.

Exercises

Exercise 1. Answer the following questions.

1. What did Ethernet evolve? 2. What was the main aim of the Aloha network? 3. When does synchronous time-division multiplexing require nodes to access a common channel? 4. What did early refinements include? 5. What con-

text did another series of refinements become possible in? 6. Did this lead to the development of carrier sense multiple access? 7. What ability was the next refinement for the LAN environment based on? 8. Is there any difference between the topology of an Ethernet network and the Aloha packet radio network?

Exercise 2. Give the Past Tense and Past Participle of each of these verbs, translate them:

to lead, to evolve, to go, to be, to transmit, to undertake, to use, to avoid, to mean, to suit, to withhold.

Exercise 3. Ask questions to which the following statements may serve as the answers. Translate the sentences.

1. The ethernet protocol uses carrier sense multiple access with collision detection. 2. There exists a separate logical link control sublayer. 3. There can be no more than 100 attachments to a segment. 4. The flexibility of the thinner cable makes it possible to dispense with the transceiver cable. 5. These networks operate at the lower rate of 1 Mb/s over unshielded twisted pair cables whose diameters range between 0.4 and 0.6 mm. 6. The 1 BASE 5 networks are physically configured in the shape of a star. 7. Each node is attached to a hub. 8. A hub is responsible for broadcasting all correctly received packets on all outgoing links. 9. The remaining segments can be either unshielded twisted pair, point-to-point links of length less than 100m each, or fiber optic point-to-point links of length less than 500m each. 10. The network span depends on the mix of repeater sets and segments used.

Exercise 4. Translate the sentences paying attention to functions of the verb «should».

1. The whole trial should be completed by the end of the year. 2. The 1452-1492 MHz frequency band should be adopted in most countries. 3. This should provide a good indication of the likely communication requirements, including frequency of messages, data required, size of messages. 4. Users should input actual values based upon their own experiences and figures from their service providers. 5. The results should be both accurate and of considerable use for the operator in making decisions about investing. 6. These developments should be available within the next two years.

Exercise 5. Translate the sentences, define different functions of Participle II.

1. Business applications are expected to be supported by multiservice terminals connected directly to the ATM switch. 2. Today's enhanced Multi Sync displays are designed for graphics-intensive windowing environments. 3. The ATM switch has been enhanced to allow path setting to be controlled by received signalling cells. 4. This experimental network is not intended to be extended into commercial operation. 5. The only workable solution was to accept that the completed specification would not necessarily reflect all current ideas. 6. Much of the specification development has been in the area of control. 7. The test validation has been limited to showing that the interface works within the

range of conditions it is designed for. 8. Pure ATM electrical interfaces will be supported as well as pure optical ATM interfaces. 9. By using standards based algorithms, the codec compresses the high bandwidth video signal so that it may be transported over relatively narrow bandwidth transmission media.

* * * * *

ATM (Asynchronous Transfer Mode) – асинхронный режим передачи

Text 3
Operation of ethernet

The core algorithm used in all the series of MAC standards and the original ethernet is essentially the same. The role of the pad field is related to collision detection. Prior to transmitting frames the MAC layer senses the physical channel. If transmission activity is detected, the node continues to monitor until a break is detected, at which time the node transmits its frame. In spite of the prior channel sensing performed, it is possible that the frame will collide with one or more other frames. Such collisions may occur either because two or more nodes concurrently initiate transmissions following the end of the previous transmission or because propagation delays prevent a node from sensing the transmission initiated by another node at an earlier instant.

Colliding users detect collisions through physical mechanisms that depend on the nature of attachment to the underlying communication medium.

All collision-sensing methods rely on a node's knowledge of its own transmission activity. Since this information is not available to all of the other nodes, the disposition of some partially received MAC frames may be in doubt. Therefore, to enforce a common view of the channel outcome, colliding users transmit a jam pattern as soon as they sense a collision.

Thus, the full duration of a collision is the sum of the maximum collision detect time and the jam pattern. The first of these two components, the time to detect a collision, is primarily determined by the time it takes for signals to propagate between any two nodes on the cable. The second component, the jam pattern length, is also constrained by standards. Thus, the longest period of collision activity, which can be thought of as an invalid frame, is limited. The pad field of the MAC frame can then be used to ensure that valid frames are larger than the longest invalid frame that may occur as a result of collisions. This provides a simple mechanism by which nodes that were not involved in a collision can also sense the collision.

In order to resolve collisions, ethernet nodes retransmit after a randomly chosen delay. Furthermore, the probability distribution of the retransmission delay of a given packet is updated each time the packet experiences a collision. The choice of the initial probability distribution of the retransmission delay and the dynamics of its updates determines whether or not the total population of

new and retransmitted users can transmit successfully. Thus the retransmission algorithm lies at the heart of the ethernet protocol.

As a consequence of the collision resolution process, the order in which ethernet serves packets depends on the traffic intensity. During periods of very light traffic, service is first come first serve. During periods of heavy contention, some colliding users will defer their transmissions into the future even as some latter arrivals transmit sooner. Because of this, packet delivery in ethernet may occur out of sequence and has to be rectified at the receiver.

Memorize the following words and word-groups:

- arrival – получение
- attachment – присоединение; связь
- to be in doubt – сомневаться
- to collide with – сталкиваться с; вступить в противоречие (конфликт) с
- concurrently – согласованно
- to constrain – сдерживать
- contention – соперничество; попытка одновременного использования канала связи
- core – сердцевина (оптоволоконного кабеля)
- to defer – откладывать, отсрочить
- delay – задержка
- to enforce – принуждать, заставлять
- frame – фрейм; кадр; рамка; страница
- to initiate – начинать; инициировать
- in spite of – несмотря на
- instant – момент
- invalid – недействительный, непригодный
- jam – загромождение; помеха при приёме и передаче
- to monitor – наблюдать, контролировать
- outcome – результат, последствие
- pad field – область нерегулируемого ослабителя
- partially – частично
- pattern – комбинация
- to prevent – предотвращать
- prior to – до, перед, прежде
- propagation – расширение; распространение
- randomly – случайно, произвольно
- to rectify – исправлять; выпрямлять
- to rely on – полагаться на; доверять
- to resolve – удовлетворить

- to sense – распознавать
- underlying – основной, лежащий в основе
- to update – совершенствовать; обновлять

* * * * *

MAC (Media access control) – управление информационным доступом.

Exercises

Exercise 1. Answer the following questions:

1. What is the role of the pad field related to? 2. What continues to monitor, if transmission activity is detected? 3. Why may collisions occur? 4. What helps colliding users to detect collisions? 5. When may the disposition of some partially received MAC frames be in doubt? 6. What does the full duration of a collision include? 7. Is the longest period of collision activity limited? 8. What lies at the heart of the ethernet protocol? 9. What depends on the traffic intensity? 10. Why may packet delivery in ethernet occur out of sequence?

Exercise 2. Make up questions beginning with the word(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 the sentences into Russian 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 4. Put the Infinitives in brackets in the Present Indefinite Tense, translate the sentences:

1. Enhanced features (to include) extra on-chip memory capacity. 2. All user data in the BUNI Demonstrator (to use) connection-oriented data with an end-to-end timing relation. 3. A metasignalling function (to be needed) to establish, monitor and release this association. 4. The protocol (to support) seven packet types. 5. Request Device Characteristics (to include) basic information such as input, output, options and summary characteristics. 6. ATM (to provide) a viable method for transporting data, voice and video traffic on a common network. 7. The severity of impact on network traffic due to disruptions in the synchronization distribution system or accumulation of phase noise (to depend) on many factors. 8. Today's optical fiber (to utilize) ultrapure silica. 9. Today's fiber strands each (to carry) a few gigabits per second. 10. Echo elimination (to be accomplished) by an echo canceller, which (to use) an adaptive filter to create a synthetic echo.

Unit XII
Text 1
Videoconferencing

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.

As well as showing the conference participants, cameras also register the background which should neither distract the distant viewer nor interfere with the quality of the video signal.

Good lighting is obviously a vital element in video quality.

Memorize the following words and word-groups:

- to become magnified to the point – становится преувеличенным до такой степени
- continuity [kəntinju:ti] – непрерывность; последовательность
- cross-fire – перекрёстный огонь
- 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 – неустрашающий
- participant [pa:'tisipənt] – 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

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. Translate the following sentences and define the tense-form.

1. The document transmission camera must be ceiling mounted directly above the document field. 2. If the graphics monitor is located in the video wall, the viewing distance is too great to for participants to appreciate the fine detail that the system can transmit. 3. In both public and private networks, technology and economics are leading to a structure where a high-capacity high-flexibility core network integrates and supports all services. 4. Public network vendors have to consider whether they should be in the core-network market, or whether

they should look to other areas. 5. A further development will be to show the interconnection of broadband LANs via B-ISDN. 6. Layer-3 signalling sets up, modifies and releases calls. 7. Printer feedback and parallel performance capacity have not progressed while other components of network computing have improved significantly. 8. At this time the 'quasipaperless office' is becoming the norm with the use of fax and E-mail to communicate. 9. Interoperable ATM implementations will require the development of standards on switch-to-switch interfaces, signalling and common protocol suites. 10. As time goes by we will be collaborating with other vendors.

Exercise 3. Make the following sentences interrogative paying special attention to modals and their equivalents. Translate the sentences.

1. Additional services, such as file transfer, might be invoked during the call. 2. It has to be shown that the specifications are independent of particular technologies or manufacturing techniques. 3. Eventually, the network also will be able to provide three separate video-on-demand programmes simultaneously. 4. Service providers may offer services at five rates. 5. It's highly probable that service providers will be able to operate for many years in a completely deregulated market. 6. A radio system with much lower build and running costs will be able to replace copper cable in the 'local loop'. 7. Based on this analysis we can offer application-specific hardware and software. 8. A similar trend can be seen in advanced voice and personal communications services.

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

An end-office telephone exchange …… two principal functions. For local calls it …… subscribers together over local access lines. For calls outside its own serving area, it …… connections to interexchange lines …… trunks. To do this the switch …… line and trunk 'appearances' whenever a subscriber …… the receiver to dial a number, or when an …… call arrives from the network.

Keys: provides, performs, incoming, lifts, called, connects, makes.

Text 2
Audio environment in videoconferencing

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 always be sited in solid walled rooms and 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.

Memorize the following words and word – groups:

- circumstances – обстоятельства
- clipping – пропускание; проглатывание; ограничение
- commensurate – соответственный, соразмерный
- concomitant – сопутствующий
- dramatically – ясно, наглядно
- echo cancelling system – система гашения эхо-сигнала
- echo compensator – компенсатор эхо-сигнала
- 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

Exercises

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

Exercise 2. Translate the following sentences into Russian, define different functions of the Participle II.

1. ANT has developed a concept based on the worldwide SDH standard (Synchronous Digital Hierarcy). 2. All known terminals and services can be operated by ANeT (Advanced Network for efficient Telecommunication). 3. The present variety of different networks is being superseded by a new integrated network architecture. 4. The physical or virtual collocation of telephone equipment owned or leased by a third party in a modern digital switching office is relatively straightforward. 5. A digital central office can be divided into three sections containing peripheral equipment (facility interface units), network equipment (switching matrix), and central control equipment (message processing computer). 6. The result will be limited competition in the local telephone service. 7. Features offered by this company include selective call-barring, a 10-number memory, last number redial, call transfer. 8. When arrived at their destination files can be returned to their original form simply by passing them back through a codec.

Exercise 3. Put the Infinitives in brackets in the Future Indefinite Tense.

1. The unit (to send or to receive) only encrypted messages, it (not to process) messages which have not been encoded. 2. The information (to be transmitted) then by radio to a central computer. 3. The loop (to be supplemented) by the planned increase in exchange capacity over the next decade. 4. A technical trial of the new broadband network (to begin) late this year. 5. With the NPA protocol implementation in both printers and host system the future (to be opened) to advanced print management systems and application development. 6. The three electricity companies (to exploit) their extensive electricity transmission networks for telecoms by combining an optical fiber optic with earth wire. 7. The new network (to incorporate) sophisticated monitoring and diagnostic equipment.

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

Tandem offices …… subscribers directly but connect different central offices together. Within a particular local access and transport area (LATA) are several tandem offices that …… to both local exchange carrier (LEC) and interexchange carrier (IXC) trunks. An office that …… access to a particular IXC network …… the point of presence (POP) of that carrier. Both kinds of connections …… now subject to collocation.

Keys: are, provides, do not access, contains, are connected.

Exercise 5. Speak about the advantages of videoconferencing using the collected material from text 1 and text 2

Unit XIII
Texts for reading and comprehension
Servers
Television Broadcast Transmissions and High-End Post

By Dick Hobbs

Meeting all media requirements

Fifteen years ago I was involved in the fist practical networked stills and graphic store. My then boss asked me what I thought we ought to do next, and I said that the obvious move was to record video clips to disk. He spent all of 45 records thinking about the technical challenges, then ignored my advice.

To be far, it was around that time that the first video disk recorders emerged. But it was still a while before the first examples of what we now think of as the video servers were seen.

Philips had a false start with a device designed to be at the heart of an automated transmission system, but the first working server was the Profile, which has existed under a number of banners but is now Thomson Grass Valley.

The original Profile was a bit like the talking dog: not so remarkable for what it did, but that it did it at all. Back then, just reading and writing video to disk was a miracle in itself, and the idea that manufacturers would one day provide multiple simultaneous streams at different resolutions and file formats was the stuff of dreams.

Now it is impossible to imagine any broadcast operation without a server- or its big brother, the storage area network- at its heart. Literally the heart: the server has become the repository of all current material, and all processes flow through it.

Servers now come in a staggering range of shapes and sizes, to meet every purpose. Capacities run from a few hours to thousands of hours. Special purpose applications may have a couple of ports; multichannel broadcasters may need literally hundreds of points of access.

Video in, video out is no longer acceptable. It may seem an obvious point, but servers are there to serve the rest of the broadcast infrastructure, which means fitting in to the channel architecture. In part, this means adopting the video formats in use, which might be a DV variant, or MPEG-2, or some multiple combination of these.

It also means providing communication across the network. Shared storage must be maintained at very much faster than real time if it is not to become a bottleneck. If the server network you choose has to move material from where it is to where it is wanted, then you really want it there more or less instantly.

(Hardware, Broadcast International,
Number 97, August 2002.)

Ex. 1 Translate and remember the following phrases:

to meet the requirements, to be involved in, my then boss, we ought to do next, to think about, to ignore the advice, to be far, it was around that time, but it was still a while, to have a false start, was a bit like, back then, to meet every purpose.

Ex. 2 Try to retell the text as close to the original as possible.

Serving the Broadcaster by David Cox

Not just with shared storage, servers and in-server editing

Television broadcasting brings together a wide range of talents, applications and technology. Technology has in many cases simplified tasks. The advent of digital technology and video servers provide the opportunity to make a paradigm shift in workflow design providing efficiencies with associated cost savings. The key is shared storage. A common repository for all media allowing simultaneous access by multiple users without the need to move tape or make copies. The storage environment can be complex with a mix of online, near-online and offline storage; high performance servers with tape or DVD archives all backed up by “on the shelf” libraries. To the user however the complexity is invisible. The user can focus on the “what” and not the “where” or “how”, making maximum use of their talents and creativity. Leitch introduced shared storage in the very early days of video servers. Technology limited performance of the first systems. Now with larger and faster drives appearing every year and network technologies constantly evolving performance is not an issue. Leitch systems include 181 GB drives and 2 GB/s fibre channel networks; scaleability is not an issue! Extremely large systems can be built or multiple small systems can be integrated to appear as one virtual storage system.

To design and implement a server system Leitch has developed a number of building blocks.

Broadcasting is a mission critical application and this is reflected in the attention paid to providing failsafe operation. Leitch systems have all the expected hardware redundancy such as dual power supplies, dual fans and dual network adapters. In addition they have powerful software redundancy providing protection against multiple drive failures and the loss of file allocation tables.

The hardware enables the development of applications that improve workflow. These include ingest, content creation, content management, archiving, browsing and transmission. Efficiency is improved through quick access to media, the ability to start projects while recording is taking place and by multiple users being able to access the same material simultaneously.

Servers are ideal devices for time delay and a time delay application is standard.

(Hardware, Broadcast International,
Number 97, August 2002.)

Ex. 1 Read the above text. Translate it in a written form.

THE ETHERNET SYSTEM

Ethernet is a LAN technology that transmits information between computers at 10 million bits per second (10 Mbps). New Ethernet standards are currently under development that will provide for data rates of 100 Mbps.

There are several LAN technologies in use today, but Ethernet is by far the most popular technology for department networks. The vast majority of computer vendors provide equipment with Ethernet attachments, making it possible to link all manners of computers with an Ethernet LAN.

Ethernet can be linked together to form extended networks using devices called bridges and routers. Bridges can be used to link multiple Ethernets within a department to support more computers. Routers are used on UT net to provide a campus-wide backbone network that spans multiple buildings. While individual Ethernet in a campus LAN system may only support dozens of computers, the total system of UT net Ethernets linked with bridges or routers supports thousands of machines.

Operation of Ethernet

Each Ethernet-equipped computer, also known as a station, operates independently of all other stations on the network, and there is no central controller. All attached stations are connected to a shared media system. Signals are broadcast over the medium to every attached station. In order to send an Ethernet packet a station first listens to the medium, and when the medium is idle the station transmits its data.

If two stations happen to transmit at the same instant their signals collide, the stations are notified of the collision, and they reschedule their transmission. To avoid another collision, the stations involved each choose a random time interval to schedule the retransmission of the collided frame.

Elements of the Ethernet System

The Ethernet System consists of three basic elements: 1) the physical media used to carry Ethernet signals between computers; 2) a set of media access control rules embedded in each Ethernet interface that allow multiple computers to access the shared Ethernet channel; and 3) an Ethernet packet, or frame, that consists of a standardized set of fields used to carry data over the system.

Computers attached to an Ethernet send application data to one another using high–level protocol packets, which are carried in the data field of Ethernet frames. A given Ethernet system can carry several different kinds of high–level protocol data. The Ethernet is simply a trucking system that carries packages of data between computers; it doesn’t care what is inside the packages.

Each computer on the LAN is equipped with an Ethernet interface which is connected to the media system. For the Ethernet media access control system to work properly, all computers must be able to respond to one another's signals within a specified amount of time. To ensure that every computer can hear the network signals within the specified time the maximum round travel time of signals on the shared Ethernet channel must be limited.

The longer a segment, the more time it takes for a signal to propagate over it. To ensure that the round trip propagation timing limits are met, each media variety has maximum segment lengths defined in the standard.

Therefore, the correct operation of an Ethernet depends upon a media system that is built according to the rules for each media type. More complex systems with multiple segment types must be built according to the multi-segment configuration guidelines provided by the IEEE for combining segments. (IEEE Std.802.3j-1993)

Ex. 1 Read and translate the text above.

Ex. 2 Choose 15-20 words unknown to you and try to memorize them.

Ex. 3 Retell the text.

Ex. 4 After taken a quick look at how Ethernet works, we need to learn some jargon.

IEEE Acronyms:
MAC – Medium Access Control Ethernet Interface
AUI – Attachment Unit Interface
MAU – Medium Attachment Unit
MDI – Medium Dependent Unit
PM – Physical Medium
CSMA – Carrier Sense Multiple Access
CD – Collision Detection
LAN – Local Area Network
DTE – Data Terminal Equipment

THE RISE OF INTERNET TELEPHONY

Internet Telephony gives service providers the
platform they need to offer PSTN-equivalent voice
quality and service richness while realizing the broad
benefits promised by voice/data convergence.

We use the term Internet Telephony to mean the mature, full-service phase of telephony delivered over IP-based (Internet Protocol-based) or IP-enabled networks. Although some commentators use the term "IP-Telephony", we prefer "Internet" to "IP", since it is more meaningful to a greater number of people, including the general public.

Internet Telephony includes the voice capability covered by the term Voice over IP (VoIP), but also implies a host of familiar and new services, delivered on unified networks designed to carry voice, data, video and multimedia.

Internet Telephony is the fastest developing market since the Internet, tracking the Internet's evolution from hobbyist to mainstream markets.

Unlike previous packet-based technologies for carrying voice over multiservice networks, Internet Telephony now has an exceptional momentum that crosses the boundaries of public and private networks, enterprise and residential markets, voice and data technologies, and local and long distance services. With large scale voice and data convergence promised for several years, Internet Telephony is now providing the final push for its full realization.

With a new investment in Internet Telephony, changes will be wide and deep. A profound reshaping of today's telecommunications infrastructure includes:

- service quality equal to dialtone for voice, data and video
- new multimedia business models, applications and services
- new broadband services incorporating voice, data and video
- a new slate of intelligent services, adding sophisticated capabilities to voice applications
- multiple services on a single customer link, with unlimited opportunities for boundling, upselling, outsourcing, and cross-marketing.
- rapid, easy, flexible, and open service development and deployment
- lower infrastructure costs.

These benefits and the vast potential of Internet Telephony give new and existing service providers the opportunity to create or reinvent themselves as part of a revolution in advanced communications infrastructure.

Internet Telephony Requirements

The requirements of a network fall into two broad categories-network and end-user requirements.

To offer true, PSTN-equivalent Internet Telephony, providers must deliver network capabilities on three layers-hardware, enabling software, and application software.

To make significant inroads into the telephony market, Internet Telephony must provide services that look and feel exactly like services on the PSTN. This PSTN-equivalent user experience is called service transparency.

First, services must be as easy to use as those on the PSTN using a traditional telephone.

Second, services must deliver equivalent voice quality and service availability.

Third, users must be able to reach all callers on existing telephony networks.

And fourth, transparency means matching the existing services of PSTN networks.

The advantages of Internet Telephony fall into four major categories-enhanced service revenues, faster time to market, more flexible services, and improved cost control.

As the Internet Telephony landscape begin to crystallize, industry experts are reaching consensus on key success factors. These points can be summarized in these seven tenets:

1. It’s about services.
2. No one owns the network.
3. Users demand equivalence.
4. Nothing is trivial.
5. The back office is critical.
6. IPQoS is a pre-requisite.
7. Those who dare, win.

As with the Internet, the first providers into the Internet Telephony market will gain a huge advantage.

(Nortel Networks, USA, 2002)

*PSTN-Public Switched Telephone Network

Ex. 1 Read the text above, be ready to translate it.

Ex. 2 Speak about Internet Telephony.

Contents

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