ДЕРЖАВНИЙ КОМІТЕТ ЗВ'ЯЗКУ ТА ІНФОРМАТИЗАЦІЇ УКРАЇНИ
УКРАЇНСЬКА ДЕРЖАВНА АКАДЕМІЯ ЗВ'ЯЗКУ ім. О.С. ПОПОВА

КАФЕДРА ІНОЗЕМНИХ МОВ

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ENGLISH FOR HOLDERS OF MASTER'S DEGREE

Затверджено:
Методичною радою
академії зв'язку.
Протокол № 4
Від 14.12.1999 р.

Одеса 2000

УДК 802.0.(075)

Чугунова Н.В., Кудряшова В.О.
English for holders of master's degree:

Нав. посібник. – Одеса: УДАЗ ім. О.С. Попова

Відповідальний редактор – к.п.н. Л.В. Тарасенко

Навчальний посібник призначено для студентів-магістрів вузів зв'язку. Оригінальний текстовий матеріал сприятиме підвищенню термінологічної компетенції студентів

Схвалено
на засіданні кафедри
іноземної мови.
Протокол № 4
від 30.11.1999 р.

INTRODUCTION

This book is a course in communication skills in English for the holders of master's degree.

The course aims to improve students' English so that they can use English effectively and confidently in their work. The book contains three parts theoretical, practical and conversational formulas.

In preparing this book we used some materials from the following editions: IEEE Communications Magazine, NTEL Computer Security Basics by Neale Brian, Business Weak, European Edition 1999-2000.

PART 1

If you want to read scientific texts of any kind, you will learn how to do it. The authors of this book try to help you. For this purpose the book contains: a piece of theory concerning scientific texts analyses; some practice composing original scientific texts on communications and a number of tasks to them.

Let's start with theoretical material.

For better understanding different kinds of scientific texts (magazine articles, monographs, patents, technical characteristics and others) it is necessary to know about functional accent of any text having following arrangement, i.e. presence of question/answer complexes; and different other constructions; such as: **it is important to point out the fact, that…**

Let us examine the following example.

Some semantic groups with the particles: **only, even, yet**; some parenthesis and parenthetic constructions;

And some grammar categories (**degrees of comparison of adjectives, passive voice,** etc.), and some stylistic devices (**repeats, parallelisms**, etc.);

And lexical constructions of the following type - **it is evidently, that**…; **it is clear that**, …**it is possible that**…, etc.

The knowledge of the above means helps to seize (master) the rules of text composition; to solve some problems concerning choice of the material to be studied.

One of the main obstacles in understanding and translation of any scientific text is the *abundance of terms* (general and specific), *abbreviations, words of Latin origin, neologisms, specific measuring units and some extra linguistic information*. Even in a case of good knowledge; sometimes it makes students hesitate (be uncertain).

Here are some *words of Latin origin*, which are rather frequently used in scientific texts:

in vivo	–	в природних умовах
et al	–	і колеги, …і інші
in situ	–	на місці
viz/videlicet	–	тобто, а саме
via	–	шляхом (через), транзит
a priori	–	апріорі, не основані на попередньому вивченні
id est(i.e.)	–	тобто

Some special *words of Latin and Greek origin* which preserved the original plural forms(they are too frequently used):

datum, data(pl)	–	дане, дані
nucleus, nuclai(pl)	–	ядро, ядра
medium, media(pl)	–	середовище, середовища
phenomenon, phenomena(pl)	–	появлення, з'явлення
spectrum, spectra(pl)	–	спектр, спектри

Another important thing to know is a *list of abbreviations* of *multiword names of devices, blocks, schemes, units, and etc.*

None of dictionaries is able to forecast the decoding of all types of abbreviations. That is why the context of the very article is the best help in it. But there are several abbreviations, which are very frequently used, and which have the abbreviated form of translation, such as:

C.P.U - ЦПУ	**TDM - ВРК**	**CMOS - К -МОП**
M.P.U - МП	**FDM - ЧРК**	**NMOS - N -МОП**
R.A.M - ОЗУ	**ROM - ПЗУ**	**MOS - МОП**
I/O - УВВ	**CRT - ЭЛТ**	**AM – AM**

or *abbreviations* of the kinds: **a.c., d.c., e.g., i.e., hi-fi, and etc.**

Some compound *words-terms* are attracted our attention as well. The majority of them are motivated read the following paying attention to the meaning:

earphone, headphone, headset, head-record, hand-up, steel-band, hand-feed, head-per-track, airburst, airspace, steel-plate.

As to composed terms, they are also difficult for understanding. But there is the way out. For better understanding try to remember the following most productive models of a large number of *composed terms*:

1) **Micro + N** microcomputer
   Micro + N1+N2 microprogrammability
   Micro + N+Ved microcomputer-based
   Micro + Adj microelectronic

2) **N1 + N2** waveform
3) **Multi + N** multistage
4) **N1 + N2 + N3= N** teletypewriter
5) **N + Ved** postoffice-designed
6) **Address + N** address-bit
   Adj + address row-address
   N + address column-address

Some more types of composed terms:

pixel picture element
on-or-off relay
open-wire lines
userprogrammable memory
mid-range application
top-end advanced processor
reel-to-reel tapes
bit-slice processor.

Thus the knowledge of key lexics is the main problem of special text understanding, but the text quality shouldn't be put aside. The good quality of any text is exactness, briefness, and simplicity of thought expression, and correct selection of terminology.

The analyses of any utterance - text fixed in a written form enables us to define the means of composing of different utterance periods into the whole text. Sentences, being the such periods, as a liner structure, are characterised by the definite semantic and communicative relationship.

English sentences arrangement, forming the whole text, doesn't always agree with the normative grammar rules. This is the characteristic

feature of different register type text. The essence of this exception is the intrusion of words and syntactic constructions into a sentence or a text, so breaking its liner structure. A sentence itself, containing such intrusions (paranthesis), can be understandible only within the context of the whole text.

From the point of view of paranthetical arrangement, they can be classified as:

1)<u>one word parathesis like:</u>

again, anyway, doubtless, first, further, furthermore, hence, however, indeed, moreover, next, now, otherwise,
perhaps, probably, say, second, since, so, sometimes, somewhat, still, too, then, thereby, therefore, though, thus, whenever.

2)<u>words with prepositions like:</u>

after all, at any rate, at best, at least, for example, for instance, in any case, in general, on the contrary, in a way, in passing, of course, at any time, without, throughout, towards, after, along, for, from, since, to, of, on, at, by.

<u>The most frequently used are</u> -LY <u>ending paranthesis:</u>

quite independently, evidently, reasonably enough, surely, generally speaking, truely, clearly enough, reasonably.

3)<u>sentence-paranthesis like:</u>

he suggested, it is true, one may say, one may think, one would suppose, some would say, let us see.

<u>They are of three types:</u>

-references to the event, fact, source, etc.
as we have seen, then
as far back as 1998
as it was given
as it was mentioned above, etc.

-examplifications for explanation, definitions, etc.

for example,
for instance,
say,
suppose we take, etc.

-deliberations, expressed doubt, thoughts, estimations, etc.

it seems,
in a sence,
at any rate,
at least,
at best,
no doubt,
no wonder, etc.

For all scientific texts the main idea is the information about reality, its explanation and estimation with the help of different theories, facts description, laws formulation.

As for written text, it is a work linguisticaly and stylisticaly formed by the author, who used different syntactical constructions and syntactical grammar means without thinking about these or those grammar rules.

That is why only the text analysis helps us to discover all sorts of linguistic expressiveness of the text. And it is first of all necessary for finding the unit of disparity between English and Russian or Ukrainian languages.

The most meaningfull unit of such disparity is *Complex Subject*, which is a part of a simple sentence where the predicate being expressed by the verbs of physical and mental perception, denoting the source of information - **to find, to take**(all in the Passive Voice) and verbs with modal meaning **seem, appear, prove, turn out, happen, to be(un) likely, sure, certain.**

The following transformations are necessary for the adequate translation of the sentences with *Complex Object*:

1) <u>The scientist is known to have delivered</u> an interesting lecture on this subject ⟶ <u>It is known that the scientist has delivered</u>
an interesting lecture on this subject.

N + Vpassive + Inf. ⟶ It + Vpassive + that + N + V(inf).

2) The scienyist seems to have made an important discovery ⟶
It seems that this scientist has made an important discovery.

N + seem + Inf. ⟶ It seem s/ed + that + N + V(inf).

3) This scientist is likely to make an important discovery ⟶
It is likely that this scientist will make an important discovery.

N + be + likely + Inf. ⟶ It + be + likely + that + N + V(inf).

Unlike other parts of a sentence the attributive group can be widespread and can contain a number of attributes on both sides of the defined word. Left and right side attributes can be expressed by different parts of speech. Moreover, some type of English attributes coincide with Russian ones, while the others are units of disparity. Here are the different types of attribute expression:

Those who hold this position usually believe that it is simply a matter of developing and extending present-day principles of chess programming aided by the continued rapid growth of hardware speeds and storage capacities of computers.

In English they use one noun or a number of nouns in the function of attribute to one defined nouns **N1 + N2 + N3 + N4 +…+Nn.**

In Russian(Ukrainian) language such noun attributive chains are absent.

Attributive chains can be expressed by:

1. **two - word combinations** like diatribution of velocity and velocity distribution;
2. **three - word combinations** like high school laboratory;
3. **hyphenate nouns**, containing attributive chains like X - ray diffraction crystal-structure study;
4. **combinations** like the quantity measured (the quantity which is measured).

PART II

This part contains the samples of different articles

Network Architectures for the 21st Century

The future belongs to the service providers who invest in new network architectures. Continuous innovation is easier, but the new architectures call for significantly different ways of running the telephone and cable businesses.

The president of Bell Laboratories stated the goal of network architectures. It is "to have access to voice, data and images, in any combination, anywhere, at any time – and with convenience and economy."

The NA (network architecture) forms the main infrastructure to meet the enterprise networking needs of the next century. Today's telephone networks treat switching, transmission, and operations systems as distinct disciplines. Distinctions between switching & transmission equipment disappear as network elements become software-based. Incorporating network management functions in the network elements can make operating a network requires a new nodal architecture. A shared access infrastructure featuring a connection control layer connects network services and management to the modules which provide intelligent network capability, such as call setup, routers and transport.

Connection control provides the pathways for a combination of these modules to work together to perform traditional network functions.

The modules can be at different sites or side by side. All modules have equal access to network management functions. The modules may be accessed by different line speeds, technologies, or media. There is the advantage of engineering bandwidth allocation and service selection close to the customer or deep within the network. This forces architectural decisions which incorporate network management as a primary consideration, in contrast to today's NAs where sharp distinctions are made between the network elements and the feature needs.

Successful network operators will change their thinking from switching, transmission, and operations systems to routing, transport, and network management.

Dynamic Services

Specialized asynchronous transfer mode (ATM) switches in wire centers will aid the unbundling of access networks.

The concepts of "routing to intelligence" and "number portability" will preserve telephone numbers while allowing customers access to new services. ATM switches placed in each wire center to route customers' calls to the network servers they need and to route incoming calls to them based on tables in the ATM switch itself. This approach does not limit engineers to wire center intelligent network services.

It permits an orderly transition to the new architecture with a mixed network of old and new. The telephone number plan remains intact while the router in the ATM switch gets the customer to the right connection. ATM voice is essential if carriers are to make ATM pervasive and cheap enough to support home multimedia technologies.

The synchronous digital hierarchy (SDH) / synchronous optical network (SONET) overhead channels, which today occupy their own channels, could be converted to ATM cells and mixed with all other ATM cells.

These special permanent virtual circuit are the control paths of the future. The term "turbo-trunk routing" was coined to describe this marriage of modern transport with modern routing. The following technical issues must be resolved before using the new NA: signalling, number plan compatibility, emergency services, life-line services, directory services (video, audio, data), interoffice trunking, standard ATM cell sizes (IEEE Communications, Magazine).

Points for discussion

1. Evolution of network management for a full-service network.
2. Typical client/server architecture.
3. Dynamic services.

TMN Framework

TMN (Telecommunication Management Network) provides a framework for networks that is flexible, scalable, reliable, inexpensive to run, and easy to enhance. TMN provides for more capable and efficient networks by defining standard ways of doing network management tasks and communicating across networks. TMN allows processing to be distributed to appropriate levels for scalability, optimum performance, and communication efficiency.

TMN principles are incorporated into a telecommunications network to send and receive information and to manage its resources. A telecommunications network is comprised of switching systems, circuits, terminals, etc. It TMN terminology, these resources are referred to as network elements (NE). TMN enables communication between operations support systems (OSS) and NEs.

TMN is defined in the International Telecommunications Union (ITU) – TM.3000 recommendation series.

TMN uses object-oriented principles and standard interfaces to define communication between management entitles in a network.

TMN architecture & interfaces build on existing open systems interconnection (OSI) standards.

TMN describes telecom network management from several viewpoints: a logical or business model, a functional model, and a set of standard interfaces. Each of these is critically important and interdependent. The TMN enables telecommunication service providers to achieve interconnectivity and communication across operating systems & telecommunications networks.

(Schmid Telecom AG, Swiss PTT).

Glossary

OS (Operation System or Support System)	Perform operations system functions, including operations monitoring & controlling telecommunications management functions. The OS can also provide some of mediation, q-adaption, and workstation functions.
MD (Meditation Device)	Perform meditation between local TMN interfaces and the OS information model. This function may be needed to ensure that the functionality are presented in the exact way that the OS expects.
QA (Q Adapter)	The QA enables the TMN to manage NEs that have non-TMN interfaces. The QA translated between TMN and non-TMN interfaces.
NE (Network Element)	In the scope of TMN, a NE contains manageable information that is monitored and controlled by an OS. In order to be managed within the scope of TMN, an NE must have a standard TMN interface,
WS (Workstation)	The WS performs workstation functions. WSs translate information between TMN format and a displayable format for the user.
DCN (Data Communication Network)	The DCN is the communication network within a TMN. The DCN represent OSI layers 1 to 3.

Programmable Digital Multiplexer (PDMX)

Conventional switching systems require a large number of circuit units to handle the variety of service and signalling options used in today's communication networks. Northern Telecon's approach to this problem is flexible multiplexer which features a programmable service and signalling capability. The PDMX caters for a range of applications, requiring mixed traffic service, with up to 30 channels being multiplexed and transmitted/received at 2048 kbit/s. Higher order multiplexers for 8 Mbit/s lines, or up to 8 Mbit/s transmissions to be multiplexed for 34 Mbit/s lines. These transmission lines can be optical fibres fed by Optical Line Transmission Units at 2,8 or 34 Mbit/s. The PDMX reduces the amount of hardware required and provides an extremely cost-effective system. In addition, it eliminates the need to hold large stocks of spare units.

At the heart of the PDMX is a bus structure, consisting of data, control, and power interconnection highways, on the equipment shelf backplane.

In most primary multiplexer applications, the 30-channel capacity of the CCITT 2 Mbit/s standard leaves a considerable portion of the PDMX shelf resources unused. It is possible to make use of this additional capacity by increasing the number of 2 Mbit/s links servicing the installation, with the addition of further interfaces for these links.

(Northern Telecom Europe Limited, London).

Loral Space and Communications System

Loral Space & Communications Ltd., headquartered in New York City, is a high-technology company that primarily concentrates in space and telecommunications. It manages and is the largest equity owner of both the Globalstar Limited.

Partnership, which was building and preparing to launch the Globalstar worldwide satellite-based digital telecommunications system, and Space Systems/Loral, a world premier manufacturer of large, high-power satellites for environmental and telecommunications applications. Space Systems/Loral is a full service provider of commercial communications satellite systems and services and insurance procurement

and mission operations from its mission control center in Palo Alto, California. SS/L currently has a total backlog of more than a hundred spacecraft. The company is the prime contractors for the Globalstar satellites, PanAmStar 6, 7, 8, L-STAR and MCI direct broadcast satellite, etc., as well as the latest series of weather-watch satellites, GOES (Geostationary Operational Environmental Satellite), and the Japanese air traffic control and weather-watch satellite. SS/L also provides a core resource base for establishing new telecommunication businesses/services for Loral Space & Communications. Included in these resources are:

- an in-depth, comprehensive technology base in both telecommunication and satellite development;
- strong program management;
- extensive global alliances and partnerships;
- global customer base.

Globalstar LP, an international partnership, operates a worldwide mobile communications system of low-earth-orbit (LEO) satellites providing hand-held telephone service to areas under served or areas not served at all by existing wire or cellular telephone systems. SS/L is the prime contractor for the Globalstar satellite system, and is working with its alliance partners in designing and building 56 LEO satellites to accommodate the fast-growing mobile telephone industry. The first Globalstar satellites were launched in 1997 with service began in 1998: SS/L Cyberstar developed a worldwide communications service for supporting Interactive, Broadband Multimedia Applications (e.g., Internet access); delivered a service that was both price and quality competitive amongst alternative services; employed a world-wide network of advanced satellites tailored to each region.

As to Cyberstar services they are as follows:

Business Applications

- internet access
- private multi-cast network
- inventory updates
- distance learning (education & training)
- software downloads
- database updates

Education-Schools & Universities
- distance learning
- multimedia interactive courses
- private school/home school programs

Consumer Services
- internet access-interactive browsing
- multimedia broadcast (sports, news, financial, movies)

Telephony
- voice
- video conferencing

Medical Imagery
CyberStar services evolves from initial release to full-service network.

From CyberLink — Initial Service release
- Streaming Data Services
- DTH-TV
- Software downloads
- High-speed Internet Access
- VoD via download

to

Intermediate CyberStar — Expanded Services
- Interactive, bi-directional capability via the satellite
- Added capacity
- Higher Datarates

to

Advanced CyberStar — Full-service Broadband

Communications

- Streaming Data Services, DTH-TV, Software downloads, High-speed Internet Access, VoD via download
- Telephony, Video telephony, Personal Communications, Video Conferencing

Point to be discussed:

1. Distance Learning
2. Video Conferencing
3. Multimedia Broadcast

Design of satellite links with frequency modulation technique
FM Improvement. Threshold Level

The frequency modulation technique has mainly been used in satellite communications by the following reasons:

- Before the beginning of satellite communications, the FM system had already been established in the field of terrestrial microwave links.
- For utilization in the early satellite repeaters, which were power-limited rather than bandwidth-limited, the FM system was considered to have an advantage of yielding a high signal-to-noise radio (S/N) with wide frequency deviation.

In general, a frequency modulated carrier signal is expressed in terms of relationship between angular frequency of the carrier, angular frequency deviation by a modulating signal, and the initial phase of the carrier.

This relations show that the power spectrum of an FM carrier, even when it is modulated by a single sinusoidal wave, is spread infinitely on both sides of the carrier at the intervals of p. Therefore, it seems that the occupied bandwidth of an FM carrier is spread out infinitely. However,

taking into account Bessel function, which represents the quantity of each sideband, it becomes negligible for the range where it is above a certain value depending on the value of modulation, an FM carrier can be considered to have finite sidebands. And it should be noted that the spread of the sidebands is not so large. In the case, more than 99% of the total power of an FM carrier is included if we take the sidebands up to the point where n=m+1. The S/N improvement by the modulation index is typical for such wideband communication system of FM or PM systems and is called the wideband gain.

For calculation S/N of the FM system the reader should bear in mind that:

- The equation is obtained by assuming that the carrier is unmodulated, therefore, strictly speaking, it does not necessarily give S/N of a modulated carrier,
- S/N equation is valid so long as the carrier-to-noise ration (C/N) at the input of the discriminator is adequately larger than unity.

It may seem to the reader who disregards the latter assumption that S/N increases infinitely as the frequency deviation is increased.

However, since the larger frequency deviation requires the wider bandwidth, the C/N at the input of the discriminator decreases so that the second assumption cannot be valid and the obtained S/N may be considerably degraded that predicted.

Thus, in an FM system, the C/N at the input of a discriminator has a threshold level, below which the wideband gain of the system is lost and the demodulated S/N deteriorates rapidly. This fact is seen commonly in the wideband modulation systems, and is called the "threshold effect".

The C/N at which the threshold effect begins is called "improvement threshold". Here we call it "threshold level" as is usually done. As the threshold effect occurs when the incoming noise amplitude reaches the carrier amplitude, the threshold level can be defined as the C/N at which the peak of the input noise is equal to the peak of the carrier.

The threshold level is often defined as the C/N at which the output S/N deteriorates by 1 or 3 dB from the S/N of the linear relation with C/N.

This definition, however, is not very practical because it does not necessarily give the minimum usable C/N in a multichannel telephony links. The threshold level should be more practically defined especially for satellite communications in which the obtainable C/N has not sufficient margin against the threshold level. Therefore, in the design of telephony links of satellite communications, the threshold level is usually defined a

the C/N at which the weighted S/N+D of the worst channel reaches 43 dB. Although the threshold level of this definition depends upon the modulation index, it has an advantage of representing the minimum usable C/N, and as a result, it enables easy handling of the threshold margin.

(Lattice Company, K. Miya)

Secure Connections to the Internet

From its early beginnings as the ARPANET, the Advanced Research Agency network in the US, the Internet has steadily increased in size. For much of this time, participating systems have been largely drawn from the academic and defence research communities. Recently, however, there has been an enrmous growth in the number of systems connected to the Internet, typically increasing by 100% per year. The corresponding number of potential users is almost impossible to quantity but has been estimated to be in the region of 15-30 million. Much of this growth is caused by the connection of existing networks rather than individual systems, and in practice the Internet is much more a collection of inter-operating networks than a single homogeneous network.

There are a number of characteristics of the Internet which are derived from its original purpose, and which are relevant to any discussion of secure use of the Internet. One of these is that network was designed to facilitate information sharing, and for the network designers the "availability" aspects were probably more important than "confidentiality" and "integrity". In simple terms, if one sends a data packet to the network there is a very high probability that it will be delivered to the destination whatever the state of the various intermediate links. Typically neither sender nor receiver will know the route the packet took, the systems through which it passed, who was potentially able to read it in transit, or whether it was modified, maliciously or otherwise. The classic example is that of electronic mail, where one can have little confidence in the accuracy of the header information (sender, source address, etc.) or the integrity and confidentiality of the actual message content without additional application-level functionality (typically based on cryptographic techniques).

Overall direction of the Internet is in the hands of the Internet Activities Board (IAB), which delegates responsibility for various aspects of operation to bodies like the Internet Engineering Task Force. However, much of the management and coordination is designed to facilitate use of

the network, and to prevent "bad citizens" from interfering with the activities of legitimate users. Therefore, much of the Internet operation is based on mutual cooperation, adherence to common published protocols, etc., rather than strict hands-on management. For example, the concept of the centralised registration of individual users with Internet access is quite impossible. For all practical purpose, so is the centralised registration of individual system manager whose machine connects to the Internet, must be responsible for the security of their own system, as they cannot rely on security controls implemented on the network itself.

The simplest and potentially the most secure means of establishing an Internet connection is via a stand-alone system with no direct connection to the organisation's internal network. Data can be transferred between the Internet-connected system and the rest of the organisation's network by floppy disk, which at least has the merit that any data transfer will only take place as the result of a deliberate action and cannot be initiated by any person outside the physical boundaries of the organisation. In addition, it is easy to regulate access by employees to Internet services by controlling access to the dedicated "Internet system". However, it is difficult and cumbersome to make use of many of the features of the Internet. Because it is so easy to set up a dial-up Internet connection, organisations should also be aware of the possibility of unauthorised and uncontrolled Internet connections from internal systems which may bypass otherwise well-constructed security infrastructures.

The simplest way of providing a continuously available Internet connection to internal users is through the use of a leased line and an IP router. This is the standard means of connecting to the Internet if security is not a high priority.

A more sophisticated connection can be used with the specific intention of preventing any direct link from system on the Internet to internal system. This used a host-based system in place of the filtering router. Usually known as a "dual-homed gateway".

While it is stronger than a filtering router by itself, the dual-homed gateway does not provide much by way of "defence in depth". Parcticulary if it is desired to provide services to the Internet hosted on the gateway, there is still the problem that the machine is potentially vulnerable to direct attacks from the Internet. A successful intrusion into the gateway will give the intruder full visibility of the internal network.

In order to prevent direct connection from the Internet to the gateway, the screened subnet configuration was developed. In this, a

"public" node, i.e. a node with full visibility from the Internet, is placed between the Internet and the gateway. In effect, the application forwarding and the filtering functions of the dual-homed gateway are separated.

The method of operation of this screened subnet configuration is much the same as for the dual-homed gateway.

The bastion system is also a good place to locate services which will be provided to the Internet. In general, these will be "public" services such as anonymous ftp directories and World-Wide Web servers. These do not require user access to other than the particular service offered, which will have been checked to ensure that it does not introduce loopholes bypassing the bastion host's security mechanism.

Compared with the filtering router, both the dual-homed gateway and the screened subnet have the considerable advantage for the oranisation's security manager that only a very small number of systems need a very high level of security, and these systems can be easily placed under the direct supervision of a centralised system and security management group. This allows strict software version control, reducing the likelihood of software "acquired" from the Internet with some as-yet undiscovered security-related flaw running of the system.

All the services that Digital network provides to the Internet are hosted on systems on the outside of the S.E.A.L. gateway.

The aim of the Internet is to provide a widely-available and easy-to-use communications path between many organisations. However, it is the responsibility of each organisation to secure its own system and Internet connection.

As with all security options, each organisation must find the balance between security, cost and complexity, and ease of use which suits its own particular needs.

Microwave DAV Modem

Microwave DAV Modem (MSOSE) provides full-duplex transmission of digital data and is compatible with microwave radio system requirements providing the user an economical way of adding digital data to an existing audio or video channel of a microwave communication link.

Microwave data transmission systems are, for the most part, well-defined and energy restricted environments. Close attention must be paid to signal bandwidth, RF energy distribution, spurious RF products, and signal levels. The data user imposes the additional requirements of minimum signal bandwidth, flexible transmit and receive frequencies, and minimal carrier spacing. The MSOSE fulfills all of these requirements.

The transmitter RF output spectrum, perhaps the most important parameter of concern to the system operator, is very clean and has spurious output of –50 dB maximum. Further, the baseband data is scrambled to spread the signal energy of the entire signal bandwidth . Network flexibility is provided by field-programmable transmit and receive frequencies from 0,5 MHz to 199,99 MHz with frequency resolution as low as 10 kHz.

Bandwidth is conserved by the MSOSE 1,4 bits/Hz data transmission density. This is a cost-effective trade-off of bandwidth versus bit error rate and yields a transmission bandwidth of only 0,7 times the data rate. This means a T1 carrier at 1,544 Mbps requires a bandwidth of only 1,081 MHz.

For flexibility at the data terminal side of the modem, the MSOSE supports data rates from 56 kbps to 8,448 Mbps. Plug-in interface modules provide operation with several interface types including T1 (DS1/CEPT), T2 (DS2), V35, RS 422/449, and MIL-STD-188/114. Complete user transparency eliminates any potential problems with protocols, parity, or software. Possibility most important from the user's point of view, the bit error rate is guaranteed to be 10^-9 or less with a S/N ratio of 20 dB. The MSOSE mounts in a standard 19" rack and is 3-1/2" high by 17" deep. Power consumption is less than 50 Watts with operation from 115/220 Vac, standard, -24 Vdc or –48 Vdc (optional). The modem proper consists of an Interface Adapter Unit, Modulator module, RF Module, and Demodulator module.

The Interface Adapter Unit plugs into the rear of the chassis and providers the interface for the data terminal equipment (DTE). The

Interface Adapter Unit functions include interface pin-out and level conversion plus baseband loopback switching.

The Modulator module comprises one large circuit board with two small daughter boards containing the data rate dependent circuitry. The main functions of the module include data scrambling and the generation of baseband I and Q signals for the Transmit module.

The RF module uses the I and Q signals from the Modulator module to generate a QPSK-modulated signal having a carrier frequency between 0,5 MHz and 23 Mhz.

The Demodulator module, like the modulator, is a large circuit board with daughter boards for the data rate dependent circuitry. This module demodulates and descrambles the IF signal from the Receiver module, and recovers the data and clock.

I. Learner training

1. Read the text.
2. Try to catch the main information.
3. Translate the whole text.
4. Make up a 5-10 worded glossary. Learn those words.
5. Find additional information in order to be ready to discuss the points given below.

Models for reproducing the main contents of the text.

1. The article (text) given under the tittle "…"
   deals with …
   studies …
   discusses …
   is devoted to …
   is about …

2. The problems it deals with are … ….
3. The figure to the article (text) above
   shows a device.
   gives an arrangement.
   represents an apparatus.
   depicts a diagram.

illustrated a circuit (a plot; a schematic representation of …)

4. The author emphasizes …
5. Scientists consider this problem to be of great interest.

this phenomenon	of great use
this device	promising
this method	important

6. To my mind this problem is of great interest.

this phenomenon	of great use
this device	promising
this method	important

II. Points for discussion

1. TMN Framework.
2. Evolution of network management for a full-service network.
3. Typical client/server architecture.
4. Dynamic services.
5. Loral space and communication systems.
6. Programmable digital multiplexer.
7. FM improvement threshold level.
8. Distance learning.
9. Video conferencing.
10. Multimedia broadcast.
11. Secure connections to the Internet.
12. Microwave DAV modem.

Text for independent study

1. *While reading the text given below make up 10-15 words glossary on each text.*
2. *Give a summary of each article of around one hundred words.*
3. *Try to analyse positives (advantage) and negatives (disadvantages) of the subject concerned.*

4. Rewrite those texts as if you were the author.

What is the World Wide Web for?

Most had assumed that the Web's major application would be electronic commerce. But the problems of Web-based electronic commerce are significant. Not list, the Web is still used mostly by academics and white-collar workers sitting on the other side of a corporate or institutional firewall, rather than by consumers in the orthodox sense. And the infrastructure of commercial transactions, including secure, easy-to-use payment mechanisms, is nowhere near mature.

As predicted the real action may be inside corporations, where the Web can play a key role in realizing the dream of a seamless information infrastructure.

Web can be used not only to browse through catalogs of corporate bumf, but also to chat with one or several colleagues in real time; to add audio and video to a text transaction; to download or upload files; and to add and open mini-applications, or applets, that are the same as those used in the wider corporation.

The Web is the most important IT development since the invention of the PC. Like the PC, which was invented for purely "personal" use but ultimately became the foundation of a new type of corporate network, so the Web, invented to let academics find information, may become the foundation for a new type of corporate information infrastructure.

What Internet Phones Will Do:

- Get the news

  You can have articles from key newspapers sent to your phone – say, reviews of the latest movies or last night's score for your favourite baseball team.
- Play the market

  You can be notified if the stock prices of selected companies move 5% or more in a day. Then make a buy or a sale.
- Date Book

  Use your phone to check the calendar you keep posted on the Web.
- Get a chuckle

Need a moral boost? Call the joke Web site. For 50 ¢, an E-mail joke zips to your phone. Sample: So what do you get if you send the Goodfather to law school? And offer you can't understand.

– Change your ring

Browse a Web site to get a new song to replace the ring on your phone. Choose anything from Mozart to the Rolling Stones.

What is Digital TV?

The digital TV receives signal as computer code, produces sharper images than a conventional TV, and includes digital surround sound. But not all digital TV is high-definition television (HDTV).

The mixture of questions & answer is given below. You are to find the only correct answer to each question.

Do I really need a digital TV?

Yes. In a few years, even better 1080p displays will be available. What's more, none of today's HDTV sets can display the full number of picture elements that some broadcaster are sending – 1920 pixels on each horizontal line. Professional monitors that can show that kind of resolution cost about $25000.

What do words such as "480i", "720p", and "1080i" mean?

Most of the sets will double as giant computer monitors. And low-cost digital "appliances" are on the way, which will facilitate Web-browsing, video-conferencing, 3-D chat, and video games. All of these activities are a lot more compelling on giant, high-resolution screens than on cramped PC monitors.

Will TV picture ever exceed 1080i?

Some manufacturers, such as Sony, have built tuner/decoder into the TVs. Other sell the monitors and set-tops separately. There are good reasons for that. The technology is still evolving, and the "interfaces" – meaning jacks and sockets for connecting different components – are not yet standardized. Compatibility with cable is also up in the air. That means changes might be needed in the set-top box's electronics.

Does a digital TV need a separate set-top box to display images?

Your satellite picture right now, on an analog TV, is as good as most low-end digital TVs will deliver. But there's no question that the picture on an HDTV set showing high-definition programming is far better than anything you get on today's satellite systems. Soon, Hitachi and RCA/Thomson will sell digital TVs with built-in HDTV and satellite receiver circuitry. These sets will display all digital-TV formats plus ordinary satellite programs and new HDTV satellite signals.

Do you mean the new sets can't connect to cable?

No – or not yet. Until at least 2006, broadcasters will continue to "simulcast" any new digital or HDTV programs in analog from, viewable on any TV. After that, so-called converter boxes costing less than $500 will convert the digital signals for older TVs.

Then what's the big advantage of digital television?

These are three of the 18 display formats that the Federal Communications Commission has approved for digital-TV broadcasts. The numbers refer to scanning lines that make up a TV picture. "I" stands for 'interlace", a way of splitting and scanning images that is used in today's analog sets. The alternative is progressive ("p"), where all the lines of the picture are scanned in each frame. Computer monitors use this approach. Roughly speaking, 480i means picture quality equal to today's best analog sets. True high definition begins at 720p. The best you will see on today's HDTVs is 1080i.

Are there other cool applications?

There are many. First, the digital broadcasts will look great – if you can receive them. In addition, most of the digital sets will clean up analog signals, using tricks such as "linedoubling" to make certain TV shows look crisper. Some of the wide-screen models will subtly "stretch" ordinary TV shows to fill up the screen, giving a more cinematic look. A new generation of digital video disk players, arriving this fall, will allow "digital to digital" output, meaning the images will be displayed exactly as they were recorded.

Is HDTV better than a digital satellite-TV system?

It depends on what you mean by "connect". You can plug them in and watch ordinary cable programs. But your cable box, right now, can't decode the new digital broadcast signals. To watch the broadcasts in digital from, you'll probably have to put an antenna on the roof, and maybe use a separate converter box.

Universal Mobile Telecommunications System (UMTS), Is the standard for 3G wireless services in Europe

The first 3G operator licenses are about to be awarded. Soon we'll be able to surf the net, send e-mail with large file attachments, watch video clips and hold multimedia meetings – and, of course, talk – all from a single hand-held device. We'll be able to be permanently on-line to a whole range of communication, information and entertainment services – while mobile.

UMTS will provide users with wireless access at speeds of up to 2 Mbit/s – some 40 times faster than the typical modems we use to access the Internet today.

The UMTS core network is based on GSM – the world's most successful and widely deployed digital mobile standard. This simplifies interworking between the two standards, provides economies of scale in infrastructure and terminals, and simplifies service creation and delivery. UMTS users will get wide-area coverage from day one through national and international roaming using multi-band, multi-mode phones.

Coming soon – ST-950 SmartRouter

Our talented engineering staff is putting the finishing touches on our next exciting new product: the ST-950 SmartRouter. It is a PC-based PBX (Private Branch Exchange) for call routing and telephone line distribution in either a SmarTrunk II or SkyLink system.

Designed to accommodate up to 24 telephone lines and 24 radio channels, the ST-950 SmartRouter will provide channel to channel routing for full duplex, intra-system calls and will serve as an interface between a SmarTrunk or SkyLink system and the PSTN (Public Switched Telephone Network). The ST-950 can also be used to distribute and manage telephone line traffic in a system with more radio channels than telephone lines.

Forward Error Control Coding – Another Means to Exploit Redundancy

We know turn to a universally effective method of exploiting redundancy, forward error-correcting (or error control) coding (FEC). Unlike interleaving alone, FEC improves performance for fixed amplitude and phase channels as well as for fading channels. We begin by applying FEC to fixed coherently demodulated signals in additive Gaussian noise and interference. We then proceed to combine FEC and interleaving for randomly time-varying lading signals with coherent demodulation. F inally, we consider the more difficult problem of noncoherently demodulated signals for both the fixed and lading cases. The delay introduced by FEC is minimal compared to the interleaving delay. We shall consider only convolutinonal codes, in keeping with common practice. For a justification based on a performance comparison with block codes (see Viterbli).

An FEC convolutional encoder can be viewed as an additional level of digital linear filtering (over the binary field) which introduces redundancy in the original digital data sequence. Such redundancy is already present in a spread spectrum system and available for exploitation. One of the simplest nontrivial convolutional encoders is implemented by a shift register that is remotely related to the shift registered generator of pseudorandom sequences. However, there are two fundamental

differences. First, a new input is provided every shift register clock cycle (as compared to the maximal length sequence generator, in which an initial input vector of finite length produces a periodic sequence of length exponentially related to the generator length).

Second, there are more output symbols than input symbols. This FEC encoder is a finite-state machine that can be most easily described in terms of its state diagram.

Thus, for an initial condition (or state) of 00, the input sequence 11010 produces an output sequence 1101010010. Though it is not really necessary for analyzing either the code characteristics or the performance of the optimal decoder, it is useful in understanding both to exhibit the code on a trellis diagram.

Performance of the coded system depends on the relative Hamming distance between corewords; the number of symbols in which they differ. The "free" distance is defined as the minimum Hamming distance between any two paths over their unmerged span. We will show that it is the dominant factor in performance evaluation, with error probability decreasing exponentially with increasing free distance.

The Noise of Barriers Falling

"In five years' time, NTT won't be a telephone company. It will be a bank", says Paul Berriman, talking about Japanese telecoms giant Nippon Telegraph & Telephone.

Berriman believes that Moore's Law, the information-technology rule that predicts a doubling of processing power per chip every 18 months, applies as much to telephones as it does to computers. It won't be long before the average mobile phone will have multiple-frequency and air-interface capabilities and will have a built-in router. For the uninitiated, this means that the average cellular phone will work virtually anywhere, and will use the IP (Internet Protocol) standard – used worldwide to control Internet communication – as its basic means of "talking" to other devices.

At present, to make a mobile-to-mobile call, a wireless phone "talks" to a base-station transceiver, which, if the caller is in a city, may be located on a nearby building. From the base station, the call is routed back

to a multimillion-dollar switching centre. This reads the number dialled by the caller and routes the call on to its final destination.

Berriman and other believe that devices that use IP will change all that. The two mobile phones just cited might be able to talk directly to each other via IP if they were close enough. If not, the call might be routed over wiring in the building from one room to another, with no need to travel to a central switch and back. This is called "peer-to-peer networking", and the Internet has been using it for years. Now it's arriving in mainstream telecoms.

IP-based technologies will slash current telecoms costs for homes and businesses.

The network-building blocks for this IP future are already falling into place. It has been possible to carry voice communications over an IP network. These technological problems have largely been solved, and a good "voice-over-IP" link is now indistinguishable from a conventional telephone circuit. The bandwidth, or carrying capacity, of optical-fibre cables is also mushrooming, thanks to smarter ways of squeezing traffic on to them. A technique called wave-division multiplexing packs multiple streams of coloured laser light on to single fibers – each colour is a separate communications channel carrying many messages. The limits of this technique rest in the ability of the electronics at either end of a cable link to differentiate between colours that are close together in the spectrum, and advances in this area continue to be made.

Mobile communications are about to undergo another, earlier revolution, too. From 2001, third-generation, networks, which will eclipse current systems by carrying more information, faster. These will enable users to have high-speed Internet access from their mobile phones, opening up a range of possibilities for new Internet-based services targeted at people on the move.

Translate the following texts into English:

І. Журнал Computer Telephony пропонує таке визначення: «Комп'ютерною телефонією (computer telephony integration, CTI) називається технологія, в якій інтелектуальні комп'ютерні ресурси (апаратура та програмне забезпечення) застосовуються для здійснення вихідних і приймання вхідних дзвінків, а також для керування телефонним з'єднанням».

Найпростіша CTI-система складається з комп'ютера, встановленої на ньому спеціальної плати, що віддалено нагадує модем, і спеціального програмного забезпечення. У багатьох CTI-реченнях телефонний апарат перетворюється в засіб віддаленого доступу до комп'ютера. До голосової плати, на відміну від модема, підключається не одна, а декілька телефонних ліній.

Комп'ютерна телефонія – це цілий спектр нових послуг. Володіючи гнучкістю та масштабуванням, КТ-системи вирішують широке коло завдань як для великих корпорацій, так і для невеликих фірм і навіть приватних осіб. CTI-технології забезпечують наступне:

- створення автоматичних інформаційно-довідкових систем;
- керування по телефону рухом грошових засобів;
- впровадження систем автоматичного оповіщення;
- створення дослідницьких телефонних центрів;
- автоматична реєстрація телефонних розмов;
- використання голосової пошти як автовідповідальча;
- аналіз структури телефонного трафіка;
- керування внутрішніми та зовнішніми телефонними комунікаціями;
- автоматизація процесу розсилання факсів до запитання;
- використання Internet як альтернативну телефонну мережу.

Деякі фахівці поділяють Internet-телефонію, використовуючи для телефонних розмов Internet, та IP-телефонію, що використовують з тією ж метою будь-яку мережу, яка підтримує IP-протокол (Internet Protocol). Багато аналітиків вважають IP-телефонію частиною CTI, тому що в них реалізуються схожі технологічні рішення.

Інколи експерти виділяють Internet-телефонію в окрему галузь, враховуючи її великі перспективи та неосяжний потенціальний ринок. У недалекому майбутньому вона витіснить звичайний аналогічний зв'язок.

Glossary:

Freephone	Дзвінки за рахунок викликуваної сторони
Premium Rate Service	Дзвінки за рахунок додаткової оплати
Prepaid Calling	Дзвінки по передоплаті з доступом абонентів по паролях
Least Cost Routing	Маршрутизація за найбільш корисним маршрутом
Call - Back	Зворотний виклик
Loop start, CAS, CCS	Базові комутаторні вузли мережі
Multi-node	Багатовузловий
Prepaid	Передоплата
Postpaid	Списання витрат
Prepaid Calling Card	Пластикові телефонні картки
Debit Card	Револьверні
RED (Random Early Detection)	Сучасне виявлення перевантаження
RTT (Round-trip time)	Час розповсюдження пакетів

II. Globalstar – це система персонального рухомого та стаціонарного зв'язку з супутниками на нижніх орбітах, що виконують роль ретрансляторів з перетворенням частот. Комунікація повідомлень здійснюється в наземних мережах. Globalstar забезпечує зв'язок по всій території Земної кулі між 70°півн.ш. и 70°півд.ш. Реалізовано взаємодію з існуючими стільниковими мережами зв'язку.

Система Globalstar розробляється на кошти міжнародного консорціуму, до складу якого входять найбільші фірми-виробники супутникових систем і телекомунікаційного обладнання (Loral Space & Communications, Space Systems/Loral, & etc.) та оператори зв'язку (France Telecom, AirTouch Communications, Vodafone Group).

Globalstar надає такі послуги:

- мобільний та стаціонарний телефонний зв'язок;
- передачу даних;
- факсимільний зв'язок;
- персональний радіовиклик (пейджинг);
- глобальний роумінг;
- визначення місцезнаходження об'єкта.

PART III

This part contains some English conversational formulas. Its aim is to present the most import ant expressions used nowadays in a wide variety of situations.

This part enables the students to practise these expressions with a more creative approach.

Opinion.

An opinion may be expressed simply as an assertion, without any introductory words.

I think (that)	
I believe (that)	Я думаю (вважаю, почуваю,
I feel (that)	гадаю), що…
I consider (that)	
It seems to me.	Мені здається.
In my opinion	На мій погляд…
To my mind	
If you ask me	Мені здається …

Agreement.

The simplest way to express agreement with a statement is yes, it is (does/can), etc.

Certainly, Sure, Of course may be included for emphasis.

I (quite) agree (with you)	Я (цілком) згодний (з вами)
I think so too	Я теж так думаю
So do I	Я теж
You're (quite) right there	Ви цілком праві
Exactly	Саме так
Quite so	
I couldn't agree more	Не можу не згодитися
I should say so	Згоден
That's just what I think	Це те, що я думаю
You can say that again	Згоден
You're telling me	
I suppose so	Гадаю, що так
I agree with you, but …	Я згоден з Вами, але …
I see what you mean, but	Я розумію Вас, але …

Disagreement

The simplest way of expressing disagreement is: No, it isn't (doesn't/can't) etc.

I don't agree (with you)	Я не згоден
I disagree (with you)	
I'm afraid I can't agree (with you)	Боюсь, що не можу погодитися з вами
I'm afraid you're mistaken	Гадаю (боюсь), що Ви
I think you're mistaken	помиляєтеся
Not at all	Нічого подібного
Nothing of the kind	
On the contrary	
Nonsense	Дурниці
Rubbish	
That's ridiculous	

Some ways of softening disagreement:
Well, …
Personally, …
As a matter of fact, …
Oh, I don't know.
I wouldn't say that.
Do you really think so?

Approval

To express approval we often use exclamations: Excellent! Splendid! Fine! Wonderful! A very good idea!

I'm sure you did right.	Переконаний, що Ви праві
I'm sure that was the right thing to do.	Переконаний, що саме так і треба було зробити
Good for you!	Молодець!
Well done!	
I take off my hat to you.	Погоджуюсь з Вами
That's clever (sensible, thoughtful) of you	Розумно з Вашого боку

Disapproval

It (that) isn't (wasn't) a very good idea.	Це не дуже гарна ідея
You shouldn't do (have done) that.	Вам не треба було так робити
What for?	Чому?
Whatever for?	
How could you!	Як Ви могли?
It's your fault …	Це Ваша вина …
You're (the one) to blame (for) …	Ви винні

Certainty

Certainty can be expressed as follows: Yes, it (he, she) is. ect. Yes, certainly.

I'm (quite/absolutely) sure (certain)	Я (цілком) згоден
I'm sure (certain) of it (that)	
There's no doubt about it (that)	Не сумніваюся

Uncertainty

I'm not sure (certain)	Не можу сказати точно
I'm not quite certain	
I can't (couldn't) say (for sure)	
I think so	Наскільки я знаю
As far as I know	
If I remember rightly	Якщо я вірно пам'ятаю
If I'm not mistaken	Якщо я не помиляюсь

Ignorance

I don't know	Не знаю
I really don't know	
I don't know, I am afraid	
I'm sorry, I don't know	
I can't remember	
I can't (couldn't) say	
I have no idea	
Sorry (I'm afraid) I've no idea.	На жаль (боюсь), що я не знаю

Surprise

Surprise is often expressed with exclamations: Oh! What a surprise! Well! Indeed? Really?

Do (have) you really?
You haven't, have you?
You don't, do you?
You don't say (so)!
Go on (with you)!

General words and phrases and some hints on conversing in English.

The following words and phrases can be used in a wide range of situations to make your conversation sound more natural.

Well
a) to express hesitation or uncertainty
b) to avoid sounding dogmatic
c) to introduce a new subject
d) to express surprise
e) a desire for information

So	are not generally used to introduce a statement
just	
so	expresses a consequence and used to connect two ideas
just	has several idiomatic uses with the idea of exactness, or a small amount or a short period of time
By the way	Між іншим
incidentally	Випадково
While we are on the subject of …	
Talking about (of) …	
About that …	
That reminds me …	
As far as	I know
	I (can) remember
	I can see

Personally	Особисто я …
Actually	Дійсно…
In a way	Взагалі…
It all depends on …	Все залежить від …
generally	В основному…
in general	
as a rule	
as usual	Як завжди
on the whole	В цілому
The thing is	Справа в тому, що…
You see	

The following phrases can make your conversation sound more natural and idiomatic but they have very little meaning and should not be overused.

You know
I mean to say
… so to say …
As a matter of fact
Frankly speaking
To tell the truth
To cut a long story short

Навчальний посібник

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English for holders of master's degree

Редактор Кодрул Л.А.

Комп'ютерне верстання
та макетування Корнійчук Є.С.