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**ПРОФЕССИОНАЛЬНО-ОРИЕНТИРОВАННЫЙ
АНГЛИЙСКИЙ ЯЗЫК**

“Telecommunication systems”

Методические указания по выполнению семестровых работ
для студентов специальности 5В071900

Алматы, 2015

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Данные методические указания содержат требования и материал для выполнения и оформления семестровой работы № 1 в рамках дисциплины «Профессионально-ориентированный английский язык» для студентов специальности 5В071900 – Радиотехника, электроника и телекоммуникации.

Методические указания предназначены для развития умений чтения и перевода технических текстов в области телекоммуникационных систем.

Методические указания включают в себя профессионально-ориентированный текстовый материал, упражнения и задания для усвоения терминов по данной специальности.

Материал может найти применение в практике самостоятельной работы с целью формирования иноязычной профессиональной компетенции студентов – бакалавров специальности 5В071900.

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Introduction

Self-study of the student is aimed at individual fulfillment of academic assignments, generating cognitive interest, extending knowledge in the area of professional occupation through language-learning practice.

Term paper 1 (SSA – self-study assignment) consists in written translation of professionally-oriented texts with volume of no less than 3,000 symbols each, compiling a terminological glossary, and fulfillment of lexical and grammar assignments, and tasks for monitoring comprehension of the text, including writing of an abstract or a summary.

Generally, a term paper should be written in out-of class conditions, in accord with the suggested list of topics and the teacher's assignments. One of the main tools for understanding the text content is its lexical and grammatical analysis which is applied while reading and checked in the process of fulfillment of the assignments.

Term paper assignments

1. Translate the text from English into Russian (volume – 3,000 symbols).
2. Compile a terminological glossary (no less than 20 per term paper).
3. Fulfill the task on text comprehension (for each term paper).
4. Fulfill the tasks on vocabulary and grammar (for each term paper).
5. Write a summary.

Criteria for evaluating translation skills (professionally-oriented texts):

- volume of the material worked up;
- currency and relevance of the text (to the profile of the chosen discipline);
- logical sequencing and clear presentation;
- terminological style and grammar accuracy;
- abilities and skills of text analysis, generalizing, organization and delivery of factual information;
- argumentation, support and conclusion.

Work on the term paper (TP 1) starts on the first week of the semester, and the completed paper must be submitted on the 5th week.

The title page should be formatted according to the standard accepted in the University (consult the teacher).

It is also required to compile a student's vocabulary book. The format may be free, or you can use the sample of a vocabulary log presented here or choose any other suitable from the Internet.

Sample Vocabulary Log

| Word or concept/ | Part of speech/ Word Definition | Transcription/ Translation | Sentence or phrase using the word |
|------------------|------------------------------------|-------------------------------|---|
|------------------|------------------------------------|-------------------------------|---|

| | | | |
|---------|--|---|--|
| Router. | A noun. A router is a networking device that forwards data packets between computer networks. A router is connected to two or more data lines from different networks (as opposed to a network switch, which connects data lines from one single network. | Маршрутиза́тор (<i>проф. жарг.</i> рáутер, рúтер (от англ. <i>router</i>) | ... a connecting device such as a router, which connects the network to other networks |
|---------|--|---|--|

Важно: при толковании и переводе терминов (понятий, слов и словосочетаний) следует показать именно то значение и смысл, которое они имеют в данном конкретном тексте (контексте). Так, “local loop” в тексте 1.1 означает “subscriber line”, но не «окружная дорога» и не «петля Нестерова».

Желательно, чтобы вся работа, выполняемая студентом в рамках дисциплины Professionally oriented English language или English for special purposes, отражалась (фиксировалась) в специальной папке (portfolio).

Unit 1

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

Text 1. Plain Old Telephone Service

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

small amount of the received transmitted signal leaks into the receiver circuit, and the user hears one's own speech, an effect known as sidetone. Actually, a small amount of sidetone is desirable because it makes the telephone seem live and natural, and thus the balance network is designed to allow an optimum amount of sidetone. Too much sidetone results in the user pulling the handset away from the head, which reduces the transmitted speech signal - an undesirable effect. The use of an induction coil to balance the electrical sidetone was patented in 1918 by G.A. Campbell, an AT&T research engineer. The induction coil has been replaced in modern telephones by a speech network that electronically cancels the sidetone leakage and performs the two-wire to four-wire conversion.

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

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

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

Vocabulary

1.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Impedance; baseband; piezoelectric transducer; capacitor; leakage current; facsimile; sidetone; induction coil; V_{rms} ; handset; center-tapped transformer; receiver circuit; public switched network; conversion; in series.

Grammar

Sometimes a noun modifies another noun and functions as an adjective (an attributive noun). Example: *balance network, sports car.*

1.3 In the text, find, write out and translate phrases (word combinations) where nouns are used as attributes.

1.4 Choose the necessary tense form of the verb in brackets:

1) Development in the field of telecommunications (is/ was/ has been, had been) very rapid in recent years.

2) The reliability of the network (depends/ is depended/ has depended/is depending) on the ability of the optical cross-connect system to reconfigure.

3) The global telecommunications network is the largest and most complex technical system that man (created/is creating/ has created/had created).

4) The basic principles of diversity (have been known/are known/have known/had been known) since 1927 when the first experiments in space diversity were reported.

5) The high-frequency quantization noise in the receive channel must (remove/be removed/have been removed/be removing) by the digital decimation filters.

6) Today the rate of change and innovation in the telecommunications industry (accelerates/has accelerated/ is accelerating/is accelerated) at a breakneck pace.

7) The first ringer patent (applied /was applied/had applied/ had been applied) for in 1878, and today's electromechanical ringers (have changed/changed/are changing/change) little since then.

8) The special code (contains/contain/is containing/has contained) pulses facilitating synchronization even when the original data has a long string of zeros.

Comprehension Check

1.5 Answer the following questions:

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

Developing Language Skills

1.6 Complete the sentences with the correct preposition (by, in, of, at) :

1) A hammer moves response to the ringer current loudly striking two bells.

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

1.7 Ask questions so that the sentences given below were the answers:

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

1.8 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

This term refers to the transmission of information over long distances using the telephone system, radio, TV satellite or computer links. Examples are two people speaking on the phone, a sales department sending a fax to a client or someone reading the teletext pages on TV. But in the modern world, telecommunications mainly means transferring information from one PC to another via modem and phone lines (or fibre-optic cables).

The global telecommunications network is the largest and most complex technical system that man has created. It makes up a substantial part of a country's infrastructure and is vital to the development of the country. Development in the field of telecommunications has been very rapid in recent years. By telecommunications we mean here all processes that render it possible to transfer voice, data and video with the help of some form of electromagnetic system, including optical transfer methods.

This rapid development points to new demands on knowledge and competence for everyone who takes an active part in modern telecommunications. Today the rate of change and innovation in the telecommunications industry is accelerating at a breakneck pace. New telecommunications technology enables

companies to interface directly with their customers wherever on the globe they happen to be. The coming convergence of voice, data, and video technologies means that the media, entertainment, computer, and telecommunications organisations are all going to be merging and interoperating their activities. Even something so small as an individual strand of optical fibre today has the capacity to carry million television channels simultaneously. How will telecommunications technology evolve and with what impact in the coming years?

Unit (Assignment variant) 2

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

Text 1. Switching Technology. Switchboard

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

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

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

The switchboard is usually designed to accommodate the operator to sit facing it. It has a high backpanel which consists of rows of jacks, each jack designated and wired as a local extension of the switchboard (which serves an individual subscriber) or as an incoming or outgoing trunk line. The jack is also associated with a lamp. When a call is received, a jack lamp lights up on the back panel and the operator responds by placing the rear cord into the jack and throwing the front key forward.

As telephone exchanges were converted to automatic, or direct dial service, switchboards remained in use for specialized purposes. Before the advent of direct dialed long distance calls, a subscriber would need to contact the long-distance

operator in order to place a call. In large cities, there was often a special number, such as 1-1-2 or 2-1-1, which would ring the long-distance operator directly. Elsewhere, the subscriber would ask the local operator to ring the long-distance operator.

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

The switching network in today's switching systems is completely digital.

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

Vocabulary

2.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

a switchboard; exchange; digitized; gradually; sophisticated; subscriber; abundance; to accommodate; a jack; a sleeve; (local) extension; plug; console; space switching; convert.

2.3 Find in the text and/or suggest English equivalents for the following.

АТС; учрежденческая телефонная станция с исходящей и входящей связью (УПАТС); ручной коммутатор каналов; внутренняя телефонная станция с внешними линиями связи; заменять; сложные устройства; обеспечивать доступ к; клеммное гнездо; патрубок; местный добавочный номер; междугородние звонки; коммутация с пространственным разделением каналов; коммутация с разделением по времени; оцифрованные образцы

Comprehension Check

2.4 Answer the following questions:

1) How was one telephone connected to another? 2) What was a switchboard? 3) Who was typically known as an operator? 4) What did each plug have? 5) What was a sleeve used for? 6) How many jacks could each operator reach? 7) When did PBXs disappear? 8) Who invented the electromechanical automatic telephone exchange? 9) What have manual PBXs been replaced by? 10) What do modern PBXs often have? 11) How is the switch board usually designed? 12) What is each jack also associated with? 13) What happens when a call is received? 14) What

would a subscriber need to do? 15) How can calls be connected? 16) What can you say about modern digital switching systems? 17) Is the switching network in today's switching systems completely digital?

2.5 Translate the following words and word combinations.

In the old days, to be connected to, operated by, manually, to connect, within and between, telephone exchange, typically, to use cords, an operator, a plug, a tip, to create the electric circuit, a sleeve, to indicate, a circuit, to be in use, gradually, sophisticated devices, an access, features, a console, backpanel, jacks, to convert to, advent, direct-dialed long distance calls, to place a call, a subscriber, to connect wires, to create an electric path, space switching, time switching, by reordering, to utilize, completely, digital signals, to transfer.

Developing Language Skills

2.6 Translate the following sentences into English. Use a dictionary.

1) Алман Струуджер изобрёл автоматический телефонный коммутатор декадно-шагового типа ёмкостью до 99 абонентов.

2) АТС – устройство, автоматически передающее сигнал вызова от одного телефонного аппарата к другому.

3) Аналоговый сигнал оцифровывается в абонентском комплекте и передаётся внутри АТС и между АТС в цифровом виде, что гарантирует отсутствие затухания и минимальное число помех независимо от длины пути между АТС.

4) В цифровых АТС (IP-PBX) используется не коммутация каналов, а коммутация пакетов, и транспортом является протокол IP.

5) IP-АТС осуществляют коммутацию устройств IP-телефонии (VoIP).

2.7 Complete the following sentences using parts from the righthand column. Translate them.

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

6. The transmitter sends a speech signal down the telephone line, and the receiver

f) the frequencies of the tones and thus decode the dialed digits.

2.8 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2 _____

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time and more.

Today's GPS receivers are extremely accurate, thanks to their parallel multi-channel design. Garmin's 12 parallel channel receivers are quick to lock onto satellites when first turned on and they maintain strong locks, even in dense foliage or urban settings with tall buildings. Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. Garmin's GPS receivers are accurate to within 15 meters on average.

Like with any technology, it depends who is using it and how they use it. Parents who do use the technology to track their children may be invading their privacy, however in a situation where sometime does happen, it will give them comfort in knowing that there is a way to track them down. A similar situation that has been highly effective is used by the police. When people call 911 emergency the system is designed to identify where the caller is, enabling the police to act quick and effectively. Even though people say this technology has invaded privacy, I believe that any technology could be bad if used in the wrong hands. This technology has saved countless lives, helped with emergency's, made traveling easier, made buildings safer, and made life easier for many people. With all these

benefits I believe that the Pros outweigh the Cons, and that the GPS system should be accepted and allowed to continually grow within our society.

Unit (Assignment variant) 3

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

Text 1. Switching Fabrics

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

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

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

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

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

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

Circuit switches are generally transparent to message content. However, to obtain efficiencies, circuit switching systems may remove or disconnect an

established path in either or both directions during silent periods in the message and re-establish the circuit when the message information resumes.

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

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

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

(Amos E. Joel Jr. Switching fabrics)

Vocabulary

3.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Switching fabric; distinct; circuit switching; packet switching; a dedicated path; session; to request; sequence; bandwidth; to originate; to terminate; to broadcast; technique

3.3 Find in the text and/or suggest English equivalents for the following.

Двунаправленные сообщения; получать; разъединять; возобновлять; подразделять на; попытка одновременного использования канала связи; планировать очередность обслуживания (в сети)

Grammar

3.4 Use the verbs in brackets in Present Simple Passive:

1) Establishment of a channel through one or more switches in sequence (know) as a connection.

2) These devices (expect) to be ready with these technologies in five upcoming years.

3) The plugs (associate) with flexible cords, several of which operate over a field of jacks that together constitute a fabric.

- 4) Circuit switching channels also (establish) on a schedule.
- 5) Crosspoints (assemble) in various ways to form switch fabrics.
- 6) Switch fabrics (organize) into divisions that are analogous to transmission multiplexing techniques.
- 7) The capacity of a frequency-division switch fabric (limit) by the bandwidth.
of the transmission medium divided by the bandwidth of each connection.
- 8) In packet switching, messages (divide) into segments or packets.

Comprehension Check

3.5 Answer the following questions:

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

3.6 Read and translate the following word combinations.

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

Developing Language Skills

3.7 Complete the following sentences:

1. The process of requesting and is known as a call.
- 2) are basic to switching.

- 3) In the past this term has been known as the switching network or
- 4) In circuit switches, a message may be sent only, directed from one terminal to another.
- 5) This technique is sometimes virtual circuit switching.
- 6) In packet switching, messages are divided

3.8 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2 _____

Convergence is creating new businesses and forcing existing businesses to adapt quickly or die. We are seeing the convergence of telecommunications, IT & Media; the convergence of fixed & mobile services and convergence at device level. All of these trends are creating new markets and making other equipment, products, services and even whole companies rapidly obsolete. For technology manufacturers or service providers, deciding which markets to base your future on becomes a challenge with serious consequences. Should BT or AT&T provide home TV services to replace their declining telephony revenues? Should Kodak integrate a mobile phone into its cameras or just give up?

Does Microsoft still need to sell boxed software when you can download applications onto a smart phone? Does everyone have to have a mobile offering or have no future? When the communication of voice is just another software application what do equipment manufacturers like Nortel or Alcatel-Lucent do? Google just does search, right? Collisions within the telecoms, IT and media sectors are occurring now on a daily basis. Like any busy crossroads, there are going to be near misses and head on crashes. As ever, the survivors will be the companies that understand their customers, and are agile enough to quickly respond to all this change.

Unit (Assignment variant) 4

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

Text 1. What the Internet is

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

Getting connected

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

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

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

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

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

Components of the Internet

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

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

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

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

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

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

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

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

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

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

Vocabulary

4.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Software, an expansion card, a dial-up telephone connection, a broadband connection, a power plug, a remote computer, power-line Internet, an attached file, to subscribe to, USB port, modem, laptop, digital assistant.

4.3 Find in the text and/or suggest English equivalents for the following.
широкополосное соединение; внутренний; предлагать различные технические возможности; состоять из; существенный, важный; отвечать на электронные объявления, внешний.

Comprehension Check

4.4 Read the text and answer the following questions.

1. What is the Internet? 2. What happens when computers communicate with one another? 3. What is every computer given? 4. What do you need to use the Internet? 5. What does the modem convert? 6. What types of modems are there? 7. At first most computers used a dial-up telephone connection, didn't they? 8. What has become more popular nowadays? 9. Does Web TV provide email and access to the Web via a normal TV set plus a high-speed modem? 10. Aren't telephone lines essential either? 11. What are basic components of the Internet?

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

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

4.6 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

Communication signals sent over copper wire are primarily direct electrical current (DC) which is modulated to represent a frequency. Any other electrical current near the communication wire (including other communication signals) can introduce interference and noise. Multiple communication wires within a cable bundle can induce interfering electro-magnetic currents, or "cross-talk". This happens when one signal within the cable is so strong that it introduces a magnetic field into an adjacent wire, or communication pair. Energy sources such as power transmission lines, or fluorescent lighting fixtures can cause electromagnetic interference. This interference can be minimized by twisting a pair of wires around a common axis, or by the use of metallic shielding, or both. The twisting effectively creates a magnetic shield that helps to minimize "crosstalk".

Twisted pair is the ordinary copper wire that provides basic telephone services to the home and many businesses. In fact, it is referred to as "Plain Old Telephone Service" (POTS). The twisted pair is composed of two insulated copper wires twisted around one another. The twisting is done to prevent opposing electrical currents traveling along the individual wires from interfering with each other.

Each connection on twisted pair requires both wires. Since some telephone sets or desktop locations require multiple connections, twisted pair is sometimes installed in two or more pairs, all within a single cable. For some business locations, twisted pair is enclosed in a shield that functions as a ground. This is known as shielded twisted pair (STP). Ordinary wire to the home is unshielded twisted pair (UTP). Twisted pair is now frequently installed with two pairs to the home, with the extra pair making it possible to add another line - perhaps for modem use.

Twisted pair comes with each pair uniquely color coded when it is packaged in multiple pairs. Different uses such as analog, digital, and Ethernet require different pair multiples. There is an EIA/TIA standard for color coding of wires, wire pairs, and wire bundles. The color coding allows technicians to install system wiring in a standard manner. A basic single telephone line in a home will use the red and green wire. If a second phone line is provided, it will use the yellow and black wire. The most common cause of telecommunication system problems is incorrect wiring. This wiring protocol is for standard telephone set jack connections. Data systems use different arrangements and color codes. The most common is the EIA/TIA standard. Please note that NEMA and ICEA have color codes for electrical wire. Do not confuse these with telecommunication wire color coding standards.

Twisted pair is categorized by the number of twists per meter. A greater number of twists provides more protection against crosstalk, and other forms of interference and results in a better quality of transmission. For data transmission, better quality equates to fewer transmission errors. Later in this chapter, we'll look at the effects of transmission errors as they impact on throughput and delay times.

There are two types of twisted pair cables used for most in-building situations today - Category 3 UTP (CAT 3) and Category 5 UTP (CAT 5). However, as of the writing of this handbook, all new and replacement installations use CAT 5. These cables have been developed based on a set of standards issued by

the EIA/TIA (Electronic Industry Association/Telecommunications Industry Association). CAT 3 is used primarily for telephone cabling and 10Base-T installations, while CAT 5 is used to support 10/100Base-T installations. CAT 5 wiring can also be used for telephone systems. Therefore, most new installations use CAT 5 instead of CAT 3. The CAT 5 cable is pulled to a cubicle or office and connected to a universal wall plate that allows for installation of data and voice communication systems. Category 5E (CAT 5E) has been developed to accommodate GigE installations. CAT 5E is manufactured and tested under stricter guidelines than CAT 3 or CAT 5. Two new standards - CAT 6 and CAT 7 - have been adopted to meet criteria for 10GigE (and higher) transmission speeds.

Unit (Assignment variant) 5

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

Text 1. Multiplexing

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

In the majority of applications, a variety of signals must be transmitted on a single channel. The channel must, therefore, be shared among the various users. The process of sending multiple signals on a single channel is called multiplexing. If multiple signals are to be sent on a same channel, the various signals must not overlap; they must be separable. In a mathematical sense, the various signals must be orthogonal.

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

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

The multiplexed signals can be separated using frequency gates (bandpass filters). The frequencies can then be shifted back to the baseband using demodulators.

Frequency - division multiplexing is sometimes used to create a composite baseband signal. For example, in FM stereo, the two audio signals are frequency multiplexed to produce a new baseband signal. One of the audio signals occupies the band of frequencies between DC and 15kHz., whereas the second audio signal is

shifted by 38kHz. It then occupies a band between 23 and 53 kHz. There is a complete duality between the time and frequency domain.

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

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

Vocabulary

5. 2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Multiplexing; frequency; proliferation; orthogonal; time separation; frequency-division multiplexing; to overlap; a carrier signal; sampling; bandpass filter; bandwidth; a baseband signal; time axis.

5.3 Find in the text and/or suggest English equivalents for the following.

электропроводная связь; многократный (множественный); сдвигать, перемещать; переключать; теорема о дискретном представлении (теорема Шеннона-Котельникова); использовать возможность.

Grammar

5.4 Read and translate the sentences containing complex subject:

1. The original shifted signal is modified to contain the carrier sinusoid. 2. The three signals are said to be time – division multiplexed. 3. Realizations of either N and T in a queuing system should be expected to fluctuate markedly about their means. 4. This phenomenon is said to be discovered in 1864. 5. He seems to know these results very well. 6. The laser beam seems to have almost unlimited possibilities. 7. The discovery of the theory of two random variables is sure to be of great value. 8. This quantizer is said to be uniform since all of the steps are of equal size.

Comprehension Check

5.5 Answer the following questions.

1. What is a channel? 2. How were channels used in the early days of electrical wire communications? 3. What is called multiplexing? 4. In what case must the various signals be separated? 5. Where is frequency – division multiplexing used? 6. What is the original message multiplied by? 7. What do we use to separate the multiplexed signals? 8. What is there between time and

frequency domain? 9. What happens if each pulse occupies only a fraction of the time spacing between samples? 10. In what cases can the bandwidth be wider?

5.6 Translate the following equivalents and memorize them.

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

Developing Language Skills

5.7. Insert the following prepositions: *to, with, over, of, on, into*

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

5.8 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

The 24 satellites that make up the GPS space segment are orbiting the earth about 12,000 miles above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are travelling at speeds of roughly 7,000 miles an hour.

GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path. Here are some other interesting facts about the GPS satellites (also called NAVSTAR, the official U.S. Department of Defense name for GPS):

The first GPS satellite was launched in 1978. A full constellation of 24 satellites was achieved in 1994. Each satellite is built to last about 10 years. Replacements are constantly being built and launched into orbit. A GPS satellite weighs approximately 2,000 pounds and is about 17 feet across with the solar panels extended. Transmitter power is only 50 watts or less.

What's the signal? GPS satellites transmit two low power radio signals, designated L1 and L2. Civilian GPS uses the L1 frequency of 1575.42 MHz in the UHF band. The signals travel by line of sight, meaning they will pass through clouds, glass and plastic but will not go through most solid objects such as buildings and mountains.

A GPS signal contains three different bits of information - a pseudorandom code, ephemeris data and almanac data. The pseudorandom code is simply an I.D.

code that identifies which satellite is transmitting information. You can view this number on your Garmin GPS unit's satellite page, as it identifies which satellites it's receiving.

Ephemeris data, which is constantly transmitted by each satellite, contains important information about the status of the satellite (healthy or unhealthy), current date and time. This part of the signal is essential for determining a position.

The almanac data tells the GPS receiver where each GPS satellite should be at any time throughout the day. Each satellite transmits almanac data showing the orbital information for that satellite and for every other satellite in the system.

Unit (Assignment variant) 6

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

Text 1. Modern light-wave technologies. Fiber Optics

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

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

At the heart of a lightwave communication system is the optical fiber, which acts as the transmission channel carrying the light beam loaded with information. It consists of a dielectric core (usually doped silica) of high refractive index surrounded by a lower refractive index cladding. Incidentally, silica is the primary constituent of sand, which is found in so much abundance on our earth. Guidance of

light through the optical fibers takes place by the phenomenon of total internal reflection. Sending the information-loaded light beams through optical fibers instead of through the open atmosphere protects the light beam from atmospheric uncertainties such as rain, fog, pollution, and so forth.

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

Although a variety of optical fibers are available, the fibers in most use today are the so-called single-mode fibers with a core diameter of about 10 μm and an overall diameter of 125 μm . Optical fibers with typical losses in the range of 0.2 dB/km at 1550 nm and capable of transmission at 2-10 Gbit/s (Gb/s) are now commercially available. Most currently installed systems are based on communication at a 1300-nm optical window of transmission. The choice of this wavelength was dictated by the fact that around an operating wavelength of 1300 nm the optical pulses propagate through a conventional single-mode fiber with almost no pulse broadening. Because silica has the lowest loss in the 1550-nm wavelength band, special fibers known as dispersion-shifted fibers have been developed to have negligible dispersion in the 1550-nm band, thus providing us with fibers having the lowest loss and almost negligible dispersion.

In the lightwave communication systems that are in operation today, the signals have to be regenerated every 30-60 km to ensure that information is intelligibly retrieved at the receiving end. This is necessary either because the light pulses have become attenuated, and hence the signal levels have fallen below the detectable level, or because the spreading of the pulses has resulted in an overlapping of adjacent pulses leading to a loss of information. Until now this regeneration had to be achieved by first converting the optical signals into electrical signals, regenerating the signals electrically, and then once again converting the electrical signals into optical signals by modulating another semiconductor laser; such devices are called regenerators.

Recent developments in optical amplifiers based on erbium- (a rare earth element) doped silica optical fibers have opened up the possibilities of amplifying optical signals directly in the optical domain without the need of conversion to electrical signals.

Because of amplification in the optical domain itself, such systems are not limited by the speed of the electronic circuitry and indeed can amplify multiple signals transmitted via different wavelengths simultaneously.

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

Vocabulary

6.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Networking; a coherent source; a carrier wave; to retrieve; beam; a dielectric core; attenuation; loss; single-mode fiber; amplification overlapping circuitry

6.3 Find in the text and/or suggest English equivalents for the following.

рефракционный (преломляющий) коэффициент; в диапазоне; диапазон длин волны; одномодовое оптоволокно с минимальным смещением длины волны (за счет ввода легирующих добавок); легированный кремний; среда передачи.

Grammar

6.4 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, the dialog may be restarted at an agreed (earlier) synchronization point. 11. These things cannot be compared.

6.5 Choose the correct substitute for each modal verb.

1. We ought to win the race. → We (are supposed to/are allowed to/are able to) win the race.
2. I can swim. → I (have to/am able to/am supposed to) swim.
3. You must meet my best friend. → You (have to/are able to/ are allowed to) meet my best friend.
4. He should be in bed by now. → He (has to/is allowed to/ is supposed to) be in bed by now.
5. I must get up early. → I (have to/am able to/ am allowed to) get up early.
6. They may stay up late. → They (have to/are allowed to/are supposed to) stay up late.
7. She needs to see the doctor. → She (has to/is able to/ is allowed to) see the doctor.
8. We need not walk. → We (do not have to/are not able to/are not allowed to) walk.

9. You must not sleep → You (do not have to/ are not able to/are not allowed to) sleep.
10. Should I go to the cinema with them? → Am I (able to/ allowed to/supposed to) go to the cinema with them?

Comprehension Check Exercises

6.6 Answer the questions. Use the topical vocabulary.

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

6.7 Translate the following word combinations and memorize them.

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

6.8 Multiple choice.

1. The technological advances ever since have indeed revolutionized the area of telecommunication and networking.
 - a) successful transmission at the rate of 1.1 trillion bits per second;
 - b) the invention of the laser in 1960;
 - c) the analysis of optical waveguides.
2. Guidance of light through the optical fibers takes place by the phenomenon of
 - a) material dispersion ;
 - b) nonlinear effects;
 - c) total internal reflection.
3. have to be regenerated every 30-60 km to ensure that

information is intelligibly retrieved at the receiving end.

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

Developing Language Skills

6.9 Translate the following sentences into English:

- 1) Типичная система оптоволоконной передачи состоит из оптического передатчика (лазерного диода), среды передачи и оптического приёмника (фотодетектора).
- 2) Информация посылается в форме оптических импульсов через линию связи.
- 3) Специальное оптоволокно известно как волокно с дисперсионным смещением.
- 4) Светонаведение происходит посредством явления полного внутреннего отражения.
- 5) Информацию обычно кодируют в цифровой поток световых импульсов путём модуляции лазерного диода.

6.10 Make up questions beginning with the words(s) given in brackets:

- 1) This network will use multiple pairs of unshielded twisted pairs. (What?)
- 2) The length of any one segment cannot exceed 500 m. (How many?)
- 3) Sensing and transmission are done on two different channels. (Where?)
- 4) The parameters that characterize the retransmission backoff algorithm are also the same. (What parameters?)
- 5) Neither of these pairs is shared with any other node. (What?)
- 6) A hub has multiple nodes attached to it. (What nodes?)
- 7) There is a possibility that when two signals collide, one of the two may be correctly captured by some or even all of the stations. (When?)
- 8) The node to hub distance and the interhub distances are limited to 250 m. (How many?)

6.11 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

An emerging trend in telecommunications is the use of packet-switching technology for transporting voice traffic. The packet-switching protocol of choice today is the Internet Protocol (IP). The advantage of packet switching over circuit switching is cost. More voice calls can share trunks in a packet mode than in circuit-switched mode. The reason for this is the statistical nature of multiplexing in a packet-switching network. As users have something to say, bandwidth is allocated

to these users. When a user is idle (e.g., not talking) no bandwidth is being used. Conversely, in circuit switching, the same bandwidth is allocated for the call regardless of the amount of talking going on.

A simple example might help make this clear. You place a call to a friend and converse for 10 minutes. In a circuit-switched environment you have used up two times the bandwidth (*from* you and *to* you) for 10 minutes for a total of 20 minutes of bandwidth. In a packet-switched environment, 50 percent of the time you are listening, so no bandwidth is being used, and 30 percent of the time when you are talking is silence (this is a regional number; your mileage may vary). So of 20 minutes of bandwidth used for the circuit-switched example, the packet-switched examples uses 7 minutes of bandwidth. A three-to-one savings of bandwidth is incurred.

Unit (Assignment variant) 7

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

Text 1. 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 concerned with the protocols associated with the data communication network being used to link the two communicating computers. In contrast, the three upper layers (5-7) are application oriented and are concerned with the protocols that allow two end user application processes to interact with each other, normally through a range of services offered by the local operating system. The intermediate transport layer (4) masks the upper application-oriented layers from the detailed operation of the lower networkdependent layers.

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

Conceptually, therefore, each layer communicates with a similar peer layer in a remote system according to a defined protocol.

The application layer provides the user interface, normally an application

program/process, to a range of network wide distributed information services. These include file transfer access and management, as well as general document and message interchange services such as electronic mail.

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

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

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

Vocabulary

7.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Layer; ISO; OSI; link layer; session layer; transport layer; transaction; presentation layer; transfer; user interface; protocol; intermediate; convention.

7.3 Find in the text and/or suggest English equivalents for the following.

Международная организация по стандартизации; эталонная модель взаимодействия открытых систем; одноуровневые коммуникации; зависимые от сети уровни.

Grammar

7.4 Translate the following sentences and state the function of the Present Participle Passive (attribute or adverbial modifier?).

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.

Comprehension Check

7.5 Answer the following questions.

1. How many protocol layers is the logical structure of the ISO reference model made up of? 2. What are the three lowest layers concerned with? 3. What is

the function of the intermediate transport layer? 4. What is the operation principle of each layer? 5. What does the application layer provide? 6. What is the presentation layer used for? 7. Is there any difference between the presentation layer and the session layer? 8. What can you say about the transport layer?

7.6 Check how well you understand the following words and word combinations (explain or give definitions).

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

Developing language skills

7.7 Complete these sentences with these verbs:

Masks selects specified provides offers

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

7.8 Use these linking words to complete these sentences:

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

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

7.9 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

For the propagation of radio waves, a transmitter and receiver are used. A radio wave acts as a carrier of information-bearing signals; the information may be encoded directly on the wave by periodically interrupting its transmission (as in dot-and-dash telegraphy) or impressed on it by a process called modulation. The actual information in a modulated signal is contained in its sidebands, or frequencies added to the carrier wave, rather than in the carrier wave itself. The two most common types of modulation used in radio are amplitude modulation (AM) and

frequency modulation (FM). Frequency modulation minimizes noise and provides greater fidelity than amplitude modulation, which is the older method of broadcasting. Both AM and FM are analog transmission systems, that is, they process sounds into continuously varying patterns of electrical signals which resemble sound waves. Digital radio uses a transmission system in which the signals propagate as discrete voltage pulses, that is, as patterns of numbers; before transmission, an analog audio signal is converted into a digital signal, which may be transmitted in the AM or FM frequency range. A digital radio broadcast offers compact-disc-quality reception and reproduction on the FM band and FM-quality reception and reproduction on the AM band.

Receiving antennas intercept part of this radiation, change it back to the form of electrical signals, and feed it to a receiver. The most efficient and most common circuit for radio-frequency selection and amplification used in radio receivers is the superheterodyne. In that system, incoming signals are mixed with a signal from a local oscillator to produce intermediate frequencies (IF) that are equal to the arithmetical sum and difference of the incoming and local frequencies. One of those frequencies is applied to an amplifier. Because the IF amplifier operates at a single frequency, namely the intermediate frequency, it can be built for optimum selectivity and gain. The tuning control on a radio receiver adjusts the local oscillator frequency. If the incoming signals are above the threshold of sensitivity of the receiver and if the receiver is tuned to the frequency of the signal, it will amplify the signal and feed it to circuits that demodulate it, i.e., separate the signal wave itself from the carrier wave.

There are certain differences between AM and FM receivers. In an AM transmission the carrier wave is constant in frequency and varies in amplitude (strength) according to the sounds present at the microphone; in FM the carrier is constant in amplitude and varies in frequency. Because the noise that affects radio signals is partly, but not completely, manifested in amplitude variations, wideband FM receivers are inherently less sensitive to noise. In an FM receiver, the limiter and discriminator stages are circuits that respond solely to changes in frequency. The other stages of the FM receiver are similar to those of the AM receiver but require more care in design and assembly to make full use of FM's advantages. FM is also used in television sound systems. In both radio and television receivers, once the basic signals have been separated from the carrier wave they are fed to a loudspeaker or a display device (usually a cathode-ray tube), where they are converted into sound and visual images, respectively.

Unit (Assignment variant) 8

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

Text 1. Asynchronous Transfer Mode (ATM)

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

B-ISDN standards are being developed in a number of national standards bodies around the world and by the International Telecommunications Union-Telecommunications Standards Sector (ITU-TS). Another major contributor to solving interoperability problems among asynchronous transfer mode (ATM) equipment is the ATM Forum, a consortium of more than 500 companies worldwide.

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

The transfer mode is defined as a technique used for transmission, multiplexing, and switching aspects of communication networks. ATM is envisioned to have the following properties:

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

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

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

(By Ralf O.Onvural)

Vocabulary

8.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Path; broadband; flexibility; multiplexing; node; interoperability; framework; asynchronous; bandwidth; packet switching; cell header; fixed size cells.

8.3 Find in the text and/or suggest English equivalents for the following.

Поле данных (48 байт); организация буферизации данных; идентификатор виртуального канала; на высоких скоростях передачи (данных); быть навязанным; широкий спектр услуг.

Grammar

8.4 В тексте встречается конструкция, именуемая “Complex subject” : The short packet size of ATM, at high transmission rates, is expected to offer full bandwidth flexibility

Повторите грамматический материал и перефразируйте предложения, используя предложенное слово и учитывая тему Complex Subject.

1. Somebody has told me that Ann is at home.
(said) Ann.....at home
2. It is thought that life on our planet was brought by aliens.
(thought) The life on our planetby aliens.
3. Many people believe that Shakespeare wrote more poems that we know of.
(believed) Shakespeare..... more poems than we know of.
4. Some people believed that somebody had helped Alison during the test.
(believed) Alisonduring the test.
5. People suppose that disasters are an inevitable part of our lives.
(supposed) Disasters..... an inevitable part of our lives.
6. Some people suppose that this abandoned house was a museum in the past.
(supposed) This abandoned housea museum in the past.
7. They thought that Andrew committed that crime.
(thought) Andrew..... that crime.
8. Everyone believes that Chelsea is the most expensive team.
(believed) Chelseathe most expensive team.
9. Everyone believed that Chelsea was the most expensive team.
(believed) Chelsea..... the most expensive team.

Comprehension Check

8.5 Answer the following questions.

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

8.6 Read and translate the following terms (word combinations.

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

8.7 Find words in the text to which the following are antonyms.

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

Developing language skills

8.8 Complete the following sentences.

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

2. are being developed in a number of national standards bodies around the world.

3. The term asynchronous states that the cells may appear at irregular intervals in the network.

4. An ATM cell a 5-byte cell header and a 48-byte payload.

5. ATM requires connections to be established prior to

8.9 Make the following sentences negative.

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

8.10 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

The Internet has benefits but also drawbacks. Because of this, some organisations have developed their own versions called intranets. For example, a school might decide that open access to the Internet is not appropriate for all students, so develops an intranet. What would this intranet look like?

The school has a number of LANs which are connected together to form WAN. Students have access to various parts of the WAN. It includes an email service for teachers and for students. Students often use it for handing in homework which has been done on computer using resources made available on the WAN.

Teachers use the WAN to send messages to students about work and also about clubs and societies. The teacher in charge of the hockey team can send an email to all the players, marked urgent, telling them that the game this evening is cancelled. The science teacher can make information available to students in the form of web pages either taken from the Internet or created especially for the school WAN.

Students can access the WAN at school but also through their Internet connection from their home computer. To do this they will need a user ID and a password. The WAN is now a small version of the Internet - it even has pages of information which look like Internet pages because they are created in the same way.

Access to information on the WAN is via a web browser, just like on the Internet. A network used in this way is called an *intranet*.

Both intranets and the Internet have a large amount of information and can be used for communication. They both use browser software to allow a user to access information in web pages.

The main difference between an intranet and the Internet is size: an intranet is a small version of the Internet. In order to see and use the contents of an intranet

you need to be known to the system and have logon details to identify yourself. The need for users to be known to the system and the consequent restriction on the number of people using it leads to a number of important differences between intranets and the Internet.

Advantages of intranets

1. Because the membership of the intranet is restricted, the views that are posted there are more likely to be relevant (they will be about school or schoolwork).

2. The information on the intranet will be useful (information on the school intranet will be aimed at IGCSE level of understanding, not university level).

3. The information on the intranet will be reliable (information on the intranet will be correct and there will be no hoax sites).

4. There are fewer people using the intranet and there will be a limited amount of information on it. This will mean that communication and access to the information will be much faster; it will also be much easier to search for the required information.

5. Using the intranet is safer than using the Internet because the intranet does not have any inappropriate material on it and the people who are using it are all from within the school.

6. The intranet is less susceptible to hacking and viruses because access to it is limited.

Disadvantages of intranets

1. Intranets are restricted so they have the disadvantage of not having the same volume of information as the Internet.

2. Intranets tend only to have one view whereas the Internet will provide different arguments from different people about a topic. (The science department may only have information about the beginning of the universe being due to the big bang because that is what is on the syllabus. There are many other theories about the start of the universe which would be featured on the Internet but not necessarily on the intranet.) Because

of the need to control the size of the intranet it is necessary to be very selective about the information on it. This means that the information tends to reflect the views of the people who decide the information to be included, in this case the science teacher.

3. Communication on the intranet is fine as long as the people who you need to communicate with are also members of the organisation and hence have access to the intranet. This is very restricting and communication with others outside the organisation needs to be done by using the Internet.

Unit (Assignment variant) 9

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

Text 1. Echo cancellation

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

A similar problem is caused by crosstalk in transmission systems over voicegrade unshielded twisted-pair cables for local-area network applications, where multipair cables are used to physically separate the two directions of transmission.

Crosstalk is a statistical phenomenon due to randomly varying differential capacitive and inductive coupling between adjacent two-wire transmission lines. At the rates of several megabits per second that are usually considered for local-area network applications, near-end crosstalk represents the dominant disturbance; hence near-end crosstalk cancellation must be performed to ensure reliable communication.

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

(Giovanni Cherubini. IBM Zurich Research Laboratory)

Vocabulary

9.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

full-duplex; a digital subscriber loop; a circuit; impedance; echo cancellation; passband; mismatch; disturbance; jitter; crosstalk; algorithm; a hybrid; baseband; impairment.

9.3 Find in the text and/or suggest English equivalents for the following.
на близком(соседнем) конце; зависеть от; дубликат (точная копия); одновременный; неэкранированная витая пара.

Grammar

9.4 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.

9.5 Translate into Russian paying special attention to Perfect Participle.

1. Having experienced the advantages, we plan to equip our 140 vehicles with mobile communication. 2. Having been repaired, the computer began operating better. 3. Having taken all these factors into account, the latest investment paid for itself. 4. Having repaired the computer, the engineer showed it to the manager. 5. Having been installed, the nonsystem premises wiring began to meet the requirements of an insulation standards. 6. Having said this, she stopped speaking. 7. Having established the channel response, the scheme illustrates noise spectrum identification.

Comprehension Check

9.6 Translate the following words and word combinations into Russian. Find and write out sentences with them.

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

9.7 Find the corresponding ending for the following statements.

1. This sequence is converted into an analog signal...

2. To avoid signal reflections at the near and far-end hybrid,....
3. The signal obtained after echo cancellation.....
4. The transmitted data consist of a sequence of.....
5. Near-end crosstalk cancellation must be performed.....
 - a) a precise knowledge of the line
 - b) impedance would be required.
 - c) is processed by a detector.
 - d) by a digital to analog converter.
 - e) to ensure reliable communication.
 - f) independent and identically disturbed
 - g) real-valued symbols.

Developing language skills

9.8 Complete the sentences with the correct preposition:

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

9.9 Read the following text, guess or suggest a title to it, choose and insert the proper verb form, and write a summary (approximately 7 sentences).

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

Text 2._____

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

The twisted pair of wires station apparatus to the central office is called the local loop. The very first stage of switching at the central office. From

there, telephone calls may be connected to other central offices, over interoffice trunks.

Calls may also..... over much greater distances by connection to the longdistance networks..... by a number of interchange carriers.

Unit (Assignment variant) 10

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

Text 1. Ultrafast Fiber Switching Devices and Systems

Future switching systems are expected to process net data rates approaching a terabit per second (Tbit/s). The terabit benchmark is significant from a research standpoint because it means that the system will require different devices and architectures that are currently in use. These future systems may use some aspect of photonic switching to take advantage of inherent optical properties. “Ultrafast” means having speeds greater than 50 Gbit/s, or at least beyond the speeds that electronic systems may reach.

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

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

Routing and logic switches differ fundamentally in the manner of the control. In routing switches, the control is typically in a different physical format than the

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

Vocabulary

10.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

switching system; data rate; bandgap; a routing switch; switching fabric; cross-talk; a logic gate; dispersion; intelligence (не ум, не интеллект и не разведка!); digital logic; saturable absorber; logical approach; physical format.

10.3 Find in the text and/or suggest English equivalents for the following.

Коммутационные системы; с точки зрения исследования; присущие оптические свойства; искажение волновой функции; высокие скорости передачи битов, волновод, выходной порт, маршрутизация, на основе цифровой логики; логический вентиль; с другой стороны; механизм коммутации; отрицательная сторона; виртуальный переход; точка зрения; электропитание; механизм переключения (коммутации); логическая (булева) операция; главные препятствия.

Comprehension Check

10.4. Answer the following questions.

1. What is expected to process net data rates approaching a terabit per second?
2. Why is the terabit benchmark significant?
3. What may these future systems use?
4. What does “ultrafast” mean?
5. What do devices based on “all-optical” interactions rely on?
6. Why aren’t the devices limited by carrier recombination times in the material?
7. In what way can all-optical switching be realized?

8. Where does most of the energy incident on the waveguide or fiber devices reappear?
9. How many categories can ultrafast devices be divided into?
10. What can you say about the first category?
11. What happens if only one output port is employed?
12. Why are routing switches called “physical” switches?
13. What is the other category?
14. Why do modern electronic systems operate based on digital logic?
15. How do routing and logic switches differ?
16. How is the signal level and timing regenerated at the output of each gate in digital logic gates?

10.5 Complete the following sentences:

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

10.6 Complete the following sentences using the words from the box:

Phase means include preserved logic decreases

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

Developing language skills

10.7 Translate the following passive constructions paying attention to the verbs followed by prepositions:

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

10.8 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

Network Topology is network structure that tells how nodes are connected to form the network. Physical topology is the actual geometric layout of nodes. The basic typologies are Bus, Star and Ring. You can create other topologies like mesh, hybrid, tree topologies by combining and modifying the basic typologies.

The choice of topology for a network will depend upon the choice of transmission media, access method, desired performance, reliability, size, expandability, cost, availability of communication lines etc.

Bus topology is one of the basic topology where nodes (computers and/or network devices) are connected linearly, with each node directly connected to the network cable (known as trunk or bus). A drop cable is connected with the trunk using a T connector. The bus has terminator at both end which absorb the signal to remove it from bus if it is not picked by any node. Bus topology is easy to implement and extend, easier to identify the cable fault but this topology has disadvantages like limited cable length and number of stations, the problem in network cable (trunk or bus) causes the break down of entire network, and the maintenance cost can be higher in long run.

Ring topology is a network structure where arrangement of nodes forms a loop or ring. The data is sent to only one direction of the ring and each node picks up, checks if it is destined to it, if not re-transmits down to the next neighbor. So the signal quality in ring topology is high. Any data packet if returned to the sender, the sender removes it from ring.

Ring topology performs better under heavy network load than bus topology, does not require network server and it is easier to use optical fibers as transmission media but ring topology has disadvantages like node failure causes network failure, it is difficult to diagnose faults in ring topology, network configuration is difficult.

In *Star topology*, there is a central computer or network device like hub, switch etc. with which all other nodes are connected (all-to-one connection). The central

computer is called hub node and other computers are leaf nodes. All the data passes through the hub node to reach up to its destination. Hub manages and controls all the functions as well as acts as a repeater for the data flow.

Star topology has advantages such as it is easy to install, detect faults and remove parts, no disruptions to the network functioning when adding new nodes or removing nodes. However star topology suffers from drawbacks like heavy dependence on hub node and problem in hub node can cause whole network failure, the performance and scalability (extensibility) of network depends on the capability of hub.

Unit (Assignment variant) 11

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

Text 1. Video Conferencing

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 becomes magnified to the point when they can distract the audience from getting the intended message.

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

A videoconferencing studio is normally constructed for four to six participants, sitting along one side of a conference table. Facing them will be a video wall in which the screens and cameras are mounted. For more than three participants, two cameras are recommended. These are mounted near the centre of the video wall and are aimed 'cross-fire' to avoid the unfortunate intimidating effect that follows from a participant staring directly, and apparently fixedly, into the camera whilst, in fact, viewing the main monitor. The use of dual cameras ensures that the image of each person is of reasonable size and that not too much space is registered above and in front of the participants.

The two pictures are combined by a split-screen unit (SSU) into the video frame for transmission. At the remote site, the SSU can de-split the picture on to two screens. If there are three or fewer participants, the SSU can be switched off from the users panel. Fixed camera positioning is generally preferable and is less expensive.

Systems, usually activated by voice switches, which 'zoom-in' on the speaker, are available but have the disadvantage of preventing the remote viewer from seeing the reactions of the local participants.

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

Vocabulary

11.2 Compile the vocabulary (term) log as shown in the preface (part of speech, definition, translation, synonyms and antonyms if possible, example of use). Words (concepts) are given below.

Disturbance; cross-fire; voice switches; 'zoom-in'; a split-screen unit; video frame; user panel; voice switches; videoconference; a video wall; to be mounted; to filter out; extraneous; the main monitor.

11.3 Find in the text and/or suggest English equivalents for the following.

декомбинированное изображение; непрерывность, последовательность; устройство с комбинированным экраном; обеспечивать, гарантировать; фильтровать, обрабатывать; в естественной и непринужденной обстановке;

Grammar

11.4 Make the following sentences interrogative paying attention to modal verbs with the Infinitive Passive:

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

11.5 Make an adverb from the given adjectives.

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

Comprehension Check

11.6 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?

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

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

Developing Language Skills

11.8 Complete the following sentences using parts from the list below (a),b),c)...). Translate them.

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

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

1, This investigation is likely to produce good results. 2. Automatic electronic links to customers are expected to be introduced in the second stage of the project. 3. This causes the current to flow in the circuit. 4. Graphic symbols on a map are said to be more readily understood than a written text or synthesized speech. 5. Maintenance costs are likely to be minimal. 6. All messages are likely to be sent over the satcoms

network. 7. The nature of the constellation allows a partial service to be offered with just four satellites in orbit. 8. They determined signals on the thinner cable to be less immune and to suffer greater degradation. 9. We observe the transmitting nodes detect collisions when voltages in excess of the amount. 10. The demand for networked digital video conferencing systems on PCs or workstations is expected to be substantial.

11.10 Read the following text, guess or suggest a title to it, and write a summary (approximately 7 sentences).

Text 2. _____

Think of an analogy with the postal system. IP is similar to the U.S. Postal System in that it allows a package (a datagram) to be addressed (encapsulation) and put into the system (the Internet) by the sender (source host). However, there is no direct link between sender and receiver.

The package (datagram) is almost always divided into pieces, but each piece contains the address of the receiver (destination host). Eventually, each piece arrives at the receiver, often by different routes and at different times. These routes and times are also determined by the Postal System, which is the IP. However, the Postal System (in the transport and application layers) puts all the pieces back together before delivery to the receiver (destination host).

Note: IP is actually a connectionless protocol, meaning that the circuit to the receiver (destination host) does not need to be set up before transmission (by the source host). Continuing the analogy, there does not need to be a direct connection between the physical return address on the letter/package and the recipient address before the letter/package is sent.

Originally, IP was a connectionless datagram service in a transmission control program created by Vint Cerf and Bob Kahn in 1974. When format and rules were applied to allow connections, the connection-oriented Transmission Control Protocol was created. The two together form the Internet Protocol Suite, often referred to as TCP/IP.

Internet Protocol version 4 (IPv4) was the first major version of IP. This is the dominant protocol of the Internet. However, IPv6 is active and in use, and its deployment is increasing all over the world.

Addressing and routing are the most complex aspects of IP. However, intelligence in the network is located at nodes (network interconnection points) in the form of routers which forward datagrams to the next known gateway on the route to the final destination. The routers use interior gateway protocols (IGPs) or external gateway protocols (EGPs) to help with making forwarding route decisions. Routes are determined by the routing prefix within the datagrams. The routing process can therefore become complex. But at the speed of light (or nearly so) the routing intelligence determines the best route, and the datagram pieces and datagram all eventually arrive at their destination.

