ЛАНЬ®
• САНКТ-ПЕТЕРБУРГ •
• МОСКВА •
• КРАСНОДАР •
2013

ENGLISH

for Network Students

Professional Course

Н. А. БЕСЕДИНА
В. Ю. БЕЛОУСОВ

АНГЛИЙСКИЙ ЯЗЫК

для инженеров компьютерных сетей

профессиональный курс

УЧЕБНОЕ ПОСОБИЕ

Издание второе, переработанное

САНКТ-ПЕТЕРБУРГ • МОСКВА • КРАСНОДАР
2013

ББК 81.2-923я73
Б 53

Беседина Н. А., Белоусов В. Ю.

Б 53 Английский язык для инженеров компьютерных сетей. Профессиональный курс / English for Network Students. Professional Course: Учебное пособие. — 2-е изд., перераб. — СПб.: Издательство «Лань», 2013. — 352 с.: ил. — (Учебники для вузов. Специальная литература).

ISBN 978-5-8114-1458-1

Данное учебное пособие предназначено для изучения английского языка в области сетевых технологий. Книга содержит оригинальные тексты профессиональной направленности и задания, способствующие усвоению и запоминанию специальной лексики из области сетевых технологий; задания для развития навыков чтения, свертывания информации при составлении рефератов на английском языке, а также формирования иноязычной профессиональной коммуникативной компетенции в условиях профессионального общения.

Пособие рассчитано на студентов, обучающихся по специальности «Сети связи и системы коммутации» и направлению подготовки бакалавриата «Инфокоммуникационные технологии и системы связи», а также всех тех, кто изучает структуру и функционирование локальных вычислительных сетей и глобальной сети Интернет и заинтересован в совершенствовании английского языка в указанной области. Пособие может быть использовано для организации самостоятельной работы студентов.

ББК 81.2-923я73

Рецензенты:

Е. А. ОГНЕВА — доктор филологических наук, профессор кафедры иностранных языков № 2 Белгородского государственного национального исследовательского университета; *Л. А. ФУРС* — доктор филологических наук, профессор, зав. кафедрой английской филологии Тамбовского государственного университета им. Г. Р. Державина.

Обложка
Е. А. ВЛАСОВА

INTRODUCTION

Данное пособие предназначено для студентов неязыковых факультетов высших учебных заведений, получающих образование по специальностям и направлениям бакалавриата в области сетевых технологий. Оно является частью серии учебных пособий «Английский язык для инженеров компьютерных сетей» и включает в себя материал профессионального курса. Поскольку будущая профессиональная деятельность студентов указанных направлений и специальностей предполагает активное использование английского языка, пособие содержит оригинальные тексты и учебные задания, направленные на усвоение специальной лексики из области сетевых технологий и развитие лингвистических компетенций. Все тексты взяты из англоязычных изданий последних лет. Цель пособия — помочь студентам овладеть навыками перевода, аннотирования и реферирования аутентичных профессиональных текстов в области сетевых технологий, развить навыки чтения и говорения, а также расширить словарный запас в области современных сетевых технологий.

Пособие состоит из двадцати шести уроков, имеющих унифицированную структуру. Каждый урок содержит оригинальный англоязычный текст профессиональной направленности, упражнения к нему, грамматический раздел, текст на русском языке по той же тематике для перевода на английский язык, тестовые задания для самоконтроля. Послетекстовые упражнения включают в себя задания для развития разных видов чтения, выработки навыков свертывания информации при реферировании на английском языке, а также задания, направленные на формирование коммуникативных компетенций в условиях иноязычного профессионального общения.

В пособие включен также список электронных источников, содержащих дополнительную информацию по тематике уроков. Данные источники могут быть использованы студентами для самостоятельной работы с иноязычной информацией при подготовке рефератов и выполнении учебно-исследовательских проектов.

Авторы выражают благодарность рецензентам: д. ф. н., профессору Л. А. Фурс и д. ф. н., профессору Е. А. Огневой, а также коллективу кафедры делового иностранного языка Белгородского государственного национального исследовательского университета за замечания и предложения, высказанные в ходе работы над пособием.

SECTION ONE

THE INTERNET

Internet is a collection
of networks connected by routers.
(Webster's New World ™ Hacker Dictionary)

QUIZ 1

Since its popularization during the 1990s, the Internet has become a big part of our lives. But it's changed a good deal since then — many people believe we're currently experiencing Web 2.0, a richer, more advanced experience of connecting with other users. If we're in Web 2.0 right now, though, what's Web 1.0? And what's the difference between the Internet and the World Wide Web? Before reading Text 1, take this quiz to check your knowledge.

1. Who coined the term Web 2.0?

a) Tim O'Reilly

b) Dale Dougherty

c) Steve Jobs

2. According to Tim O'Reilly, the Web 2.0 philosophy:

a) Sacrifices users' security

b) Democratizes the Web

c) Makes the Internet really boring

3. Which of the following is a feature of Web 1.0?

a) Static Web sites

b) Interactive Web sites

c) Social networking

4. What's an example of a Web 1.0 site?

a) An online bookstore that lets customers post reviews

b) A social networking site that lets users share photos and make public comments

c) An official online encyclopedia

5. What's considered the «backbone» of the World Wide Web?

a) Uniform resource locator (URL)

b) Hypertext mark-up language (HTML)

c) Hypertext transfer protocol (HTTP)

6. What's the difference between HTTP and HTML?

a) HTML describes what's on the page, HTTP allows sites to communicate with each other

b) HTTP describes what's on the page, HTML allows sites to communicate with each other

c) There's no difference, they mean the same thing

7. What's the best way to describe the Internet?

a) One master computer that connects to all of our homes

b) A network of networks

c) A series of pipes

8. We access the World Wide Web using:

a) Browsers

b) Instant messaging applications

c) Spidery senses

9. What's one way you can use the Internet without using HTTP?

a) Using a browser

b) Accessing e-mail

c) Using a telephone

10. The Internet began with the development of:

a) USENET

b) ARPANET

c) Ethernet

(To find correct answers to this quiz, see pages 329–330)

UNIT 1

TEXT 1
THE INTERNET

PART 1. HOW DOES THE INTERNET WORK?

Even though the Internet is still a young technology, it's hard to imagine life without it now. Every year, engineers create more devices to integrate with the Internet. This network of networks crisscrosses the globe and even extends into space. But what makes it work?

To understand the Internet, it helps to look at it as a system with two main components. The first of those components is hardware. That includes everything from the cables that carry terabits of information every second to the computer sitting in front of you.

Other types of hardware that support the Internet include routers, servers, cell phone towers, satellites, radios, smartphones and other devices. All these devices together create the network of networks. The Internet is a malleable system — it changes in little ways as elements join and leave networks around the world. Some of those elements may stay fairly static and make up the backbone of the Internet. Others are more peripheral.

These elements are connections. Some are end points — the computer, smartphone or other device. We call those end points clients. Machines that store the information we seek on the Internet are servers. Other elements are nodes which serve as a connecting point along a route of traffic. And then there are the transmission lines which can be physical, as in the case of cables and fiber optics, or they can be wireless signals from satellites, cell phones or 4G towers, or radios.

All of this hardware wouldn't create a network without the second component of the Internet: the protocols. Protocols are sets of rules that machines follow to complete tasks. Without a common set of protocols that all machines connected to the

Internet must follow, communication between devices couldn't happen. The various machines would be unable to understand one another or even send information in a meaningful way. The protocols provide both the method and a common language for machines to use to transmit data.

We'll take a closer look at protocols and how information travels across the Internet in the next part.

Essential vocabulary (1)

Words

backbone *n*	crisscross *v*	protocol *n*
client n	end point *n*	router *n*
complete *v*	feature *n*	server *n*
create *v*	node *n*	support *v*, *n*

Word Combinations

to become part of one's life	to seek on the Internet
to coin the term	to follow the sets of rules
it's hard to imagine	to store information
malleable system	to create a network
support the Internet	to provide both ... and ... (for)

EXERCISES

1. Find in part 1 of text 1 English equivalents for the following words and phrases:

молодая технология оплетать земной шар; система с двумя основными составляющими; передавать терабиты информации; включать в себя все, начиная от ... и заканчивая ... ; гибкая система; составлять основу Интернета; маршрут передачи данных; линии передачи данных; выполнять задачи; набор правил (инструкций); понимать друг друга.

2. Transcribe and learn to read the following words:

technology, component, support, malleable, client, satellite, meaningful.

3. Write the Past Indefinite and the Past Participle of the verbs:

create, make, understand, include, carry, leave, stay, seek, send, follow, take, happen.

4. Find in part 1 of text 1 synonyms to the following words and word combinations:

to fancy, to reach, earth, element, to comprise, mobile phone, machine, to produce, all over the world, to look for, way, to perform, to forward information, manner.

5. Match the words on the left with their definitions on the right.

1. Hardware	a) Machine that stores information on the Internet.
2. Client	b) Set of rules that machine follows to complete tasks.
3. Server	c) End point.
4. Node	d) Everything that includes cables, routers, servers, cell phone towers, satellites, radios, smartphones.
5. Protocol	e) Element serving as a connecting point along a route of traffic.

6. Translate the passages in writing.

A) The Internet is a malleable system — it changes in little ways as elements join and leave networks around the world. Some of those elements may stay fairly static and make up the backbone of the Internet. Others are more peripheral.

B) Protocols are sets of rules that machines follow to complete tasks. Without a common set of protocols that all machines connected to the Internet must follow, communication between devices couldn't happen. The various machines would be unable to understand one another or even send information in a meaningful way. The protocols provide both the method and a common language for machines to use to transmit data.

7. Answer the following questions using the information from part 1 of text 1.

1. How many main components does the Internet have? What are they? 2. What does hardware include? 3. How do we call end points? 4. What are servers? 5. What function do nodes perform? 6. Can you give examples of physical transmission lines? 7. What are protocols? 8. What do the protocols provide?

8. Look through part 1 of text 1 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Even though the Internet is an ancient technology, it's hard to imagine life without it now. ☐
2. To understand the Internet, we should look at it as a system with three main components. ☐
3. The first component includes everything from cables to computers. ☐
4. The Internet is an inflexible system — it doesn't change at all as elements join and leave networks. ☐
5. Connections are peripheral elements. ☐
6. Computers, smartphones, tablets are called clients. ☐
7. Servers are machines that serve as a connecting point along a route of traffic. ☐
8. Hardware can easily create a network without protocols. ☐
9. All the machines connected to the Internet must follow the protocols to complete tasks. ☐
10. The protocols provide only the method for machines to transmit data. ☐

9. Make summary of part 1 of text 1 using opening phrases on pages 336–337.

10. Read the text below. Put the verbs in brackets into the correct tense-aspect form.

a) Provide definitions to the words and word combinations in bold type.

b) Summarize the text in 5–6 sentences (use opening phrases on pages 336–337).

Early Networks

In 1973, engineers (to begin) to look at ways to connect **ARPANET** to the packet radio network (PRNET). A packet radio network (to connect) computers through radio transmitters and receivers. Instead of sending data across phone lines, the computers (to use) radio waves. It (to take) three years, but in 1976 engineers successfully (to connect) the two networks.

Technicians (to join) the Satellite Network (SATNET) to the other two networks in 1977. They (to call) the connection between multiple networks inter-networking, or the Internet for short.

Other early computer networks soon (to join). They (to include) USENET, **BITNET**, CSNET and NSFNET.

In 1990, Tim Berners-Lee (to develop) a system designed to simplify navigation on the Internet. In time, this system (to become) known as the *World Wide Web*. It (not to take) long for some people to mistakenly identify the Internet and the Web as the same thing. The Internet (to be) a global interconnection of computer networks; the World Wide Web (to be) a way to navigate this massive network. In sailing terms, it's like comparing an ocean to a ship.

Most early Internet users (to be) government and military employees, graduate students and computer scientists. Using the World Wide Web, the Internet (to become) much more accessible. Colleges and universities (to begin) to connect to the Internet, and businesses soon (to follow). By 1994, Internet commerce (to become) a reality.

Today, the Internet (to be) more complex than ever. It (to connect) computers, satellites, mobile devices and other gadgets together in a massive network millions of times more intricate than the original ARPANET.

(By Jonathan Strickland)

11. Put the operations in the order that you do them (variations are possible).

- ☐ close down your browser
- ☐ connect to your ISP
- ☐ disconnect from the internet
- ☐ enter a web address (also known as a URL) into the address field
- ☐ launch your browser (for example, Internet Explorer, Netscape Navigator or Mozilla Firefox)
- ☐ perhaps wait for a few seconds while the web-page downloads
- ☐ view the page

12. Translate the following text into English.

Интернет как сеть сетей

Сеть Интернет можно описать как огромную цифровую магистраль — систему, связывающую миллионы компьютеров, подключенных к тысячам сетей по всему миру. Ее яркое прошлое уходит своими корнями в эпоху холодной войны, конец 60-х — начало 70-х годов. Официально можно считать, что Интернет, в современном понимании, родился 2 января 1969 года. В этот день были начаты работы над проектом ARPANET.

Первоначально данные разработки финансировались правительством США, и сеть, ставшая предшественницей Интернета, была специально спроектирована таким образом, чтобы обеспечить коммуникации между правительственными узлами в том случае, если часть ее выйдет из строя в результате ядерной атаки. Применяемый в ней алгоритм управления передачей информации (межсетевой протокол) был разработан так, чтобы компьютеры всех видов могли совместно использовать сетевые средства и непосредственно взаимодействовать друг с другом как одна эффективно интегрированная компьютерная сеть.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 1

BRITISH AND AMERICAN ENGLISH

Many words in the field of IT come from American English. So you may see the following spellings:

British English	American English
–our honour colour	**–or** honor color
–re centre fibre metre	**–er** center fiber meter
–ce defence licence	**–se** defense license
–s– organisation analyse	**–z–** organization analyze
–ue catalogue dialogue	– catalog dialog
–ll– travelled cancelling dialled	**–l–** traveled canceling dialed
–me programme	– program

The difference also takes place in word usage. Look at the table below:

British English	American English
flat	apartment
lawyer	attorney
luggage	baggage
milliard	billion
cab	taxi
company	corporation
city/town centre	downtown
chemist's	drugstore
lift	elevator
autumn	fall
petrol	gas
motorway	highway
cross-roads	intersection
living room	drawing room
coach	long-distance bus
post	mail
cinema	movies
trousers	pants
sleeper	Pullman
railway	railroad
shop-assistant	salesman, clerk
time-table	schedule
football	soccer
underground	subway
booking office	ticket office
to be sick	to be ill
advocate	trial lawyer
lorry	truck
boot	trunk

13. Match the British words and phrases with their American equivalents (use the table above and your dictionary if necessary).

British	American
flat	candy
tube	gasoline
shop	store
chemist	can
grey	sidewalk
area	elevator
mates	airplane
dustbins	apartment
lift	buddies
sweets	hood
biscuits	french fries
chips	do the dishes
post	garbage cans
autumn	wash up
bill	check
petrol	zip code
mum	closet
aeroplane	vacation
crisps	cookies
caravan	drug store
holiday	potato chips
post code	neighborhood
tin	subway
pavement	gray
wardrobe	trailer
wash up	mail
wash your hands	fall
car bonnet	mom

UNIT 2

PART 2. A MATTER OF PROTOCOLS

You've probably heard of several protocols on the Internet. For example, hypertext transfer protocol is what we use to view Web sites through a browser — that's what the *http* at the front of any Web address stands for. If you've ever used an FTP server, you relied on the file transfer protocol. Protocols like these and dozens more create the framework within which all devices must operate to be part of the Internet.

Two of the most important protocols are the transmission control protocol (TCP) and the Internet protocol (IP). We often group the two together — in most discussions about Internet protocols you'll see them listed as TCP/IP.

What do these protocols do? At their most basic level, these protocols establish the rules for how information passes through the Internet. Without these rules, you would need direct connections to other computers to access the information they hold. You'd also need both your computer and the target computer to understand a common language.

You've probably heard of IP addresses. These addresses follow the Internet protocol. Each device connected to the Internet has an IP address. This is how one machine can find another through the massive network.

The version of IP most of us use today is IPv4, which is based on a 32-bit address system. There's one big problem with this system: We're running out of addresses. That's why the Internet Engineering Task Force (IETF) decided back in 1991 that it was necessary to develop a new version of IP to create enough addresses to meet demand. The result was IPv6, a 128-bit address system. That's enough addresses to accommodate the rising demand for Internet access for the foreseeable future.

When you want to send a message or retrieve information from another computer, the TCP/IP protocols are what make the transmission possible. Your request goes out over the network, hitting domain name server (DNS) along the way to find the target server. The DNS points the request in the right direction. Once the target server receives the request, it can send a response back to your computer. The data might travel a completely different path to get back to you. This flexible approach to data transfer is part of what makes the Internet such a powerful tool.

In the next part we'll take a closer look at how information travels across the Internet.

Essential vocabulary (2)

Words

access *n*, *v*	hit *v*	DNS
accommodate *v*	massive *adj*	FTP
approach *n*, *v*	operate *v*	HTTP
browser *n*	rely (on) *v*	IETF
completely *adv*	request *n*, *v*	IP
decide *v*	run out *v*	TCP
develop *v*	stand for *v*	
hold *v*	view *n*, *v*	

Word Combinations

to view Web sites	to send a response
to establish rules	to retrieve information
direct connections (to)	to make smth. possible
to access information	to receive the request
to meet demand	data transfer
to send a message	target computer

EXERCISES

1. Find in part 2 of text 1 English equivalents for the following words and phrases:

просматривать веб-сайты с помощью браузера; прямое подключение к другим компьютерам; большая сеть; 32-битная система адресов; новая версия Интернет-протокола; обеспечивать возрастающие потребности; обозримое будущее; достигать; находить целевой сервер; перемещаться по совершенно разным маршрутам; гибкий подход.

2. Transcribe and learn to read the following words:

control, discussion, access, through, enough, foreseeable, receive, completely.

3. Write the Past Indefinite and the Past Participle of the verbs:

hear, rely, see, do, establish, hold, find, have, run, meet, go, hit, receive, point, travel, get.

4. Find in part 2 of text 1 synonyms to the following words and word combinations:

for instance, maybe, to mean, to work, significant, to set up, to comprehend, enormous, to supply, to pull out information, to enable, to reach, absolutely, to return.

5. Write the expansions of the following abbreviations and learn them:

HTTP, TCP, IP, FTP, IETF, DNS.

6. Translate the passages in writing.

A) If you've ever used an FTP server, you relied on the file transfer protocol. Protocols like these and dozens more create the framework within which all devices must operate to be part of the Internet.

B) At their most basic level, these protocols establish the rules for how information passes through the Internet. Without these rules, you would need direct connections to other computers to access the information they hold.

C) There's one big problem with this system: we're running out of addresses. That's why the Internet Engineering Task Force (IETF) decided back in 1991 that it was necessary to develop a new version of IP to create enough addresses to meet demand. The result was IPv6, a 128-bit address system. That's enough addresses to accommodate the rising demand for Internet access for the foreseeable future.

7. Answer the following questions using the information from part 2 of text 1.

1. What kind of protocol do we use to view Web sites through a browser? 2. What are two of the most important protocols? 3. What is the function of these protocols? 4. What does each device connected to the Internet have? 5. What address system is IPv4 based on? 6. What is the difference between IPv4 and IPv6? 7. What does our request hit to find the target server? What does the DNS do? 8. What makes the Internet such a powerful tool?

8. Look through part 2 of text 1 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. We use hypertext transfer protocol to view Web sites through a browser. ☐
2. The transmission control protocol and the Internet protocol are two of the least important protocols. ☐
3. TCP and IP establish the rules for how information travels across the Internet.
4. Any device connected to the Internet has an IP address. ☐
5. A new version of IP was created in 1991. ☐
6. IPv6 is based on a 32-bit address system. ☐
7. IPv6 provides enough addresses to accommodate the rising demand for Internet access for the foreseeable future. ☐
8. The TCP/IP protocols are what make the sending a message or retrieving information from another computer possible. ☐
9. DNS doesn't take part in finding the target server. ☐
10. The Internet is such a powerful tool due to the flexible approach to data transfer. ☐

9. Make summary of part 2 of text 1 using opening phrases on pages 336–337.

10. Read the text and fill in prepositions or adverbs where necessary.

a) Single out the main points of the text. Sum up its content.

Internet vs. World Wide Web

To answer this question, let's look … each element. And since the Internet seems to be the more easily understood component, let's start there.

Simply, the Internet is a network … networks — and there are all kinds … networks in all kinds of sizes. You may have a computer network … your work, … your school or even one … your house. These networks are often connected … each other … different configurations, which is how you get groupings such as local area networks (LANs) and regional networks. Your cell phone is also … a network that is considered part … the Internet, as are many of your other electronic devices. And all these separate networks — added together — are what constitute … the Internet. Even satellites are connected … the Internet.

The World Wide Web, … the other hand, is the system we use to access … the Internet. The Web isn't the only system out there, but it's the most popular and widely used. (Examples … ways to access the Internet without using HTTP include e-mail and instant messaging.) The World Wide Web makes use … hypertext to access the various forms … information available … the world's different networks. This allows … people all … the world to share knowledge and opinions. We typically access the Web … browsers, like Internet Explorer and Mozilla Firefox. … using browsers like these, you can visit … various Web sites and view other online content.

So another way to think … it is to say the Internet is composed … the machines, hardware and data; and the World Wide Web is what brings this technology … life.

(By Jessika Toothman)

11. Choose the best words.

1. ADSL is more commonly known as ….

a) longband b) broadband c) wideband

2. Broadband internet connection is much faster than ….

a) dial-in b) dial-through c) dial-up

3. Before you can connect to the internet for the first time, you have to … an account with an ISP.

a) set b) set up c) set in

4. Each time you want to connect to your ISP's system, you have to enter a log-in name and a ....

a) security word b) safe word c) password

5. You can set your computer to ... your log-in details, so you don't have to type them in each time.

a) store b) remember c) recall

6. With a broadband connection, you usually have to pay a ....

a) fixed monthly price b) fixed monthly fee c) fixed monthly cost

7. With dial-up, you can usually choose a ... tariff.

a) pay–as–you–go b) pay–what–you–want c) pay-if-you-like

8. Some broadband contracts limit the amount of ... you can have each month.

a) pages b) traffic c) use

9. Looking at web pages can be called «navigating the Web» but is more commonly called ... .

a) «surfing the net» b) «skiing the net» c) «swimming the net»

10. You can often find the answer to a question by ... on the internet.

a) looking at it b) looking for it c) looking it up

11. When your computer is not connected to the internet, it is ....

a) out of line b) offline c) off the line

12. Internet banking is also called ....

a) online banking b) on the line banking c) inline banking

13. An unexpected disconnection from the internet is called a ....

a) lost connection b) missed connection c) dropped connection

14. A file which is copied from the internet onto your computer is called ....

a) an upload b) a download c) a load

15. Downloading files from the internet can ... your computer with a virus.

a) infect b) contaminate c) dirty

12. Render the following text in English.

Фундамент сетевого взаимодействия

Интернет позволяет легко взаимодействовать самым различным видам компьютерных систем. Каким же образом это происходит? Благодаря стандартам. В Интернете применяются стандартизованные методы передачи данных, позволяющие скрыть от пользователя все многообразие сетей и машин.

Наиболее фундаментальным стандартом, применяемым в Интернете, является набор сетевых протоколов *TCP/IP*, определяющих алгоритмы передачи данных. Поскольку все компьютеры взаимодействуют с Интернетом через *TCP/IP*, нет необходимости в сложном и дорогостоящем преобразовании протоколов, что значительно упрощает передачу. Протокол *TCP/IP* не зависит от конкретной операционной системы и, таким образом, реализуется для всех типов компьютеров – *IBM*, *APPLE* и др.

Как работает протокол *TCP/IP*? Предположим, требуется передать информацию с одного компьютера, подключенного к Интернету, на другой компьютер. Протокол *TCP* разбивает информацию на порции и нумерует все порции, чтобы при получении можно было правильно собрать информацию. Далее с помощью протокола *IP* все части передаются получателю, где с помощью протокола *TCP* проверяется, все ли части получены. Так как отдельные части могут путешествовать по Интернету самыми разными путями, то порядок прихода частей может быть нарушен. После получения всех частей *TCP* располагает их в нужном порядке и собирает в единое целое.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 2

CONTEXTUAL REFERENCE

The words that are used to link ideas in the text together are called transitional markers. They make the text easier to read. As transitional markers we usually use:

Pronouns		Demonstrative adjectives	Other words
it they them I he she	which who whose that such one	this that these those	the former the latter the first the second the last

Transitional markers refer to a word, or words, mentioned earlier in the sentence or paragraph so that they take reader's thoughts back to something that has already been mentioned.

Sample paragraph:

A computer, like any other machine, is used because it does certain jobs better and more efficiently than humans. It can receive more information and process it faster than any human. The speed at which a computer works means it can replace weeks or even months of pencil-and-paper work. Therefore, computers are used when the time saved offsets their cost, which is one of the many reasons they are used so much in business, industry, and research.

13. Using the sample paragraph as a model, draw a rectangle around the word, or words, that the circled words refer to. Then join the and the with arrows.

A) Modern accounting firms use spreadsheet software to do complicated calculations. They can provide their clients with an up-to-date report whenever it is needed. This software has many functions and can be integrated with other software. The spreadsheet's basic component is a cell. This may contain a formula which performs a mathematical operation. It could also contain a label or data. The former describes the information on the worksheet. The latter is the information itself.

The worksheet is the basic work area of a spreadsheet program. It is made up of cells arranged in rows and columns. The number of these varies depending on the software you are using. You can change the width and format of cells. Such parameters are usually quite easy to change with just a few keystrokes.

B) To understand the Internet, it helps to look at it as a system with two main components. The first of those components is hardware. That includes everything from the cables that carry terabits of information every second to the computer sitting in front of you.

C) A computer is a machine with an intricate network of electronic circuits that operate switches or magnetize tiny metal cores. A computer can solve a series of problems and make thousands of logical decisions without becoming tired. It can find the solution to a problem in a fraction of the time it takes a human being to do the job. A computer can replace people in dull, routine tasks, but it works according to the instructions given to it.

UNIT 3

PART 3. PACKET, PACKET, WHO'S GOT THE PACKET?

First, you open your Web browser and connect to the Web site. When you do this, your computer sends an electronic request over your Internet connection to your Internet service provider (ISP). The ISP routes the request to a server further up the chain on the Internet. Eventually, the request will hit a domain name server (DNS).

This server will look for a match for the domain name you've typed in (such as www.yahoo.com). If it finds a match, it will direct your request to the proper server's IP address. If it doesn't find a match, it will send the request further up the chain to a server that has more information.

The request will eventually come to the target Web server. This server will respond by sending the requested file in a series of packets. Packets are parts of a file that range between 1,000 and 1,500 bytes. Packets have headers and footers that tell computers what's in the packet and how the information fits with other packets to create an entire file. Each packet travels back up the network and down to your computer. Packets don't necessarily all take the same path — they'll generally travel the path of least resistance.

That's an important feature. Because packets can travel multiple paths to get to their destination, it's possible for information to route around congested areas on the Internet. In fact, as long as some connections remain, entire sections of the Internet could go down and information could still travel from one section to another — though it might take longer than normal.

When the packets get to you, your device arranges them according to the rules of the protocols. It's kind of like putting together a jigsaw puzzle. The end result is that you obtain the requested information.

This holds true for other kinds of files as well. When you send an e-mail, it gets broken into packets before zooming across the Internet. Phone calls over the Internet also convert conversations into packets using the voice over Internet protocol (VoIP). We can thank network pioneers like Vinton Cerf and Robert Kahn for these protocols — their early work helped build a system that's both scalable and robust.

That's how the Internet works in a nutshell. As you look closer at the various devices and protocols, you'll notice that the picture is far more complex than the overview we've given.

(By Jonathan Strickland)

Essential vocabulary (3)

Words

according (to) *prep*
arrange *v*
convert *v*
eventually *adv*
footer *n*
go down *v*
header *n*
look (for) *v*
necessarily *adv*
notice *v*
overview *n*
packet *n*
remain *v*
robust *adj*
scalable *adj*
type (in) *v*
various *adj*
ISP
VoIP

Word Combinations

to route (direct) the request
to get to the destination
congested area
to put together a jigsaw puzzle
to hold true
in a nutshell

EXERCISES

1. Find in part 3 of text 1 English equivalents for the following words and phrases:

направлять запрос; в итоге (в конце концов); искать совпадение; находить совпадение; создавать цельный файл; выбирать тот же самый маршрут; наименьшее сопротивление; добираться до места назначения; обходить перегруженные участки; конечный результат; преобразовывать; надежная система; давать общее представление (обзор).

2. Transcribe and learn to read the following words:

eventually, header, entire, necessarily, feature, multiple, congested, robust.

3. Write the Past Indefinite and the Past Participle of the verbs:

open, connect, route, come, tell, respond, remain, arrange, put, convert, thank, build, notice, give.

4. Find in part 3 of text 1 synonyms to the following words and word combinations:

ultimately, to aim, certainly, characteristic, overcrowded, to stay, whole, to collapse, part, to organize, to receive, to change, sturdy, to construct, briefly, intricate.

5. Write the expansions of the following abbreviations and learn them:

ISP, VoIP.

6. Circle transitional markers and find the words they refer to (see Language Focus 2 in Unit 2). Translate the passages in writing.

A) Packets are parts of a file that range between 1,000 and 1,500 bytes. Packets have headers and footers that tell computers what's in the packet and how the information fits with other packets to create an entire file... Packets don't necessarily all take the same path — they'll generally travel the path of least resistance.

B) That's an important feature. Because packets can travel multiple paths to get to their destination, it's possible for information to route around congested areas on the Internet. In fact, as long as some connections remain, entire sections of the Internet could go down and information could still travel from one section to another — though it might take longer than normal.

7. Answer the following questions using the information from part 3 of text 1.

1. Where does our computer send an electronic request when we connect to the Web site? 2. What does DNS look for? 3. What will happen if it doesn't find a match? 4. What are packets? 5. What do packets have? 6. Is it necessary for packets to take the same path? 7. What happens when the packets get to us? 8. Who can we thank for these protocols?

8. Look through part 3 of text 1 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. When we open our Web browser and connect to the Web site, our request goes first to the DNS. ☐
2. DNS looks for a match for the domain name we've typed in. ☐
3. Packets are parts of a file that range between 4,000 and 4,500 bytes. ☐
4. Packets have only headers that tell computers what's in the packet. ☐
5. The important feature concerning packets is that they generally travel the path of least resistance. ☐
6. It's possible for information to route around congested areas on the Internet. ☐
7. Arranging the packets according to the rules of the protocols can be compared to putting together a jigsaw puzzle. ☐
8. Phone calls over the Internet are never converted into packets. ☐

9. Make summary of part 3 of text 1 using opening phrases on pages 336–337.

10. Read the text and insert articles where necessary.

What is the future of the Internet in your opinion? Write down your ideas in 5–7 sentences.

What is the future of the Internet?

… Internet is just … few decades old, but in that short span of … time it has experienced significant changes. It grew out of a hodgepodge of … independent networks into … global entity. It serves as … platform for business, communication, entertainment and education. And you can connect to this enormous network through dozens of … different devices.

What's next? When you can call up minute trivia about … most obscure subject you can think of with … couple of taps on … smartphone screen, where else can you go? … answer isn't entirely clear, but … possibilities are exciting.

One thing that seems certain is that … data transmission speeds will increase globally. According to Akamai Technologies, which publishes … quarterly state of … Internet report, … average global data transmission speed in late 2009 was 1.7 megabits per second. Compare that to … record for data transmission speed set by … Bell Labs: 100 petabits per … second. That's equivalent to 100 billion megabits per second. At that speed, you could transmit 400 DVDs worth of data every second.

That's … enormous gap between what's currently possible and what's commercially available. But as time passes, … costs of producing ultra-high-speed networks will decrease. Eventually, … average consumer will be able to download … high-definition movie in … second or play cloud-based video games without … hint of lag.

Even as wired connections reach unprecedented speeds, wireless technology continues to evolve. Technologies like LTE and WiMAX give us … ability to access … Internet wirelessly at … speeds comparable to broadband connections. It also opens … doors for portable devices like smartphones, laptops and tablets to plug into … Internet without … need for wires.

We believe that … Internet will be faster and more pervasive. What else might … future hold?

(By Jonathan Strickland)

11. Read the text and choose the correct word for each number.

Think of a suitable title for the text.

***

The Internet is robust. It's not (1) … upon a single machine or cable. It's a network made up of other computer networks. It spans the globe. Connections cross over continents, under oceans and through space via satellites. And as the Internet has grown, so has our (2) … upon it.

Connections across the Internet are **(3)** … When you **(4)** … your computer to contact another machine on the Internet, the data could cross one of millions of pathways. Whenever you download a file, the file comes to your machine in **(5)** … data packets that travel across the Internet. The packets don't all take the same path — the traffic routes are **(6)** …. If a **(7)** … connection is damaged or **(8)** …, the data can follow a **(9)** … path to reach your machine.

(By Jonathan Strickland)

1. a) dependence; b) dependent; c) depend; d) dependable.
2. a) dependably; b) dependability; c) dependence; d) dependent.
3. a) flex; b) flexible; c) flexibility; d) flexibly.
4. a) usability; b) useful; c) usable; d) use; e) usage; f) user.
5. a) electronic; b) electronics; c) electron; d) electronically.
6. a) dynamics; b) dynamically; c) dynamic; d) dynamicize.
7. a) particularly; b) particularity; c) particular; d) particularize.
8. a) unresponsible; b) unresponsive; c) unresponsiveness.
9. a) difference; b) differentiate; c) differ; d) different; e) differently.

12. Translate the following text into English.

Кто придумал Интернет?

К созданию Интернета человечество шло долгие годы, изобретая новые и новые средства связи: изобретение телеграфа (1836); первый атлантический кабель для связи между континентами (1858); изобретение телефона (1876).

Считается, что начало этим исследованиям положил доктор Ликлидер, назначенный в 1962 году главой проекта использования компьютерных технологий в военных целях. Он привлек к исследованиям частные невоенные фирмы и университеты, положив начало *ARPANET*. Первый «разговор» по компьютерной сети состоялся в 1969 году между Университетом Лос-Анджелеса, Стэндфордским исследовательским институтом и Университетами Санта Барбары и Юты.

План был беспрецедентным: профессор Клейнрок из Лос-Анджелеса со своими студентами надеялся войти в компьютер Стэнфорда и передать в него некоторые данные. Они начали печатать на клавиатуре слово *login* и по телефону следили, видят ли коллеги из Стэнфорда эти буквы на мониторе. Они успешно передали буквы *L* и *O*. Когда они напечатали букву *G*, система связи вышла из строя, а революция в связи началась.

К 1971 году была создана сеть с 23 пользователями в разных концах США. В 1972 году впервые *ARPANET* была продемонстрирована перед публикой. В 1973 году к сети подсоединились Университетский колледж в Лондоне и Государственные службы в Норвегии; начали развиваться идеи создания Интернета; изобретен e-mail.

В 1977 году число пользователей Интернета достигло 100, в 1984 — 1000, в 1986 году их было уже больше 5000, в 1989 — более 100 000. В 1991 году в ЦЕРНе был реализован проект *World Wide Web* (*WWW*). В 1997 году насчитывалось уже 19,5 миллионов пользователей сети Интернет.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 3

WORD FORMATION: PREFIXES

It is possible to guess the meanings of unfamiliar words in the text you are reading if you know the ways English words are generally formed. In English new words are usually formed with the help of prefixes and suffixes. An English word can be divided into three parts:

prefix → stem ← suffixes

Prefix comes before the stem. For example, the prefix *re-* (meaning «do again») in a word like **re**transmit (meaning «to transmit once more»). Suffix is attached to the end of the stem. For example, the suffix *–er* (meaning «someone who») in a word like send**er** («a person who sends»).

Suffixes change the word from one part of speech to another. For example, if we add *–ly* to the adjective *sufficient*, we'll have the adverb *sufficiently*. Prefixes usually change the meaning of the word. For example, *in-* changes a word to the negative. **In**compatible means «not capable of being used together» or «conflicting with each other».

Let us now consider some prefixes, their usual meanings, and how they change the meanings of English words.

Prefixes				
Negative and positive	**Size**	**Location**	**Time and order**	**Number**
un- non- in- dis- re-	semi- mini- micro-	inter- super- trans- ex- extra- peri-	pre- ante- fore- post-	mono- bi- hex- oct- multi-

13. Study these tables. Try to find additional examples, using your dictionary if necessary.

1. Negative and positive prefixes:			
	Prefix	**Meaning**	**Examples**
Negative	un- in- im- il- ir-	not	unmagnetized incomplete impossible illegal irregular, irrelevant
	non-	not connected with	non-programmable
	mis- mal-	bad, wrong	misdirect malfunction
	dis-	oppsite feeling oppsite action	disagree disconnect
	anti-	against	antiglare
	de-	reduce, reverse	demagnetize, decode
	under-	too little	underestimate
Positive	re-	do again	reorganize
	over-	too much	overload

2. Prefixes of size:		
Prefix	**Meaning**	**Examples**
semi-	half, partly	semiconductor
equi-	equal	equidistant
mini-	small	minicomputer
micro-	very small	microcomputer
macro- mega-	large, great	macroeconomics megabyte

3. Prefixes of location:		
Prefix	**Meaning**	**Examples**
inter-	between, among	interface, interactive
super-	over	supersonic
trans-	across	transmit, transfer
ex-	out	exclude, extrinsic
extra-	beyond	extraordinary
sub-	under	subschema
infra-	below	infrared
peri-	around	peripheral
4. Prefixes of time and order:		
Prefix	**Meaning**	**Examples**
ante- pre-	before	antecedent prefix
prime-	first	primary, primitive
post-	after	postdated
retro-	backward	retroactive
5. Prefixes of numbers:		
Prefix	**Meaning**	**Examples**
semi-	half	semicircle
mono-	one	monochromatic
bi-	two	binary
tri-	three	triangle
quad-	four	quadruple
penta-	five	pentagon
hex-	six	hexadecimal
sept(em)-	seven	September
oct-	eight	octal
dec-	ten	decimal
multi-	many	multiplexor
6. Other prefixes:		
Prefix	**Meaning**	**Examples**
pro-	before, in advance forward	program progress
auto-	self	automatic
co- con-	together, with	co-ordinate connect

14. Read the following sentences and circle the prefixes. Decide what the prefixes mean. Refer back to the table if you need help.

1. The progress in semiconductor technology led to the development of the integrated circuit, which was discovered due in 1958.

2. You can maximize your chances of finding a job if you are bilingual or even trilingual.

3. The multiplexor was not working because someone had disconnected it by mistake.

4. Your pay rise is retroactive to the beginning of June and you will receive a biannual bonus.

5. After you transfer text using the "cut and paste" feature, you may have to reformat the text you have inserted.

6. If a printer malfunctions, you should check the interface cable.

7. Peripheral devices can be either input devices (such as keyboards) or output devices (such as printers).

8. Improper installation of the antiglare shield will make it impossible to read what is on the screen.

9. A computer can replace people in dull, uninteresting tasks, but it works according to the instructions given to it.

10. As the results are irregular, the program will have to be rewritten.

11. The protocols provide both the method and a common language for machines to use to transmit data.

12. The various machines would be unable to understand one another without a common set of protocols.

13. The octal and hexadecimal systems are number systems used as a form of shorthand in reading groups of four binary digits.

14. Floppy disks are inexpensive and reusable.

15. Computer systems remain vulnerable to the entry by humans of invalid data.

15. Fill in prefixes from the following list.

auto	de	dec	inter
maxi	mega	micro	mini
mono	multi	semi	sub
bi	ex		

1. When the user and the computer are in active communication on a graphics system, we refer to this as ...active graphics.

2. The introduction of ...conductor technology revolutionized the computer industry.

3. A ...byte equals approximately one million bytes.

4. Once you finish your program, you will have to test it and ... bug it to remove all the mistakes.

5. ... script is a character or symbol written below and to the right of a number or letter, often used in science.

6. If a computer system has two or more central processors which are under common control, it is called a ... processor system.

7. The ... imal system is a number system with a base of 10.

8. Most people prefer a color screen to a ... chrome screen.

9. Data are stored in secondary storage in the same ... nary code as in main storage.

10. Input and output units link the computer to its ... ternal environment.

QUIZ 2

It's hard to believe that only about 10 to 15 years ago the Internet was a strange new world. And now it's impossible to imagine life without it. We can't even remember how we booked hotel rooms way back then — or kept in touch with people. Can you imagine trying to write a term paper without the Internet? You might practically live your life on the Internet, but how much do you really know about it? Before reading text 2 test your knowledge here.

1. Al Gore invented the Internet.

a) fact

b) fiction

c) almost fiction: It was actually Tipper. Shhhh, don't tell.

2. About a quarter of the world's population uses the Internet.

a) fact

b) fiction

c) almost fiction: About a quarter of the people on Earth use computers, but they don't all have Internet access.

3. As of June 2009, there were about 18 million domain names in existence.

a) fact

b) fiction

c) almost fiction: There are 180 million domain names out there.

4. One of the most important predecessors of the Internet was a network called NETLINX. It started in 1979 with a connection between Harvard and MIT.

a) fact

b) fiction

c) almost fiction: The schools were Yale and Princeton.

5. The Samsung i5000, which came out in 1996, was the first cell phone with Internet access.

a) fact

b) fiction

c) almost fiction: Right year, but it was the Nokia 9000 Communicator.

6. The first widely used Web browser was called Mosaic, which was introduced in 1993.

a) fact

b) fiction

c) almost fiction: Mosaic rolled out in 1989.

7. March 10, 2000, is the date of the infamous dot–com «bubble burst».

a) fact

b) fiction

c) almost fiction: It was May 10, 2000.

8. After July 1, 2009, all computers sold in China will come with software that won't allow users to type sexual keywords.

a) fact

b) fiction

c) almost fiction: True, but it also blocks other stuff, like anti-government sites and anything related to the Tiananmen Square protests.

9. By some estimates, «cyberslacking» costs companies around the world $1 billion a year.

a) fact

b) fiction

c) almost fiction: It's more like $10 billion a year — yikes.

10. If you forward this quiz to 10 of your friends in the next 10 minutes, Bill Gates will give you a free trip for two to Disney World!

a) fact

b) fiction

c) almost fiction: You'll actually get a $25 gift certificate to the Gap!

(To find correct answers to this quiz, see pages 330–331)

UNIT 4

TEXT 2

INTERNET INFRASTRUCTURE

PART 1. INTRODUCTION TO THE INTERNET INFRASTRUCTURE

One of the greatest things about the Internet is that nobody really owns it. It is a global collection of networks, both big and small. These networks connect together in many different ways to form the single entity that we know as the Internet. In fact, the very name comes from this idea of interconnected networks.

Since its beginning in 1969, the Internet has grown from four host computer systems to tens of millions. However, just because nobody owns the Internet, it doesn't mean it is not monitored and maintained in different ways. The Internet Society, a non-profit group established in 1992, oversees the formation of the policies and protocols that define how we use and interact with the Internet.

In this article, you will learn about the basic underlying structure of the Internet. You will learn about domain name servers, network access points and backbones. But first you will learn about how your computer connects to others.

PART 2. THE INTERNET: COMPUTER NETWORK HIERARCHY

Every computer that is connected to the Internet is part of a network, even the one in your home. For example, you may use a modem and dial a local number to connect to an Internet Service Provider (ISP). At work, you may be part of a local area network (LAN), but you most likely still connect to the Internet using an ISP that your company has contracted with. When you connect to your ISP, you become part of their network (Fig. 1).

The ISP may then connect to a larger network and become part of their network. The Internet is simply a network of networks.

Most large communications companies have their own dedicated backbones connecting various regions. In each region, the company has a Point of Presence (POP). The POP is a place for local users to access the company's network, often through a local phone number or dedicated line. The amazing thing here is that there is no overall controlling network. Instead, there are several high-level networks connecting to each other through Network Access Points or NAPs.

Here's an example. Imagine that Company A is a large ISP. In each major city, Company A has a POP. The POP in each city is a rack full of modems that the ISP's customers dial into. Company A leases fiber optic lines from the phone company to connect the POPs together.

Imagine that Company B is a corporate ISP. Company B builds large buildings in major cities and corporations locate their Internet server machines in these buildings. Company B is such a large company that it runs its own fiber optic lines between its buildings so that they are all interconnected.

In this arrangement, all of Company A's customers can talk to each other, and all of Company B's customers can talk to each

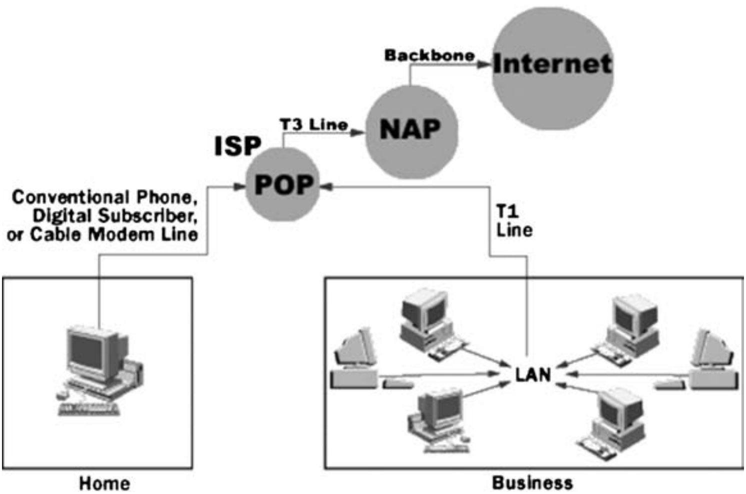


Fig. 1
When you connect to the Internet, your computer becomes part of a network

other, but there is no way for Company A's customers and Company B's customers to intercommunicate. Therefore, Company A and Company B both agree to connect to NAPs in various cities, and traffic between the two companies flows between the networks at the NAPs.

In the real Internet, dozens of large Internet providers interconnect at NAPs in various cities, and trillions of bytes of data flow between the individual networks at these points. The Internet is a collection of huge corporate networks that agree to all intercommunicate with each other at the NAPs. In this way, every computer on the Internet connects to every other.

Essential vocabulary (1), (2)

Words

amazing *adj*	hierarchy *n*	monitor *n*, *v*
come (from) *v*	huge *adj*	non-profit *adj*
contract (with) *v*	infrastructure *n*	overall *adj*
conventional *adj*	intercommunicate *v*	oversee *v*
customer *n*	interconnected *adj*	own *v*
dedicated *adj*	lease (to/from) *v*	rack *n*
define *v*	locate *v*	LAN
dial (up) *v*	maintain *v*	NAP
entity *n*	major *adj*	POP
flow (about traffic) *v*	mean *v*	

Word Combinations

to connect in many different ways	to access smth. through smth.
to form the single entity	dedicated line
to interact with the Internet	to talk to each other
underlying structure	high–level network
computer network hierarchy	individual network
to dial a local number	corporate network
to be (become) part of smth.	

EXERCISES

1. Find in parts 1 and 2 of text 2 English equivalents for the following words and phrases:

никто в действительности не владеет Интернетом; совокупность сетей во всём мире; единое целое; следить за созданием норм и протоколов; некоммерческая организация, учрежденная в 1992 году; цифровая абонентская линия; обычная телефонная линия; подключаться к большей по размеру сети; выделенная линия; точка доступа к сети; крупный поставщик услуг Интернета; стеллаж, полностью заставленный модемами; брать в аренду оптико-волоконные линии у телефонной компании; корпоративный Интернет-провайдер; размещать серверы в этих зданиях; соединять свои собственные оптико-волоконные линии между своими зданиями; в этой схеме; нет никакого способа; соглашаться; множество крупных Интернет-провайдеров соединяются в точках доступа к сети; огромные корпоративные сети; таким образом.

2. Transcribe and learn to read the following words:
infrastructure, maintain, society, hierarchy, lease, arrangement, intercommunicate, major.

3. Give the Infinitive of:
owned, knew, came, begun, meant, oversaw, learnt, became, had, built, ran, agreed.

4. Find in parts 1 and 2 of text 2 synonyms to the following words and word combinations:
to possess, to originate from, to back up, uncommercial, to found, to find out, to agree, universal, in exchange for, chief, to hire, jointly, to place, client, isolated, massive.

5. Write the expansions of the following abbreviations and learn them:
ISP, LAN, POP, NAP.

6. Match the words on the left with their definitions on the right.

1. Infrastructure	a) An organized system of labor and material aids used to supply the needs of the public.
2. Network	b) A series of ordered groupings within a system.
3. Backbone	c) The basic structure of an organization, system, etc.
4. Hierarchy	d) A framework for holding, carrying, or displaying a specific load or object.

5. Service	e) The set form in which data must be presented for handling by a particular computer configuration, esp. in the transmission of information between different computer system.
6. Rack	f) A connecting route, passage, or link.
7. Protocol	g) A large-capacity, high-speed central section by which other network segments are connected.
8. Communication	h) A system of interconnected computer systems, terminals, and other equipment allowing information to be exchanged.

7. Circle transitional markers and find the words they refer to (see Language Focus 2 in Unit 2). Translate the passages in writing.

A) Since its beginning in 1969, the Internet has grown from four host computer systems to tens of millions. However, just because nobody owns the Internet, it doesn't mean it is not monitored and maintained in different ways. The Internet Society, a non-profit group established in 1992, oversees the formation of the policies and protocols that define how we use and interact with the Internet.

B) At work, you may be part of a local area network (LAN), but you most likely still connect to the Internet using an ISP that your company has contracted with.

C) Imagine that Company A is a large ISP. In each major city, it has a POP. The POP in each city is a rack full of modems that the ISP's customers dial into. Company A leases fiber optic lines from the phone company to connect the POPs together.

8. Answer the following questions using the information from parts 1 and 2 of text 2.

1. Who really owns the Internet? 2. How much has the Internet grown since its beginning in 1969? 3. Who oversees the formation of the policies and protocols that define how we use and interact with the Internet? 4. What do we connect to when, for example, we use a modem and dial a local number? 5. What do large communications companies have in each region? 6. What is POP? 7. How are the high-level networks connected to each other? 8. How does the POP in each city look like?

9. Look through parts 1 and 2 of text 2 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. The Internet is a local collection of small networks. ☐
2. The Internet Society, a commercial company established in 1973, oversees the formation of policies and protocols. ☐
3. When you connect to your ISP, you become part of their network. ☐
4. The POP is a place where local users can pay for the Internet provided by their ISP. ☐
5. Instead of one overall controlling network, there are several high-level networks connecting to each other through NAPs. ☐
6. An imaginary Company A leases fiber optic lines from the phone company to connect the POPs together. ☐
7. In this arrangement, there are a lot of ways for Company A's customers and Company B's customers to intercommunicate. ☐
8. In the real Internet, only some large Internet providers interconnect at NAPs. ☐

10. Make summary of parts 1 and 2 of text 2 using opening phrases on pages 336–337.

11. Read the text and fill in prepositions or adverbs where necessary.

a) Provide definitions to the words in bold type.

b) Summarize the text.

The Internet's Owners

So who actually **owns** the Internet? There are two answers ... this question:

Nobody

Lots ... people

If you think ... the Internet as a unified, single entity, then no one owns it. There are organizations that determine ... the Internet's structure and how it works, but they don't have any **ownership** over the Internet itself. No government can lay claim ... owning the Internet, nor can any company. The Internet is like the telephone system — no one owns the whole thing.

... another point of view, thousands ... people and organizations own the Internet. The Internet consists ... lots of different bits and pieces, each of which has an owner. Some of these owners can control ... the **quality** and level ... access you have ... the Internet. They might not own the entire system, but they can impact ... your Internet experience.

The physical network that carries Internet traffic ... different computer systems is the Internet backbone. ... the early days of the Internet, *ARPANET* served as the system's backbone. Today, several large corporations provide ... the routers and cable that make ... the Internet backbone. These companies are upstream Internet Service Providers (ISPs). That means that anyone who wants to access ... the Internet must ultimately work ... these companies, which include:

- UUNET;
- Level 3;
- Verizon;
- AT&T;
- Qwest;
- Sprint;
- IBM.

Then you have all the smaller ISPs. Many individual **consumers** and businesses subscribe ... ISPs that aren't part ... the Internet backbone. These ISPs **negotiate** ... the upstream ISPs ... Internet access. Cable and DSL companies are examples ... smaller ISPs. Such companies are concerned ... what the industry calls the last mile — the distance ... the end consumer and Internet connectivity.

(By Jonathan Strickland)

12. Choose the best word from each pair in italic type in brackets.

What's the difference between the Web and the internet?

Some people think that the internet and the Web are the same thing, but in fact they are different. The internet (often called simply «the net») is a global (*network/net*) of interconnected computers. These computers communicate with each other (*over/through*) existing telecommunications networks — principally, the telephone system. The Word Wide Web (usually known as just «the Web») is the billions of web pages that are stored on large computers called web (*servers/services*).

To (*see/access)* the web, you need a computer and a modem. You then connect over your telephone line to an internet service (*port/provider)* (ISP), which sends your request to view a particular web page to the correct web server.

Websites are not the only service available on the internet. It is also used for many other functions, including sending and receiving email, and connecting to newsgroups and (*discussion/talking)* groups.

You could say that the internet is a system of roads, and web pages and emails are types of traffic that travel on those roads.

13. Translate the following text into English.

Точка присутствия

Точка присутствия (POP) — место расположения оборудования оператора связи (провайдера), к которому возможно подключение клиентов.

Обычно POP — это узел связи или датацентр, возможно, отдельная единица коммуникационного оборудования, вынесенная ближе к месту концентрации потенциальных клиентов, например, в офисное здание. Данный термин применяется при планировании сетей передачи данных и расчете их стоимости. Обычно провайдер, оказывающий услуги по подключению к сети или передаче данных, указывает стоимость своих услуг именно в точке присутствия. Для определения же полной стоимости следует учесть построение (аренду) и эксплуатацию канала связи от точки присутствия до оборудования клиента (так называемой, последней мили). Поэтому при планировании сетей территориальное расположение точек присутствия различных провайдеров имеет не меньшее значение, чем стоимость и технические характеристики их услуг.

(«Информационные технологии»,
www.information-technology.ru)

LANGUAGE FOCUS 4

WORD FORMATION: SUFFIXES

We already know how prefixes can change the meaning of a word. Let us now consider some suffixes, their usual meanings, and how they change the meanings of English words.

Suffixes			
Nouns	**Verbs**	**Adjectives**	**Adverbs**
-ance -ence -or -er -ist -ness	-ize -ate -fy -en -ify	-able -ible -less -ic ical -ish -ive	-ly

14. Study these tables. Try to find additional examples, using your dictionary if necessary.

1. Noun-forming suffixes:		
Suffix	**Meaning**	**Examples**
-ance -ence	state quality of	performance independence
-er, -or	a person who a thing which	programmer, operator compiler, accumulator
-ist, -yst	a person who	typist, analyst
-ian	pertaining to	electrician
-tion, -ation	the act of	compilation
-ness	condition of	readiness
-ion	action/state	conversion
-ing	activity	multiplexing
-ment	state, action	measurement
-ity	state, quality	electricity
-ism	condition/state	magnetism
-dom	domain/condition	freedom
-ship	condition/state	relationship, partnership
2. Verb-forming suffixes:		
Suffix	**Meaning**	**Examples**
-ize/-ise -ate -ify -en	to make	computerize automate, activate, calculate simplify harden, widen

3. Adverb-forming suffix:		
Suffix	**Meaning**	**Examples**
-ly	in the manner of	electronically, logically, comparably, helpfully
4. Adjective-forming suffixes:		
Suffix	**Meaning**	**Examples**
-al -ar -ic -ical	having the quality of	computational, logical circular magnetic, automatic electrical
-able -ible	capable of being	Comparable divisible
-ous	like, full of	dangerous
-ful	characterized by	helpful
-less	without	careless
-ish	like	yellowish
-ed -ive	having the quality of	Computed interactive

Notes:
A) Words ending in *-ing* are formed from verbs. The *-ing* form may be used as a noun, part of a noun phrase, or part of a verb.
Examples:
1. ***Programming** is an interesting job.* (noun)
2. ***Programming** in C is interesting.* (part of noun phrase)
3. *He is **working** as a programmer.* (part of verb)

B) Words ending in *-s* may be nouns or verbs. The ending *-s* in a noun denotes the plural form. The ending *-s* in a verb is used with third person singular (he, she, it) in the Present Simple Tense.
Examples:
1. *The Word Wide Web is the **billions** of web **pages** that are stored on large **computers** called web **servers**.* (plural form of nouns)
2. *This network **crisscrosses** the globe and even **extends** into space.* (verbs with third person singular)

15. Read the following sentences and mark the suffixes. Underline the stem if it can be used on its own. The first one has been done for you.

1. A programm**er** design**s**, write**s**, and test**s** program**s** for perform**ing** vari**ous** task**s** on a comput**er**.
2. Electronic devices are widely used in scientific research and industrial designing.
3. A computer is a machine with an intricate network of electronic circuits that operate switches or magnetize tiny metal cores.

4. Another important achievement in developing computers came in 1947.

5. We have found that operators who have the freedom to take short breaks during the day greatly improve their performance.

6. The number of shipments will increase over the coming months.

7. We decided to computerize the entire plant to give each division more independence.

8. There are times when a computer seems to operate like a mechanical "brain", but its achievements are limited.

9. Turning your office into a paperless environment may be expensive at the beginning but can produce big savings in the long run.

10. Software developers are producing increasingly sophisticated applications for a growing global market.

11. The flexible approach to data transfer is part of what makes the Internet such a powerful tool.

12. The server responds by sending the requested file in a series of packets.

13. Laser printers are preferable to other types of printing devices because of their speed and quietness.

14. Spooling is a way of storing data temporarily on disk or tape until it can be processed by another part of the system.

15. A systems analyst studies organizational systems and decides what action needs to be taken to maximize efficiency.

16. Charles Babbage, a gifted English mathematician, proposed to build a general-purpose problem-solving machine.

17. Many technical developments of electronic digital computers took place in the 1940s and 1950s.

18. The microcomputer we have purchased does not have a FORTRAN compiler. It is programmable in BASIC only.

19. The contribution of John von Neumann was particularly significant.

20. The data, once entered, are organized and stored in successively more comprehensive groupings.

Now, for each word that has a suffix, indicate what part of speech the word is (e.g. noun, verb, etc.).

UNIT 5

PART 3. THE FUNCTION OF AN INTERNET ROUTER

All of these networks rely on NAPs, backbones and routers to talk to each other. What is incredible about this process is that a message can leave one computer and travel halfway across the world through several different networks and arrive at another computer in a fraction of a second!

The routers determine where to send information from one computer to another. Routers are specialized computers that send your messages and those of every other Internet user speeding to their destinations along thousands of pathways. A router has two separate, but related, jobs:

It ensures that information doesn't go where it's not needed. This is crucial for keeping large volumes of data from clogging the connections of «innocent bystanders».

It makes sure that information does make it to the intended destination.

In performing these two jobs, a router is extremely useful in dealing with two separate computer networks. It joins the two networks, passing information from one to the other. It also protects the networks from one another, preventing the traffic on one from unnecessarily spilling over to the other. Regardless of how many networks are attached, the basic operation and function of the router remains the same. Since the Internet is one huge network made up of tens of thousands of smaller networks, its use of routers is an absolute necessity.

PART 4. INTERNET BACKBONE

The National Science Foundation (NSF) created the first high-speed backbone in 1987. Called NSFNET, it was a T-1 line that connected 170 smaller networks together and operated at 1.544 Mbps (million bits per second). IBM, MCI and Merit worked with NSF to create the backbone and developed a T-3 (45 Mbps) backbone the following year.

Backbones are typically fiber optic trunk lines. The trunk line has multiple fiber optic cables combined together to increase the capacity. Fiber optic cables are designated OC for optical carrier, such as OC-3, OC-12 or OC-48. An OC-3 line is capable of transmitting 155 Mbps while an OC-48 can transmit 2,488 Mbps (2.488 Gbps). Compare that to a typical 56K modem transmitting 56,000 bps and you see just how fast a modern backbone is.

Today there are many companies that operate their own high-capacity backbones, and all of them interconnect at various NAPs around the world. In this way, everyone on the Internet, no matter where they are and what company they use, is able to talk to everyone else on the planet. The entire Internet is a gigantic, sprawling agreement between companies to intercommunicate freely.

Essential vocabulary (3), (4)

Words

agreement *n*
attach *v*
capacity *n*
clog *v*
compare *v*
crucial *adj*
deal (with) *v*
designate *v*
determine *v*
ensure *v*
freely *adv*
gigantic *adj*
increase *v*
incredible *adj*
necessity *n*
protect *v*
regardless *adv*
spill over *v*
Mbps
NSF
OC

Word Combinations

halfway across the world
in a fraction of a second
to keep (prevent) from doing smth.
to perform a job
intended destination
make it
high-speed backbone
trunk line
optical carrier
to be capable of doing smth.
high-capacity backbone

EXERCISES

1. Find in parts 3 and 4 of text 2 English equivalents for the following words and phrases:

все эти сети зависят от … ; достигать другого компьютера за долю секунды; специализированные компьютеры; самостоятельные, но связанные между собой операции; невинный свидетель; добраться до намеченного адресата; чрезвычайно полезный; излишнее распространение; независимо от того, сколько …; основные операции и функции маршрутизатора остаются теми же самыми; десятки тысяч меньших по размеру сетей; безусловная необходимость; в следующем году; проектировать магистрали T-3; множество оптико-волоконных кабелей, объединённых вместе; в то время (тогда), как; сегодня существует множество компаний; соглашение между компаниями.

2. Transcribe and learn to read the following words:

rely, router, determine, crucial, unnecessarily, regardless, national, science, increase (*v*), designated, gigantic, sprawling.

3. Give the Infinitive of:

relied, left, travelled, sent, kept, made, dealt, spilt, increased, operated.

4. Find in parts 3 and 4 of text 2 synonyms to the following words and word combinations:

to depend on, improbable, to abandon, to decide, a route, to guarantee, a witness, to do business with, to connect, to defend, identical, requirement, fund, to design, fast, to collaborate, to enlarge, to parallel, regardless of, enormous, easily.

5. Write the expansions of the following abbreviations and learn them:

NSF, NSFNET, Mbps, IBM, MCI, OC.

6. Match the words on the left with their definitions on the right.

1. Router	a) A device for connecting two computers by a telephone line, consisting of a modulator that converts computer signals into audio signals and a corresponding demodulator.

2. Pathway	b) A route to or way of access to; way of reaching or achieving something.
3. Destination	c) An institution supported by an endowment, often one that provides funds for charities, research, etc.
4. Traffic	d) The smallest unit of information, indicating the presence or absence of a single feature.
5. Foundation	e) A device that allows packets of data to be moved efficiently between two points on a network.
6. Capacity	f) The aggregate volume of messages transmitted through a communications system in a given period.
7. Modem	g) The bit rate that a communication channel or other system can carry.
8. Bit	h) the predetermined end of a journey or voyage.

7. Circle transitional markers and find the words they refer to (see Language Focus 2 in Unit 2). Translate the passages in writing.

A) The routers determine where to send information from one computer to another. Routers are specialized computers that send your messages and those of every other Internet user speeding to their destinations along thousands of pathways.

B) The router ensures that information doesn't go where it's not needed. This is crucial for keeping large volumes of data from clogging the connections of «innocent bystanders».

C) Backbones are typically fiber optic trunk lines. The trunk line has multiple fiber optic cables combined together to increase the capacity. Fiber optic cables are designated OC for optical carrier.

8. Answer the following questions using the information from parts 3 and 4 of text 2.

1. What do all of these networks rely on to talk to each other? 2. How long does it take for a message to leave one computer and travel halfway across the world through several different networks at another computer? 3. What do the routers do? 4. What two jobs does a router have? 5. What organization created the first high-speed backbone in 1987? 6. What was NSFNET? What companies worked with NSF and developed a T-3 backbone? 7. What does the trunk line have to increase the capacity? 8. How many bits per second is an OC-48 capable of transmitting?

9. Look through parts 3 and 4 of text 2 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. The routers determine where to send information from one computer to another. ☐
2. A router has three separate, unrelated jobs. ☐
3. In performing its jobs, a router is absolutely useless in dealing with two separate computer networks. ☐
4. A router only joins the two networks, passing information from one to the other, and doesn't protect the networks. ☐
5. The basic operation and function of the router remains the same, no matter how many networks are attached. ☐
6. The National Science Council created the first high-speed backbone in 1987. ☐
7. Backbones are usually fiber optic trunk lines. ☐
8. An OC-3 line is capable of transmitting 2,488 Mbps. ☐

10. Make summary of parts 3 and 4 of text 2 using opening phrases on pages 336–337.

11. Read the text and fill in suitable words from the box.
What Internet plan do you have? Why have you signed for this Internet plan? Give your reasons.

amount, mobile, plans, technology, corporate, monthly, prepaid, advantages, wirelessly, price, frequent, transmit, modems, providers, conventional, charged, location

Prepaid Internet Plans

A basic … Internet plan promises a set amount of minutes for a certain … . But it's important to read the fine print. The … of minutes listed on the card or quoted in the plan depends on your … . For most U. S. prepaid Internet … , you only get the full amount of minutes if you're dialing up through a local access number within the contiguous United States and Canada (not Hawaii or Alaska).

Let's say you buy a prepaid Internet card that says 600 minutes for six dollars. Your actual number of minutes — or how much you're … per minute — depends on where you're dialing from and whether you're using a local access or toll-free number:

- Local access numbers in the contiguous U. S. or Canada = 600 minutes (one cent/min);
- Local access numbers in Alaska, Hawaii, Puerto Rico and Virgin Islands = 300 minutes (2 cents / min);
- Toll-free from U. S. lower 48, Canada, Alaska, Hawaii, Puerto Rico and Virgin Islands = 100 minutes (6 cents / min);
- Local access from international locations = 50 minutes (12 cents / min).

There are also special international plans for … travelers, offering better rates for certain international locations.

In addition to individual prepaid Internet plans, you can also sign up for group or … plans. Corporate plans offer some … for businesses that want to supply employees with dial-up access while away from the office:

- Pay-as-you-go plans with no … charges;
- Lower domestic and international rates than individual plans;
- Web portals for managing accounts, real-time stats on minutes used;
- Billing organization by department or other groups;
- Flexibility for traveling employees.

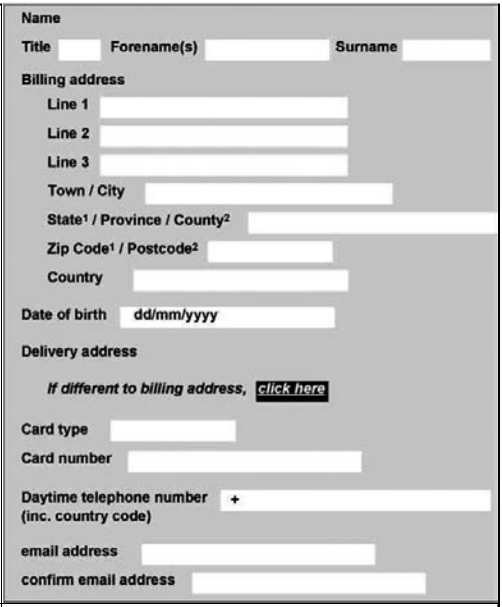
Some prepaid Internet … offer what they call prepaid «broadband». They claim to use special servers to speed up download and upload speeds beyond the … 56K dial-up modem. These are not, in fact, true prepaid broadband connections, since they work through the same dial-up … . The providers make no claims to the actual speed of their «broadband» service, other than it's faster than normal dial-up.

WiFi access is another service offered by a few prepaid Internet providers. With prepaid WiFi, you can use some of your minutes surfing … from select WiFi hotspots. Generally, you pay more per minute for this service.

In Europe, Australia and elsewhere, there's also something called prepaid mobile Internet. Prepaid … Internet uses 3G mobile devices like a BlackBerry, iPhone and other smartphones as … to connect a computer to the Internet. It resembles using a cell phone as a modem, except that these devices can … data at a faster rate. Prepaid mobile is advertised as «broadband» since it transmits at rates up to 115 kbps. Prepaid mobile Internet typically charges by the kilobyte or megabyte of data transferred.

(By Dave Roos)

12. Write the information into the fields.

27/03/1965 213 Wood Street 4044 5055 6066 7077 Anne Mary amj999@hotmail.com Apartment 17 Bellevue Apartments Lancaster California Jones Ms USA Visa Debit CA 93539 1 661 999 0000	 Name Title Forename(s) Surname Billing address Line 1 Line 2 Line 3 Town / City State[1] / Province / County[2] Zip Code[1] / Postcode[2] Country Date of birth dd/mm/yyyy Delivery address *If different to billing address,* click here Card type Card number Daytime telephone number (inc. country code) + email address confirm email address
[1]USA	[2]United Kingdom

13. Translate the following text into English.

Частные лица и организации используют для подключения к Интернету разные типы телекоммуникационных услуг — Т-1, Т-3, аналоговые линии, службы *DSL* (цифровая абонентская линия), *ISDN* и кабельные модемы. Поставщики услуг Интернета (сервис-провайдеры) объединяют трафик множества пользователей и передают его по высокоскоростным линиям в магистраль Интернета. Они также поддерживают работу серверов и маршрутизаторов. Серверы выполняют самые разнообразные функции, например, обрабатывают электронную почту пользователей и предоставляют услуги по размещению *Web*-страниц. Кроме того, на серверах могут храниться различные данные, предоставляемые поставщиками информации, такие как спортивная статистика или игры.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 5

ORGANIZING INFORMATION

The idea is usually developed in a group of related sentences called a paragraph. In almost every paragraph there is one idea that is more important than all the others. It is called the main idea. As a rule, the main idea of the paragraph is expressed at the beginning.

> Sample paragraph 1:
> Broadband Internet refers to a data communication service that provides a connection to the World Wide Web through the use of a large band of frequencies over a telephone link. Because of the availability of a large bandwidth, the information carrying capacity of this link is much more than the traditional dial up connection. The data rates that are available on a broadband connection are 5 to 6 times faster than the traditional dial up connections.

In sample paragraph 1, the first sentence,

Broadband Internet refers to a data communication service that provides a connection to the World Wide Web through the use of a large band of frequencies over a telephone link,
expresses the main idea of the paragraph.

All the sentences expressing the main idea have a topic and some information about the topic, for *example*:

Broadband Internet [*topic*] refers to a data communication service that provides a connection to the World Wide Web through the use of a large band of frequencies over a telephone link [*about the topic*].

While you are reading, finding main ideas is very important, but very often you need to understand details. And it is sometimes difficult to do. To easier understand details you should think of them as growing out of the main idea. In sample paragraph 1, there is a major detail growing out of the main idea. Here it is:

Because of the availability of a large bandwidth, the information carrying capacity of this link is much more than the traditional dial up connection.

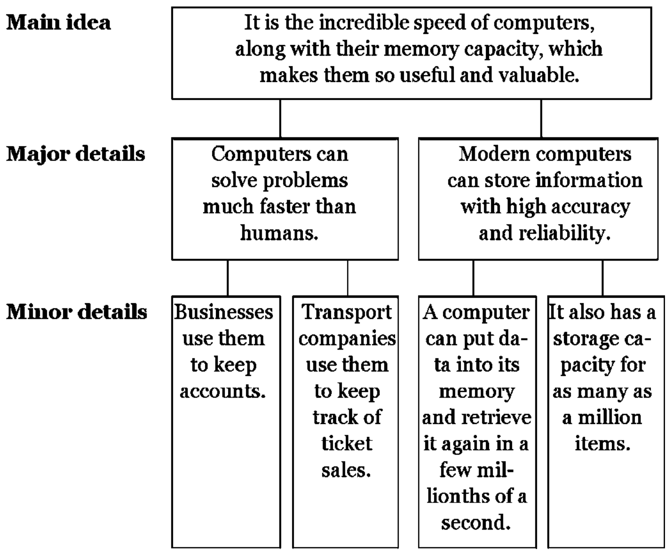
A major detail often has minor details growing out of it. These minor details give more information about a major detail. In sample paragraph 1, we can find the following minor detail growing out of the major detail:

The data rates that are available on a broadband connection are 5 to 6 times faster than the traditional dial up connections.

When you study, you often come across a paragraph that has a lot of small details that you must understand and remember. Breaking up a paragraph into its three elements: the main idea, major details, and minor details will be helpful to understand and remember what the paragraph is about.

Sample paragraph 2:
It is the incredible speed of computers, along with their memory capacity, which makes them so useful and valuable. Computers can solve problems in a fraction of the time it takes man. For this reason, businesses use them to keep their accounts, and airline, railway, and bus companies use them to control ticket sales. As for memory, modern computers can store information with high accuracy and reliability. A computer can put data into its memory and retrieve it again in a few millionths of a second. It also has a storage capacity for as many as a million items.

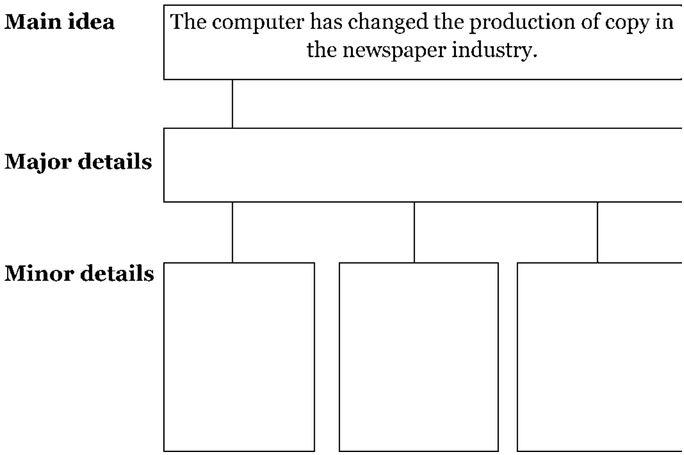
If you were to organize this paragraph into its three components, it would look like this:



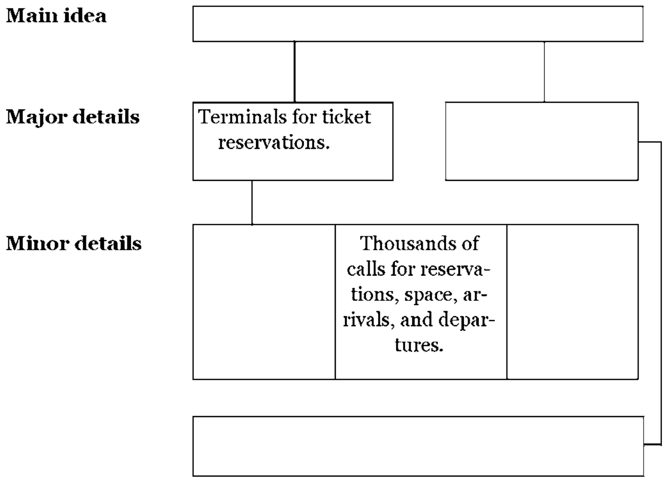
In making a block diagram you don't have to write every word in the main idea sentence or in each of the detail sentences.

14. Practice finding the main idea, major details, and minor details by completing the block diagrams after reading the following paragraphs.

A) The computer has changed the production of copy in the newspaper industry. There are three steps involved in the process: input, correction, and output. First, the computer numbers each story, counts words, and gives a listing of the length of each story. Then, a page is made up, advertisements are placed in, the copy is shifted or deleted, and corrections are made. Finally, the computer hyphenates words, and the result of all this is a newspaper page.



B) Railway companies use large computer systems to control ticket reservations and to give immediate information on the status of their trains. The computer system is connected by private telephone lines to terminals in major train stations, and ticket reservations for customers are made through these phone lines. The passenger's name, type of accommodation, and the train schedule is put into the computer's memory. On a typical day, a railway's computer system gets thousands of telephone calls about reservations, space on other railways, and requests for arrivals and departures. A big advantage of the railway computer ticket reservation system is its rapidity because a cancelled booking can be sold anywhere in the system just a few seconds later. Railway computer systems are not used for reservations alone. They are used for a variety of other jobs including train schedules, planning, freight and cargo loading, meal planning, personnel availability, accounting, and stock control.



15. Practice finding the main idea, major details, and minor details by making your own diagram.

Fiber optics is a technology that uses glass or plastic threads to transmit data. Each of the thread is capable of transmitting messages modulated onto light waves. The light in the fiber optics travels by a process of internal reflection. Parts of an optical fiber includes: core, cladding and the coating. The core is a thin glass center of the fiber where the light travels. The cladding is the outer optical material surrounding the core that reflects the light back into the core and the buffer coating is a plastic coating which is used to protect the fiber from damage and moisture. The light travels through the core by constantly bouncing from the cladding which makes use of the concept of total internal reflection. The light wave can travel great distances as the cladding does not absorb any light from the core.

UNIT 6

PART 5. INTERNET PROTOCOL: IP ADDRESSES

Every machine on the Internet has a unique identifying number, called an IP Address. The IP stands for Internet Protocol, which is the language that computers use to communicate over the Internet. A protocol is the pre-defined way that someone who wants to use a service talks with that service. The «someone» could be a person, but more often it is a computer program like a Web browser. A typical IP address looks like this: 216.27.61.137.

To make it easier for us humans to remember, IP addresses are normally expressed in decimal format as a dotted decimal number like the one above. But computers communicate in binary form. Look at the same IP address in binary:

11011000.00011011.00111101.10001001.

The four numbers in an IP address are called octets, because they each have eight positions when viewed in binary form. If you add all the positions together, you get 32, which is why IP addresses are considered 32-bit numbers. Since each of the eight positions can have two different states (1 or zero), the total number of possible combinations per octet is 2^8 or 256. So each octet can contain any value between zero and 255. Combine the four octets and you get 2^{32} or a possible 4,294,967,296 unique values!

Out of the almost 4.3 billion possible combinations, certain values are restricted from use as typical IP addresses. For example, the IP address 0.0.0.0 is reserved for the default network and the address 255.255.255.255 is used for broadcasts.

The octets serve a purpose other than simply separating the numbers. They are used to create classes of IP addresses that can be assigned to a particular business, government or other entity based on size and need. The octets are split into two sections: Net and Host. The Net section always contains the first octet. It is used to identify the network that a computer belongs to. Host (sometimes referred to as Node) identifies the actual computer on the network. The Host section always contains the last octet. There are five IP classes plus certain special addresses.

PART 6. INTERNET PROTOCOL: DOMAIN NAME SYSTEM

When the Internet was in its infancy, it consisted of a small number of computers hooked together with modems and telephone lines. You could only make connections by providing the IP address of the computer you wanted to establish a link with. For example, a typical IP address might be 216.27.22.162. This was fine when there were only a few hosts out there, but it became unwieldy as more and more systems came online.

The first solution to the problem was a simple text file maintained by the Network Information Center that mapped names to IP addresses. Soon this text file became so large it was too cumbersome to manage. In 1983, the University of Wisconsin created the Domain Name System (DNS), which maps text names to IP addresses automatically. This way you only need to remember www.yahoo.com, for example, instead of Yahoo's IP address.

Essential vocabulary (5), (6)

Words

actual *adj*	contain *v*	pre-defined *adj*
add *v*	express *v*	refer (to) *v*
almost *adv*	human *n*	restrict *v*
assign (to) *v*	identify *v*	split (into) *v*
belong (to) *v*	map (to) *v*	state *n*
cumbersome *adj*	normally *adv*	unique *adj*
consider *v*	octet *n*	value *n*
consist (of) *v*	particular *adj*	DNS

Word Combinations

decimal format	to serve a purpose
dotted decimal number	to be in one's infancy
binary form	to establish a link with smth.
to be reserved for	to become unwieldy
more and more	solution to the problem

EXERCISES

1. Find in parts 5 and 6 of text 2 English equivalents for the following words and phrases:

уникальный идентификационный номер; пользоваться услугой; выглядеть; для того, чтобы облегчить; общаться в двоичной форме; тот же самый IP-адрес; иметь два разных значения; суммарное количество возможных комбинаций; содержать любое значение; использовать для широковещательной рассылки; отделять цифры; создавать классы IP-адресов; государственная организация; компьютеры, соединённые между собой с помощью ... ; устанавливать соединение; простой текстовый файл; преобразовывать имена в IP-адреса; система доменных имен; вам необходимо только запомнить; вместо чего-л.

2. Transcribe and learn to read the following words:

unique, identify, decimal, pre-define, binary, value, purpose, assign, business, actual, default, special, cumbersome, automatically.

3. Give the Infinitive of:

stood, looked, combined, was, split, identified, referred, hooked.

4. Find in parts 5 and 6 of text 2 synonyms to the following words and word combinations:

normal, to employ, person, dual, configuration, to append, to regard, probable, to limit, to hold aside, aim, to detach, category, to appoint, babyhood, to supply, to translate, bulky.

5. Write the expansions of the following abbreviations and learn them:

IP, NIC, DNS.

6. Match the words on the left with their definitions on the right.

1. Machine	a) A computer connected to a network and providing facilities to other computers.
2. IP-address	b) A sequence of coded instructions fed into a computer, enabling it to perform specified logical and arithmetical operations on data.
3. Program	c) The numeric code that identifies all computers that are connected to the Internet.
4. Format	d) A communications link between two points, esp. by telephone.
5. Class	e) Any mechanical or electrical device that automatically performs tasks or assists in performing tasks.
6. Host	f) A named collection of information, in the form of text, programs, graphics, etc. held on a permanent storage device such as a magnetic disk.
7. Connection	g) The defined arrangement of data encoded in a file or, for example on magnetic disk or CD-ROM, essential for the correct recording and recovery of data on different devices.
8. File	h) A collection or division of people or things sharing a common characteristic, attribute, quality, or property.

7. Translate the passages in writing.

A) To make it easier for us humans to remember, IP addresses are normally expressed in decimal format as a dotted decimal number like the one above. But computers communicate in binary form.

B) The four numbers in an IP address are called octets, because they each have eight positions when viewed in binary form. If you add all the positions together, you get 32, which is why IP addresses are considered 32-bit numbers.

C) The octets serve a purpose other than simply separating the numbers. They are used to create classes of IP addresses that can be assigned to a particular business, government or other entity based on size and need.

D) The first solution to the problem was a simple text file maintained by the Network Information Center that mapped names to IP addresses. Soon this text file became so large it was too cumbersome to manage.

8. Answer the following questions using the information from parts 5 and 6 of text 2.

1. What does every machine on the Internet have? 2. What is the Internet Protocol? 3. What format are IP addresses normally expressed in? 4. But what form do computers communicate in? 5. How are the four numbers in an IP address called and why? 6. What values can each octet contain? 7. What other purpose do the octets serve for? 8. How many sections are the octets split into? 9. What is the Net section used for? 10. What does the Host section identify? 11. What was the first solution to the problem of increasing number of computers online? 12. What did the University of Wisconsin create in 1983?

9. Look through parts 5 and 6 of text 2 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. The IP stands for Information provider, which is the language that computers use to communicate over the Internet. ☐
2. Computers communicate in decimal form. ☐
3. The four numbers in an IP address are called octets because they each have eight positions when viewed in binary form. ☐
4. Each octet can contain any value between zero and 512. ☐
5. The octets are also used to create classes of IP addresses. ☐
6. The octets are split into two sections: Net and Host. ☐
7. The Net section identifies the actual computer on the network and the Host section is used to identify the network that a computer belongs to. ☐
8. In 1983 the Domain Name System which maps text names to IP addresses automatically was created. ☐

10. Make summary of parts 5 and 6 of text 2 using opening phrases on pages 336–337.

11. Read the text and fill in prepositions or adverbs from the box.

Provide definitions to the words and word combinations in bold type.

for, to, without, via, upon, to, on, up, of, to, on, between, with, upon, of, up, with, to, on, through

Internet Collapse and Communication Errors

A world … the Internet would probably seem very strange … us now. Depending … the nature of the **disaster** and how you defined the Internet, even basic services like text messaging or cell phone service could become unavailable. That's because the infrastructure … these services is also part … the Internet infrastructure. If you take this thought experiment … an extreme case, even the phone lines might not work since they, too, form part of the Internet's infrastructure.

Some cable and satellite services would be unavailable. You could still access television programming sent … broadcast towers if you had an antenna. But if the cable and satellite systems were part … the general **collapse**, you'd lose access … most channels.

You wouldn't be able to log … to social networking sites and services like Facebook or Twitter. You wouldn't be able to fire up an instant messaging service to check … on friends. Many of the tools we rely … to keep … … what our friends and family are doing would cease to exist. If the cell phone towers and telephone lines were also affected, we'd be reduced … writing letters and sending them … the post office.

Transferring files … computers would be difficult, too. You'd either need to store the files … some form of physical media like a compact disc or you'd need to connect the two computers … a physical cable. Projects that depend … **grid computing** to make complex calculations wouldn't work either. **Cloud computing** services would also fail and the information you store on those services could become inaccessible.

(By Jonathan Strickland)

12. Read the e-mail.


From: anna@goodmail.com
To: bernard@ciaociao.it
Cc: carol@freemail.co.uk
Bcc: dave@norsemail.no
Subject: arriving in Rome

Hi Bernard

I'll be arriving in Rome just after midday tomorrow (Friday). You don't need to pick me up at the airport – I can get a taxi to the city centre.

See you soon!

Anna

Are these statements true or false?

1. The recipient is Anna. ☐
2. The sender is Anna. ☐
3. Bernard knows that Carol knows when Anna will be arriving in Rome. ☐
4. You can say that Anna Cc-ed her email to Carol. ☐
5. You can say that Anna Bcc-ed her email to Dave. ☐
6. The subject line is empty. ☐
7. The style of the email is formal. ☐
8. Cc stands for carbon copy and Bcc stands for blind carbon copy, but the full terms are almost never used. ☐
9. Carbon copies were a method of making copies of documents typed on typewriters. ☐

13. Render the following text in English.

Что такое IP-адрес?

IP-адрес — уникальный идентификатор (адрес) устройства (обычно компьютера), подключенного к локальной сети или интернету.

IP-адрес представляет собой 32-битовое (по версии IPv4) или 128-битовое (по версии IPv6) двоичное число. Удобной формой записи IP-адреса (IPv4) является запись в виде четырех десятичных чисел (от 0 до 255), разделённых точками, например, 192.168.0.1.

IP-адреса представляют собой основной тип адресов, на основании которых сетевой уровень протокола IP передает пакеты между сетями. IP-адрес назначается администратором во время конфигурирования компьютеров и маршрутизаторов.

IP-адрес состоит из двух частей: номера сети и номера узла. В случае изолированной сети ее адрес может быть выбран администратором из специально зарезервированных для таких сетей блоков адресов (192.168.0.0 / 16, 172.16.0.0 / 12 или 10.0.0.0 / 8). Если же сеть должна работать как составная часть Интернета, то адрес сети выдается провайдером либо региональным интернет-регистратором (*Regional Internet Registry, RIR*).

Номер узла в протоколе IP назначается независимо от локального адреса узла. Маршрутизатор по определению входит сразу в несколько сетей. Поэтому каждый порт маршрутизатора имеет собственный IP-адрес. Конечный узел также может входить в несколько IP-сетей. В этом случае компьютер должен иметь несколько IP-адресов, по числу сетевых связей. Таким образом, IP-адрес характеризует не отдельный компьютер или маршрутизатор, а одно сетевое соединение.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 6

TIME SEQUENCE

In our everyday activities, sometimes it is important to recognize the sequence of events. As we know, events do not simply occur in isolation, they occur either before, during, or after other events. This time sequence may be chronological, logical, or causal. The following tables show examples of time relaters.

1. Before given time-references:			
	Time relaters		
Adjectives	earlier former	preceding previous	
Adverbials	already prior before	earlier first formerly originally	previously so far yet
	before that before then	up to now/then until now/then	in the beginning (long) ago

Examples:

1. **Originally**, the change only applied to the memory unit, but today the whole design has changed.

2. When the first wireless technology was developed, wired networks had **already** been in use for a long time.

3. **Up to now,** cloud computing technology has not been developed for widespread implementation.

2. Simultaneous with given time-references:		
	Time relaters	
Adjectives	contemporary	simultaneous
Adverbials	at present at this point now/then today for the time being at the moment at that time	meantime meanwhile in the meantime when at the same time

Examples:

1. **At present** many new computer programs are being developed not only for use in businesses, but also for home use.

2. Computers may soon take over many daily tasks, but **in the meantime** ordinary people must continue to do them themselves.

3. It is almost necessary for everyone to be interested in **contemporary** issues in the computing world.

3. After given time-references:			
	Time relaters		
Adjectives	following	later	next
Adverbials	afterwards after that eventually	since by the time	by the end soon next

Examples:

1. **Since** the development of new network protocols, communication between computers has become faster and more reliable.

2. You will have a good idea of the different programming languages **by the time** you finish this course.

3. Although the first models of portable computers were not very efficient, **later** models were much more sophisticated.

Sample paragraph:
Computers, as we know them *today*, have not been around for a long time. It was not *until* the mid-1940s that the first working digital computer was completed. But *since* then, computers have evolved tremendously. Vacuum tubes were used in the first-generation computers only to be replaced by transistors in the second-generation computers *at the beginning* of the early 1960s. *By the end of the* 1960s, transistors themselves were replaced by tiny integrated circuit boards and, consequently, a new generation of computers was on the market. Fourth-generation computers are now produced with circuits that are much smaller than *before* and can fit on a single chip. *Even now,* new technologies are being developed to make even better machines.

14. Read the following paragraph and underline the time relaters.

During the seventeenth and eighteenth centuries, many easy ways of calculating were devised. Logarithm tables, calculus, and the basis for the modern slide rule were invented during this period. It was not until the early 1800s that the first calculating machine appeared and, not too long after, Charles Babbage designed a machine which became the basis for building today's computers. A hundred years later, the first analog computer was built, but the first digital computer was not completed until 1944. Since then, computers have gone through four generations: digital computers using vacuum tubes in the 1950s, transistors in the early 1960s, integrated circuits in the mid-60s, and a single chip in the 1970s. In the 1980s, we saw computers become smaller, faster, and cheaper. Earlier this decade, computers became portable, from laptops to palmtops. At the rate computer technology is growing now, we can expect further dramatic developments before the end of the century.

15. Read the following sentences. Underline the time relaters and indicate whether they refer to before, during, or after the given time reference. The first one has been done for you.

1. *after* Since then, over seventy million PCs made by IBM and other manufacturers have been sold.

2. ... Today there are many companies that operate their own high-capacity backbones, and all of them interconnect at various NAPs around the world.

3. ... When you want to send a message, the TCP/IP protocols are what make the transmission possible.

4. ... Large companies are considering running major applications on PCs, something which, ten years ago, no one would have believed possible of a PC.

5. ... When the computer finds the closest match, it encodes the character in memory and displays it on the screen as if it has been typed.

6. ... The development of a large variety of tubes designed for specialized functions made possible the progress in radio communication technology before the World War II.

7. ... Eventually, we're all going to be interlinked, no matter which service we use, in what DIALOG's Richard Ream calls a «network of networks».

8. ... Until then, most of us have to go to more than one service to find everything we need.

9. ... And then there are the transmission lines which can be physical, as in the case of cables and fiber optics, or they can be wireless signals from satellites.

10. … The version of IP most of us use today is IPv4, which is based on a 32-bit address system.

11. … Ten years later, in 1991, IBM were making PCs with 16Mb of memory, expandable to 64Mb, running with a processor speed of 33MHz.

12. … Eventually, the request will hit a domain name server.

13. … When the packets get to you, your device arranges them according to the rules of the protocols.

14. … Since its beginning in 1969, the Internet has grown from four host computer systems to tens of millions.

15. … IBM, MCI and Merit worked with NSF to create the backbone and developed a T3 backbone the following year.

16. … Over this period, PCs have become commodity items. Since IBM made the design non-proprietary, anyone can make them.

17. … The first solution to the problem was a simple text file maintained by the NIC that mapped names to IP addresses. Soon this text file became so large it was too cumbersome to manage.

18. … Enter the clipboard computer, a technology that has been in development for the last 20 years but took hold in the mass market only this year.

19. … The development of vacuum tubes made possible the progress in the creation of early computers during the war.

20. … IC greatly reduced the size of devices, lowered manufacturing costs and at the same time they provided high speed and increased reliability.

21. … By the early part of the twentieth century electromechanical machines had been developed.

22. … Until the middle of the twentieth century machines designed to manipulate punched card data were widely used for business data processing.

23. … Initially electronic computers accepted their input data from punched cards.

24. … Since that time advances in science have led to the proliferation of computers throughout our society.

UNIT 7

PART 7. URL : UNIFORM RESOURCE LOCATOR

When you use the Web or send an e-mail message, you use a domain name to do it. For example, the Uniform Resource Locator (URL) «http://www.yahoo.com» contains the domain name yahoo.com. So does this e-mail address: example@yahoo.com. Every time you use a domain name, you use the Internet's DNS servers to translate the human-readable domain name into the machine-readable IP address.

Top-level domain names, also called first-level domain names, include .COM, .ORG, .NET, .EDU and .GOV. Within every top-level domain there is a huge list of second-level domains. For example, in the .COM first-level domain there is:

- Yahoo;
- Microsoft.

Every name in the .COM top-level domain must be unique. The left-most word, like www, is the host name. It specifies the name of a specific machine (with a specific IP address) in a domain. A given domain can, potentially, contain millions of host names as long as they are all unique within that domain.

DNS servers accept requests from programs and other name servers to convert domain names into IP addresses. When a request comes in, the DNS server can do one of four things with it:

1. It can answer the request with an IP address because it already knows the IP address for the requested domain.

2. It can contact another DNS server and try to find the IP address for the name requested. It may have to do this multiple times.

3. It can say, «I don't know the IP address for the domain you requested, but here's the IP address for a DNS server that knows more than I do».

4. It can return an error message because the requested domain name is invalid or does not exist.

Let's say that you type the URL http : // www.yahoo.com into your browser. The browser contacts a DNS server to get the IP address. A DNS server would start its search for an IP address by contacting one of the root DNS servers. The root servers know the IP addresses for all of the DNS servers that handle the top-level domains (.COM, .NET, .ORG, etc.). Your DNS server would ask the root for www.yahoo.com, and the root would say, «I don't know the IP address for www.yahoo.com, but here's the IP address for the .COM DNS server».

Your name server then sends a query to the .COM DNS server asking it if it knows the IP address for www.yahoo.com. The DNS server for the COM domain knows the IP addresses for the name servers handling the www.yahoo.com domain, so it returns those.

Your name server then contacts the DNS server for www.yahoo.com and asks if it knows the IP address for www.yahoo.com. It actually does, so it returns the IP address to your DNS server, which returns it to the browser, which can then contact the server for www.yahoo.com to get a Web page.

One of the keys to making this work is redundancy. There are multiple DNS servers at every level, so that if one fails, there are others to handle the requests. The other key is caching. Once a DNS server resolves a request, it caches the IP address it receives. Once it has made a request to a root DNS server for any .COM domain, it knows the IP address for a DNS server handling the .COM domain, so it doesn't have to bug the root DNS servers again for that information. DNS servers can do this for every request, and this caching helps to keep things from bogging down.

Even though it is totally invisible, DNS servers handle billions of requests every day and they are essential to the Internet's smooth functioning. The fact that this distributed database works so well and so invisibly day in and day out is a testimony to the design.

Essential vocabulary (7)

Words

bog down *v*	include *v*	redundancy *n*
bug *v*	invalid *adj*	request *n*, *v*
cache *v*	invisible *adj*	resolve *v*
caching *n*	invisibly *adv*	specific *adj*
essential *adj*	key (to) *n*	specify *v*
exist *v*	left-most *adj*	testimony *n*
fail *v*	potentially *adv*	URL
handle *v*		

Word Combinations

to translate smth. into smth.	to type the URL into one's browser
human-readable	to start one's search for smth.
machine-readable	to send a query
top-level (first-level) domain name	smooth functioning
second-level domain name	distributed database
to accept request from smth.	day in and day out
error message	

Web addresses

Web address / URL :	http : // www.bsu.edu.ru
domain name	www.bsu.edu.ru
host :	bsu
protocol :	http : //
type of site :	.edu.ru
country code :	.ru

EXERCISES

1. Find in part 7 of text 2 English equivalents for the following words and phrases:

отправлять сообщение по электронной почте; каждый раз; преобразовывать в читаемый машиной IP-адрес; крайнее левое слово; так как (поскольку); когда поступает запрос; устанавливать контакт с другим сервером доменных имен; пытаться найти IP-адрес для запрашиваемого имени; возвращать сообщение об ошибке; запрашиваемое доменное имя не существует; управлять доменами высшего уровня; посылать запрос; на самом деле; одна из разгадок чего-л.; на каждом уровне; для того, чтобы; помещать IP-адрес в кэш-память; предотвращать задержку; даже если (хотя); полностью скрытый; необходимый для гладкой работы Интернета; работать изо дня в день, целыми днями.

2. Transcribe and learn to read the following words:

resource, specify, accept, error, return, redundancy, essential, design.

3. Give the Infinitive of:

did, included, specified, gave, tried, found, returned, handled, got, received.

4. Find in part 7 of text 2 synonyms to the following words and word combinations:

to comprise, particular, since, to change, to perform, a demand, to attempt, to give back, mistake, to begin, clue, profusion, to go down, to acquire, to impede, necessary, proof.

5. Write the expansion of the following abbreviation and learn it:

URL.

6. Match the words on the left with their definitions on the right.

1. E-mail	a) A software package that enables a user to find and read hypertext files, esp. on the World Wide Web.
2. List	b) A systematized collection of data that can be accessed immediately and manipulated by a data-processing system for a specific purpose.
3. Server	c) A small high-speed memory that improves computer performance.
4. Browser	d) A computer or program that supplies data or resources to other machines on a network.
5. Redundancy	e) The meaning given to data by the way in which it is interpreted.
6. Cache	f) The transmission and distribution of messages, information, facsimiles of documents, etc., from one computer terminal to another.

7. Information	g) An item-by-item record of names or things, usually written or printed one under the other.
8. Database	h) Duplication of components in electronic or mechanical equipment so that operations can continue following failure of a part.

7. Translate the passages in writing.

A) Every time you use a domain name, you use the Internet's DNS servers to translate the human-readable domain name into the machine-readable IP address.

B) One of the keys to making this work is redundancy. There are multiple DNS servers at every level, so that if one fails, there are others to handle the requests. The other key is caching. Once a DNS server resolves a request, it caches the IP address it receives.

C) Even though it is totally invisible, DNS servers handle billions of requests every day and they are essential to the Internet's smooth functioning. The fact that this distributed database works so well and so invisibly day in and day out is a testimony to the design.

8. Answer the following questions using the information from part 7 of text 2.

1. What do we use when we use the Web or send an e-mail message? 2. What translates the human-readable domain name into the machine-readable IP address? 3. How are the top-level domain names also called? 4. How do we call the left-most word, like www? What is its function? 5. What four things can the DNS server do when a request comes in? 6. What do the root servers know? 7. What are the keys to making this work? 8. How many requests do DNS servers handle every day?

9. Look through part 7 of text 2 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Every time we use a domain name, we use the Internet's DNS servers to translate the human-readable domain name into the machine-readable IP address.	☐
2. The list of second-level domain names include .COM, .ORG, .NET, .EDU and .GOV.	☐
3. It is not essential for every name in the .COM top-level domain to be unique.	☐

4. DNS servers accept requests to convert domain names into IP addresses. ☐
5. The DNS server can return an error message if the requested domain name is invalid or doesn't exist. ☐
6. A DNS server would start its search for an IP address by contacting one of the minor DNS servers. ☐
7. There is only one single DNS server at every level, so that if it fails, there is no other to handle the requests. ☐
8. Caching helps to keep things from bogging down. ☐

10. Match each top-level domain name with the type of organization it denotes.

1. .aero	a) Professional workers.
2. .biz	b) Cooperatives.
3. .com	c) Nonprofit organization.
4. .coop	d) Museums.
5. .edu	e) Businesses.
6. .gov	f) International organization.
7. .info	g) Individuals.
8. .int	h) Commercial.
9. .mil	i) Unrestricted use.
10. .museum	j) United States military.
11. .name	k) Nonmilitary agency, United States . federal government.
12. .net	l) Educational.
13. .org	m) Air-transport industry.
14. .pro	n) Network provider.

11. Make summary of part 7 of text 2 using opening phrases on pages 336–337.

12. Read the text and insert articles where necessary. Make summary of the text.

Could the Internet collapse?

Here's ... good news — a total collapse of the Internet would be almost impossible. The Internet isn't ... magic box with an on/off switch. It's not even ... physical thing. It's ... collection of ... physical things and it's constantly changing. The Internet isn't ... same entity from one moment to ... next — machines are always joining or leaving ... Internet.

It's possible for parts of … Internet to go … offline. In fact, this happens all … time. Whether it's … particular server that crashes and needs to be rebooted or replaced or … cable under … ocean gets snagged by … anchor, there are events that can disrupt Internet service. But … effects tend to be isolated and temporary.

While there is such __ thing as the Internet backbone — a collection of cables and servers that carry … bulk of data across various networks — it's not centralized. There's no plug you could pull out from … socket or a cable you could cut that would cripple … Internet. For the Internet to experience … global collapse, either … protocols that allow machines to communicate would have to stop working for some reason or … infrastructure itself would have to suffer massive damage.

Since … protocols aren't likely to stop working spontaneously, we can rule out that eventuality. As for the massive damage scenario — that could happen. … asteroid or comet could collide with … Earth with enough force to destroy … significant portion of the Internet's infrastructure. Overwhelming … gamma radiation or electromagnetic fluctuations coming from … sun might also do the trick. But in those scenarios, … Earth itself would become … lifeless hulk. At that stage it hardly matters whether or not you can log in to MySpace.

The positive way to look at this is to realize that … men and women who helped design … Internet created … amazing tool that's remarkably stable. Even when sections of … Internet have … technical hiccup, … rest carries on with … business as usual. While … collapse of … Internet would be … catastrophic event, it's not one you need to worry about.

(By Jonathan Strickland)

13. Read the e-mail.

Hi Tony

Thanks for sending through that a/w so quickly. Just one problem — I couldn't open the attachment. I'm not sure why. My inbox is virtually empty, so there's plenty of room, and the attachment limit is 20MB, so there's no problem there. Perhaps there was a glitch somewhere. Anyway, rather than trying to figure out what went wrong, could you just send it again?

Did we discuss file format? I don't know much about TIFFs, JPEGs etc, but I meant to tell you that if you have any queries on this, you could get in touch with Steve, our designer. His email address is steve@stevegreendesign.co.uk.

One other thing. When you resend me the a/w, could you cc it to Angela? I've asked her to have a quick look at it before we put it in the brochure.

I'm looking forward very much to seeing those pics — fingers crossed that they'll come through OK this time. However, if I still can't download them, I'll ask you to put them on a disk and mail them.

All the best

Jenny

a) Are these statements true or false?

1. Jenny didn't receive the a / w because her inbox is too small. ☐
2. The attached files came to less than 20MB in total. ☐
3. Jenny has resolved a technical problem, and the attachment will come through without any problems next time. ☐
4. Tony will have to resend the a / w. ☐
5. Jenny is a graphic design expert. ☐
6. Tony is also going to put the files onto a disk and mail them. ☐
7. Angela has already seen the a / w. ☐
8. The style is too informal — business emails should always be more formal than this. ☐

b) Find words or expressions in the e-mail which mean the same as the phrases below:

artwork; a small technical problem; type of file; questions about this; send again; e-mail a copy to; communicate with; with luck... .

14. Translate the following text into English.

Единый указатель ресурсов

Единый указатель ресурсов (URL) — единообразный локатор (определитель местонахождения) ресурса. URL — это стандартизированный способ записи адреса ресурса в сети Интернет.

URL был изобретен Тимом Бернерсом-Ли в 1990 году в стенах Европейского совета по ядерным исследованиям (*CERN*) в Женеве, Швейцария. URL стал фундаментальной инновацией в Интернете. Изначально URL предназначался для обозначения мест расположения ресурсов (чаще всего файлов) во Всемирной паутине. Сейчас URL применяется для обозначения адресов почти всех ресурсов Интернета. Стандарт URL закреплён в документе *RFC* 1738, прежняя версия была определена в *RFC* 1630. Сейчас URL позиционируется как часть более общей системы идентификации ресурсов URI, сам термин URL постепенно уступает место более широкому термину URI. Стандарт URL регулируется организацией *IETF* и её подразделениями.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 7

LISTING

When reading it is important to recognize and understand the relationship between sentences and paragraphs. They can be linked by means of connective words or markers. We should know that most enumerations belong to clearly defined sets. The table below is a list of the markers that can be used to show the order in which we can enumerate things.

1, 2, 3, etc. one, two, three, etc. first(ly), second(ly), third place	
another, next, then furthermore, afterwards, moreover	
lastly /finally to begin/start with, and to conclude	
first and foremost first and most important(ly)	mark the beginning of a descending order
above all last but not least	mark the end of an ascending order

There are many ways of showing sequential relationships. Those given in the table above are not the only ones, they are the most common ones used in listing or enumerating. The *-ly* forms are usually used when listing.

Sample paragraphs:
More and more police departments are now using sophisticated devices to help control the increasing crime rate. Some of these devices *are: firstly,* a computer terminal inside a police vehicle to answer an officer's questions, *secondly,* a computer-controlled display unit for displaying fingerprints, and *thirdly,* educational systems for police

officers such as terminals, enabling them to verify changes in laws, rules, and regulations.
The computer memory of many law enforcement systems contains all kinds of information. *First and foremost,* it has data on stolen items such as cars, license plates, and property. *Second,* it has information on missing persons and wanted fugitives. *Last but not least,* it contains information on political extremist groups and their activities.
Computers have certainty revolutionized police work by providing access to millions of items of information with the least possible delay and speeding up the process of apprehending suspicious-looking characters.

15. Complete the following paragraphs by filling in appropriate listing markers.

A) When you are creating a new database, you must **(1)** ... decide how many fields you will need in your database. **(2)** ... , you will have to provide up to five items of information about each field. **(3)** ... each field needs to have a name. **(4)** ... , the field type has to be defined.

Character, numeric, date, and logical are some common types. **(5)** ... choice to be made is the width of the field. However, some fields, such as date, have present default values. The **(6)** ... step is to set the number of decimal places if the field is numeric. **(7)** ... , you will have to indicate whether the field is to be indexed or not.

B) Computers can do wonders, but they can waste a lot of money unless careful consideration goes into buying them. Businessmen and women thinking of buying a computer system should **(1)** ... admit they know very little about computers. **(2)** ... , they must realize that the computer sales people don't always know how their business works. **(3)** ... , it is essential that buyers should get outside advice, not necessarily from consultants but from other executives who have had recent experience in buying a computer system. **(4)** ... they should try to see systems similar to ones under consideration in operation. Because their operations will have differences that must be accommodated, they should **(5)** ... find out what would be involved in upgrading a system. **(6)** ... important thing to know before buying a computer is the financial situation of the supplier because computer companies come and go and not all are financially stable. **(7)** ... , the prospective buyer should demand that every detail be covered in writing, including hardware and software if they are supplied by different companies. There's nothing wrong with computers themselves, it's how and why they are used that can cause problems.

UNIT 8

PART 8. INTERNET SERVERS AND CLIENTS

Internet servers make the Internet possible. All of the machines on the Internet are either servers or clients. The machines that provide services to other machines are servers. And the machines that are used to connect to those services are clients. There are Web servers, e-mail servers, FTP servers and so on serving the needs of Internet users all over the world.

When you connect to www.yahoo.com to read a page, you are a user sitting at a client's machine. You are accessing the Yahoo Web server. The server machine finds the page you requested and sends it to you. Clients that come to a server machine do so with a specific intent, so clients direct their requests to a specific software server running on the server machine. For example, if you are running a Web browser on your machine, it will want to talk to the Web server on the server machine, not the e-mail server.

A server has a static IP address that does not change very often. A home machine that is dialing up through a modem, on the other hand, typically has an IP address assigned by the ISP every time you dial in. That IP address is unique for your session — it may be different the next time you dial in. This way, an ISP only needs one IP address for each modem it supports, rather than one for each customer.

PART 9. PORTS AND HTTP

Any server machine makes its services available using numbered ports — one for each service that is available on the server. For example, if a server machine is running a Web server and a file transfer protocol (FTP) server, the Web server would typically be available on port 80, and the FTP server would be available on port 21. Clients connect to a service at a specific IP address and on a specific port number.

Once a client has connected to a service on a particular port, it accesses the service using a specific protocol. Protocols are often text and simply describe how the client and server will have their conversation. Every Web server on the Internet conforms to the hypertext transfer protocol (HTTP).

Networks, routers, NAPs, ISPs, DNS and powerful servers all make the Internet possible. It is truly amazing when you realize that all this information is sent around the world in a matter of milliseconds! The components are extremely important in modern life — without them, there would be no Internet. And without the Internet, life would be very different indeed for many of us.

(By Jeff Tyson)

Essential vocabulary (8), (9)

Words

change *v*	intent *n*	realize *v*
conform (to) *v*	numbered *adj*	truly *adv*
describe *v*	powerful *adj*	

Word Combinations

either ... or	to have a static IP address
to serve the needs of	on the other hand
with a specific intent	to dial up through a modem
	to make smth. available

EXERCISES

1. Find in parts 8 and 9 of text 2 English equivalents for the following words and phrases:

делать Интернет возможным; и так далее; удовлетворять потребности пользователей; находить страницу; домашний компьютер; IP-адрес, назначенный Интернет-провайдером; один для каждого пользователя; использовать пронумерованные порты; просто описывать то, как; за долю секунды; в современной жизни; для многих из нас; в самом деле.

2. Transcribe and learn to read the following words:

specific, dialing, customer, available, transfer, describe, conversation, hypertext, realize, indeed.

3. Give the Infinitive of:

provided, needed, read, changed, described, dialed, supported.

4. Find in parts 8 and 9 of text 2 synonyms to the following words:

to discover, purpose, to aim, to alter, frequently, every, accessible, merely, to depict, potent, really, significant.

5. Write the expansions of the following abbreviations and learn them:

FTP, HTTP.

6. Match the words on the left with their definitions on the right.

1. Client	a) Computer software and hardware that allows users to create, store, and view text and move between related items easily and in a non-sequential way; a word or phrase can be selected to link users to another part of the same document or to a different document.
2. Page	b) The programs that can be used with a particular computer systems.
3. Software	c) A program or work station that requests data or information from a server.
4. Port	d) A constituent part or aspect of something more complex.
5. Hypertext	e) A screenful of information from a website, teletext service, etc., displayed on a television monitor or visual display unit.
6. Component	f) A logic circuit for the input and output of data.

7. Circle transitional markers and find the words they refer to (see Language Focus 2 in Unit 2). Translate the passages in writing.

A) A server has a static IP address that does not change very often. A home machine that is dialing up through a modem, on the other hand, typically has an IP address assigned by the ISP every time you dial in. That IP address is unique for your session — it may be different the next time you dial in.

B) Any server machine makes its services available using numbered ports — one for each service that is available on the server.

C) Protocols are often text and simply describe how the client and server will have their conversation. Every Web server on the Internet conforms to the hypertext transfer protocol (HTTP).

8. Answer the following questions using the information from parts 8 and 9 of text 2.

1. What makes the Internet possible? 2. What are clients? 3. Give examples of servers that serve the needs of Internet users all over the world? 4. What kind of IP address does a server have? 5. What kind of IP address does a client have? 6. What does any server machine use to make its services available? 7. What function do Protocols perform? 8. What does every Web server on the Internet conform to?

9. Look through parts 8 and 9 of text 2 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. All of the machines on the Internet are either servers or clients. ☐
2. Services are provided to other machines by clients. ☐
3. The machines that are used to connect to those services are servers. ☐
4. The server machine finds the requested page and sends it to us. ☐
5. A server has a dynamic IP address that constantly changes. ☐
6. A home machine typically has an IP address assigned by the ISP every time we dial in. ☐
7. Any server machine makes its services available using a special port — one for all the services that are available on the server. ☐
8. The hypertext transfer protocol is simply a description of how the client and server will have their conversation. ☐

10. Make summary of parts 8 and 9 of text 2 using opening phrases on pages 336–337.

11. Read the text and put the verbs in brackets into the correct tense-aspect form.

Match each paragraph of the text with the appropriate summary given below.

a) Annual research about the future of the Internet. ☐
b) The Internet can bring a period of peace and friendship. ☐
c) The usage of the Internet in learning. ☐
d) Changes in relations between countries and cultures. ☐
e) Information instead of ability to think. ☐
f) An atrophy of concentration and focus. ☐
g) Interdependence of recording and accessing information and the way we think. ☐

The Internet and Human Intelligence

1. Nicholas Carr (to write) an article titled «Is Google making us stupid?» In it, Carr (to say) he (to notice) that as his reliance on the Internet for research and entertainment (to increase), other faculties seemed to atrophy. One of those (to be) his concentration or focus. He (to hypothesize) that because the way you navigate the Internet in general — and the World Wide Web in particular — you're always leaping from one piece of information to another.

2. Could the Internet affect the way humans (to think)? On the one hand, we (to have) unprecedented access to an enormous library of information. Answers to questions ranging from «What is the Big Bang theory?» to «How long should I let dough rise?» (to be) just a couple of clicks away. But that information (to come) at the cost of our own ability to think?

3. There does seem to be a correlation to the way we (to record) and (to access) information and the way we (to think). As we (to develop) systems that (to allow) us to save our knowledge for posterity, we (to unload) that burden onto an inanimate object. That necessarily (not to mean) we (to become) less intelligent.

4. Not everyone (to agree) with Carr's hypothesis. The Pew Research Center (to perform) a survey each year about the future of the Internet. The research group (to poll) a group of experts

and industry analysts on a series of questions. For the 2010 report, one of the questions (to ask) the respondents if they (to think) Carr (to be) right about Google — and the Internet in general — making us stupid. Eighty-one percent of the experts (to disagree).

5. But it's true that access to information (not to equate) to intelligence. You might be able to look up a fact, but that (not to mean) you understand what the fact (to mean) or its context. The Internet (to be) a tool that we can use to help us learn — it (not to replace) learning itself.

6. Optimists (to hope) that the Internet (to teach) us about ourselves. The reach of the Internet (to creep) into countries and cultures that (to segregate) from the rest of the world. Some (to hope) the Internet (to provide) the common ground that (to allow) various people to learn and understand each other, possibly bringing about an era of peace and cooperation.

7. Ultimately, the Internet could begin to erase traditional boundaries between countries and cultures. But that sort of global change (not to be) trivial. It might take decades before we (to see) a noticeable difference in the way we (to think) of one another. Cynics may think even a tool as useful and pervasive as the Internet (not to overcome) the hurdles we face in becoming a united world.

(By Jonathan Strickland)

12. Read the e-mail.

Dear Jenny

As requested, I'm attaching the a/w files again.

The technical problems you've been experiencing may be due to your email provider. I have to say, I've never heard of Whoopydudu.com. You might be better of switching to one of the big names, such as Gmail or Yahoo.

Regarding file formats, TIFFs should be OK. If necessary, your designer will be able to reformat them very easily, but in my experience most designers have no problem working with TIFFs.

As the file sizes are quite large, and I understand that Angela only has a dial-up connection, I've sent her low-res versions to look at. I hope that will be OK. They should be clear enough.

I'm just about to go on holiday, so if you need me to send these files on disk, please let me know by Friday afternoon.

I probably won't get the opportunity to check my email while I'm away, but if anything arises that won't keep, my assistant Trevor may be able to deal with it.

Best regards

Tony

a) Are these statements true or false?

1. Tony thinks Jenny should change her email provider. ☐
2. The designer will need to reformat the files. ☐
3. Angela doesn't have broadband. ☐
4. Tony is sending resized versions of the a/w files to Angela. ☐
5. These versions will look the same as the original versions. ☐
6. Tony is going on holiday on Friday morning. ☐
7. Trevor may be able to help with any problems that come up while Tony is away. ☐
8. The style is neutral — neither formal nor informal. ☐

b) Find words or expressions in the e-mail which mean the same as the phrases below:

as you asked; famous companies; change the type of file; I think, but I may be wrong ... ; low image resolution; on Friday afternoon or before; comes up; that's urgent.

13. Translate the following text into English.

Клиент и сервер

Сервер или клиент — это функции, которые выполняет компьютер. Любой компьютер в сети может выполнять функции сервера или клиента, а может выполнять обе эти функции одновременно. Все зависит от программного обеспечения.

Функции сервера — выполнять операции по запросам клиентов. Это может быть хранение и передача файлов, выполнение приложений с выдачей результатов, обслуживание принтеров и т. д. Если компьютер выполняет только функции сервера, то его, обычно, называют выделенный сервер. Нередко у такого компьютера выключены или вовсе отсутствуют монитор или клавиатура, а все управление им производится с других компьютеров через сеть.

Если компьютер не выполняет никаких серверных функций в сети, то такой компьютер называют рабочей станцией, за ним работают пользователи.

Если же компьютеры в сети одновременно выполняют и серверные, и клиентские функции, то такая сеть называется одноранговая.

Различные операционные системы по-разному приспособлены для функций сервера и клиента. Существует ряд операционных систем специально предназначенных для выполнения серверных задач.

(«Информационные технологии», www.information-technology.ru)

LANGUAGE FOCUS 8

GIVING EXAMPLES

Examples are often used either to explain a point or to illustrate an idea, especially when the main aim of a text is to inform the reader about a subject. When giving examples, do not mix the idea itself and the illustration of the idea.

Some expressions for introducing examples are shown in the table below.

for example (e.g.)	examples of	shown by
for instance	instances of	exemplifies
an example (of this)	cases of	shows
as an example	illustrations of	illustrates
such as	exemplified by	a second/third example
like	illustrated by	etc.
including	seen in	

Examples:

1. Today there are a lot of types of computers **such as** servers, desktop computers, laptops computers, pocket PCs and many others.

2. The Internet has radically changed our lives. **For example,** we can buy things on-line sitting on the sofa.

3. Students can make good use of Internet technology in their study. Finding any sort of information, **for instance,** can be done using a computer with Internet access.

Note: Sometimes the markers follow the example, separated by commas, as in 3 above.

14. The list below is made up of five groups of words, consisting of five main categories and examples of each category. Find the word groups and then write sentences to show the relationship between the groups of words. Use a different marker for each sentence. One has been done for you.

trackball	*bus*	PC
mainframe	output device	*star*
microcomputer	printer	VDU
network configuration	APL	C
programming language	COBOL	*ring*
mouse	stylus	computer
input device		

Example:

Ring, bus, and star are all examples of network configurations.

15. Read the following sentences. Mark and underline the main idea for which the example is given. The first one has been done for you.

1. Networks also allow users in one locality to share <u>expensive resources</u>, such as printers and disk-systems.

2. Protocols like TCP/IP and dozens more create the framework within which all devices must operate to be part of the Internet.

3. There are a lot of types of hardware that support the Internet, including routers, servers, cell phone towers, satellites, smartphones and other devices.

4. Here's an example of a simple virus, the Lehigh virus.

5. Top-level domain names, also called first-level domain names, include .COM, .ORG, .NET, .EDU and .GOV.

6. The PC passes the query, written in a special language (e. g. Structured Query Language — SQL), to the mainframe, which then parses the query, returning to the user only the data requested.

7. You've probably heard of several protocols on the Internet. For example, http, FTP, TCP/IP.

8. There are a handful of clipboard computers now on the market, including CRIDPad, which is sold in the US.

9. Fiber optic cables are designated OC for optical carrier, such as OC-3, OC-12 or OC-48.

10. If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC's drives without a write-protect tab.

16. Not all texts present examples explicitly. In some cases, markers are not used. Read the paragraph below. Mark the main idea and underline the examples of that idea.

The widespread availability of computers has in all probability changed the world for ever. The microchip technology which made the PC possible has put chips not only into computers, but also into washing-machines and cars. Some books may never be published in paper form, but may only be made available as part of public databases. Networks of computers are already being used to make information available on a world-wide scale.

SECTION TWO

THE ETHERNET

Ethernet is a set of standards for Local Area Networks.
(Webster's New World TM Hacker Dictionary)

QUIZ 3

Home networks are becoming common in homes that use more than one computer. With people using computers for shopping, home businesses and entertainment, it can be essential to link up not only PCs but also fax machines and TVs. In the following quiz, find out what's going on behind this linked-up system.

1. A home network is simply a method of allowing computers communicate with each other. At its most basic level, a home network must have all of the following to operate except:

a) print server
b) more than one computer
c) router

2. In wireless and Ethernet home networks, what directs traffic among connected devices?

a) cable modem
b) router
c) DSL modem

3. Of the following, what company is not a reputed purveyor of firewalls?

a) Firestorm
b) McAfee
c) Symantec

4. An Ethernet home network is also referred to as a ... network.

a) wired
b) cable-connected
c) hard

5. If you're planning on connecting just two computers, what type of card is necessary?

a) category 5 cable

b) network interface

c) wireless Internet

6. Which of the following isn't true?

a) Wired networks are cheaper than wireless networks.

b) Wired networks are faster than wireless networks.

c) Wired networks are more secure than wireless networks.

7. Wireless networks are flexible because:

a) You can connect a limitless number of computers to one router.

b) You don't need any special hardware other than the router.

c) You don't need wires to connect your computer to the router.

8. Wireless security options include all of the following except:

a) MAC

b) MPA

c) WEP

9. A wireless router is essential for building a wireless network. Unfortunately, walls can interrupt the signal — even though it extends about 100 feet (30.5 meters) in all directions. This device can help you get more coverage (even through those pesky walls):

a) router probe

b) wireless tunneler

c) range extender (or repeater)

10. While the Institute of Electrical and Electronics Engineers has approved MAC, WEP and WPA security options, studies have shown that ... can be broken into fairly easily.

a) WPA

b) WEP

c) MAC

(To find correct answers to this quiz, see pages 331–332)

UNIT 9

THE ETHERNET

PART 1. INTRODUCTION TO ETHERNET

In today's business world, reliable and efficient access to information has become an important asset in the quest to achieve a competitive advantage. File cabinets and mountains of papers have given way to computers that store and manage information electronically. Coworkers thousands of miles apart can share information instantaneously, just as hundreds of workers in a single location can simultaneously review research data maintained online.

Computer networking technologies are the glue that binds these elements together. The public Internet allows businesses around the world to share information with each other and their customers. The global computer network known as the World Wide Web provides services that let consumers buy books, clothes, and even cars online, or auction those same items off when no longer wanted.

In this article, we will take a very close look at networking, and in particular the Ethernet networking standard, so you can understand the actual mechanics of how all of these computers connect to one another.

PART 2. WHY NETWORK?

Networking allows one computer to send information to and receive information from another. We may not always be aware of the numerous times we access information on computer networks. Certainly the Internet is the most conspicuous example of computer networking, linking millions of computers around the world, but smaller networks play a role in information access on a daily basis. Many public libraries have replaced their card catalogs with computer terminals that allow patrons to search for books far more quickly and easily. Airports have numerous screens displaying information regarding arriving and departing flights. Many retail stores feature specialized computers that handle point-of-sale transactions. In each of these cases, networking allows many different devices in multiple locations to access a shared repository of data.

Before getting into the details of a networking standard like Ethernet, we must first understand some basic terms and classifications that describe and differentiate network technologies — so let's get started!

PART 3. LOCAL AREA VS. WIDE AREA

We can classify network technologies as belonging to one of two basic groups. Local area network (LAN) technologies connect many devices that are relatively close to each other, usually in the same building. The library terminals that display book information would connect over a local area network. Wide area network (WAN) technologies connect a smaller number of devices that can be many kilometers apart. For example, if two libraries at the opposite ends of a city wanted to share their book catalog information, they would most likely make use of a wide area network technology, which could be a dedicated line leased from the local telephone company, intended solely to carry their data.

In comparison to WANs, LANs are faster and more reliable, but improvements in technology continue to blur the line of demarcation. Fiber optic cables have allowed LAN technologies to connect devices tens of kilometers apart, while at the same time greatly improving the speed and reliability of WANs.

Essential vocabulary (1), (2), (3)

Words

actual *adj*
auction off *v*
asset *n*
blur *v*
efficient *adj*
feature *v*, *n*
improvement *n*
instantaneously *adv*
relatively *adv*
reliable *adj*
repository *n*
share *v*

competitive *adj*	network *n*	simultaneously *adv*
conspicuous *adj*	numerous *adj*	solely *adv*
differentiate *v*	patron *n*	LAN
demarcation *n*	point-of-sale *n*	WAN

Word Combinations

to give way (to)	at the same time
in the quest to do smth.	to be at the opposite ends of smth.
to bind smth. together	to replace smth. with smth.
to be aware of smth.	shared repository of data
on a daily basis	to be many kilometers apart
to blur the line of demarcation	to make use of smth.
to improve the speed /reliability	competitive advantage

EXERCISES

1. Find in parts 1, 2 and 3 of the text English equivalents for the following words and phrases:

в деловом мире; достигать конкурентного преимущества; картотечный шкаф; хранить информацию в электронном виде; коллега; в одном месте; одновременно просматривать данные исследований; делиться информацией с клиентами; больше не; множество раз; соединять миллионы компьютеров во всем мире; несомненно; искать книги намного быстрее; магазины розничной торговли; совместно используемая база данных; устройства, относительно близкие друг к другу; отображать информацию о книге; локальная сеть; региональная сеть; меньшее количество устройств; выделенная линия, арендованная у местной телефонной компании; по сравнению с ... ; прогресс в технологии; волоконно-оптические кабели позволили ... .

2. Transcribe and learn to read the following words:

reliable, efficient, instantaneously, mechanics, conspicuous, Ethernet, area, differentiate.

3. Write the Past Indefinite and the Past Participle of the verbs:

become, achieve, share, bind, let, buy, take, send, search, classify, blur.

4. Find in parts 1, 2 and 3 of the text synonyms to the following words and word combinations:

trustworthy, to reach, workmate, to yield, immediately, at the same time, investigation, to permit, to purchase, criterion, noticeable, every day, location, depository, to distinguish, to organize, to employ, distinction.

5. Write the expansions of the following abbreviations and learn them:

LAN, WAN.

6. Match the words on the left with their definitions on the right.

1. Access	a) A point in a network where a message can be transmitted or received.
2. Standard	b) The ability of a device to function as intended, efficiently and without failure.
3. Terminal	c) The process of looking for and identifying a character or word or section of data in a document or file.
4. Device	d) The process of showing the difference between two areas.
5. Demarcation	e) The normal quality or normal conditions which are used to judge other things.
6. Reliability	f) The fact of being allowed to use a computer and read or alter files stored in it.
7. Search	g) A small useful machine or piece of equipment.

7. Translate the passages in writing

A) File cabinets and mountains of papers have given way to computers that store and manage information electronically. Coworkers thousands of miles apart can share information instantaneously, just as hundreds of workers in a single location can simultaneously review research data maintained online.

B) We may not always be aware of the numerous times we access information on computer networks. Certainly the Internet is the most conspicuous example of computer networking, linking millions of computers around the world, but smaller networks play a role in information access on a daily basis.

C) In comparison to WANs, LANs are faster and more reliable, but improvements in technology continue to blur the line of demarcation. Fiber optic cables have allowed LAN technologies to connect devices tens of kilometers apart, while at the same time greatly improving the speed and reliability of WANs.

8. Use the information from parts 1, 2 and 3 of the text to complete the dialogue in your own words.

A : What has become an important asset in today's business world?

B : ...

A : What an opportunity do coworkers thousands of miles apart have?

B : ...

A : What kind of services does the global computer network provide?

B : ...

A : What does networking allow?

B : ...

A : How can we classify network technologies?

B : ...

A : What is LAN?

B : ...

A : What is WAN?

B : ...

A : Give example of the usage of WAN technologies.

B : ...

9. Look through parts 1, 2 and 3 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Computers that store and manage information electronically have replaced file cabinets and mountains of papers. ☐
2. The public Internet forbids businesses around the world to share information with each other and their customers. ☐
3. The Internet is the most conspicuous example of computer networking. ☐
4. The card catalogues weren't replaced with computer terminals in the public libraries. ☐
5. LAN technologies connect a smaller number of devices that can be many kilometers apart. ☐

6. WAN technologies connect many devices that are relatively close to each other. ☐
7. In comparison to WANs, LANs are faster and more reliable. ☐
8. Fiber optic cables have given LAN technologies an opportunity to connect devices thousands of kilometers apart. ☐

10. Make summary of parts 1, 2 and 3 of the text using opening phrases on pages 336–337.

11. Read the text and supply prepositions or adverbs where necessary.

a) Give synonyms to the words in bold type.

b) Single out the main points of this text and sum up its content using the opening phrases on pages 336–337.

Wired Networks

Ethernet and wireless networks each have advantages and disadvantages; depending ... your needs, one may serve you better than the other. Wired networks provide users ... **plenty** of security and the ability to move lots of data very **quickly**. Wired networks are typically faster than wireless networks, and they can be very affordable. However, the cost of Ethernet cable can add up — the more computers ... your network and the farther apart they are, the more **expensive** your network will be. ... addition, unless you're building a new house and installing ... Ethernet cable in the walls, you'll be able to see the cables running from place to place ... your home, and wires can **greatly** limit your mobility. A laptop owner, ... example, won't be able to move around easily if his computer is tethered ... the wall.

Here are three basic systems people use to set ... wired networks. An Ethernet system uses either a twisted copper-pair or coaxial-based transport system. The most commonly used cable ... Ethernet is a category 5 unshielded twisted pair (UTP) cable — it's **useful** for businesses who want to connect several devices together, such as computers and printers, but it's **bulky** and expensive, making it less practical ... home use. A phone line, ... the other hand, simply uses existing phone wiring found ... most homes, and can provide ... fast services such as DSL. Finally, broadband systems provide ... cable Internet and use the same type of coaxial cable that gives us cable television.

If you plan to connect … only two computers, all you'll need is a network interface card (NIC) in each computer and a cable to run … them. If you want to connect several computers or other devices, you'll need an **additional** piece … equipment: an Ethernet router. You'll also need a cable to connect each computer or device … the router.

(By Tracy V. Wilson and John Fuller)

12. Fill in suitable words from the box.

intranet, Local, log onto, network card, satellite, server, terminals, WAN (Wide Area Network)

LAN is pronounced «lan», and stands for (1) … Area Network. In a typical LAN, there is a central network (2) … which supports a number of (3) … . Users have to (4) … the network server. Pages of information that can be viewed within a LAN are called an (5) … . A number of LANs connected to each other via (6) … or other form of communication are called a (7) … . To be used as network terminals, each computer needs to have a (8) … installed.

13. Render the following text in English:

Спецификации физической среды Ethernet

Исторически первые сети технологии Ethernet были созданы на коаксиальном кабеле диаметром 0,5 дюйма. В дальнейшем были определены и другие спецификации физического уровня для стандарта Ethernet, позволяющие использовать различные среды передачи данных.

Физические спецификации технологии Ethernet на сегодняшний день включают следующие среды передачи данных.

- 10Base-5 — коаксиальный кабель диаметром 0,5 дюйма, называемый «толстым» коаксиалом. Имеет волновое сопротивление 50 Ом. Максимальная длина сегмента – 500 метров (без повторителей).
- 10Base-2 — коаксиальный кабель диаметром 0,25 дюйма, называемый «тонким» коаксиалом. Имеет волновое сопро-

тивление 50 Ом. Максимальная длина сегмента — 185 метров (без повторителей).

- 10Base-T — кабель на основе неэкранированной витой пары. Образует звездообразную топологию на основе концентратора. Расстояние между концентратором и конечным узлом — не более 100 м.
- 10Base-F — волоконно-оптический кабель. Топология аналогична топологии стандарта 10Base-T. Имеется несколько вариантов этой спецификации — FOIRL (расстояние до 1000 м), 10Base-FL (расстояние до 2000 м), 10Base-FB (расстояние до 2000 м).

Число 10 в указанных выше названиях обозначает битовую скорость передачи данных этих стандартов — 10 Мбит/с, а слово Base — метод передачи на одной базовой частоте 10 МГц (в отличие от методов, использующих несколько несущих частот, которые называются Broadband — широкополосными). Последний символ в названии стандарта физического уровня обозначает тип кабеля.

*(Олифер В. Г., Олифер Н. А.
«Компьютерные сети. Принципы,
технологии, протоколы»)*

LANGUAGE FOCUS 9

THE PASSIVE VOICE

The Passive Voice is very often used in technical writing where we are more interested in facts, processes, and events than in people. We form the Passive Voice by using the appropriate tenses of the verb to *be* followed by the past participle of the verb we are using.

Examples:

Active

1. We **use** computers. (The Present Simple)

2. Vannevar Bush **built** the first analog computer. (The Past Simple)

Passive

1. Computers **are used**. (The Present Simple)

2. The first analog computer **was built** in 1930. (The Past Simple)

FACTS AND PROCESSES

When we write or talk about facts or processes that happen regularly, we use the Present Simple Passive.

*Example*s:

1. Hypertext transfer protocol **is used** to view Web sites through a browser.

2. All our computers **are connected** to the Internet.

3. The request **is sent** to a server further up the chain on the Internet.

14. Read the text and put the verbs in brackets into the correct form.

All calls (1) … (register) by the Help Desk staff. Each call (2) … (evaluate) and then (3) … (allocate) to the relevant support group. If a visit (4) … (require), the user (5) … (contact) by telephone, and an appointment (6) … (arrange). Most calls (7) … (deal with) within one working day. In the event of a major problem requiring the removal of a user's PC, a replacement can usually (8) … (supply).

15. Put the verbs in brackets into the correct form.

1. Computers … (accept) information in the form of instructions and characters.

2. The address bus … (use) to send address details between the memory and the address register.

3. A computer … (replace) people in dull, routine tasks.

4. An operating system … (store) on disk.

5. The computer's input device … (read) the information into the computer.

6. The star configuration, all processing and control functions … (perform) by the central computer.

7. When a document arrives in the mail room, the envelope … (open) by a machine.

8. Once the index … (store), a temporary key number … (generate) and … (write) on the document.

9. Inputting signals … (turn) certain switches on and … (turn) others off.

10. The part of the processor which controls data transfers between the various input and output devices … (call) the control unit.

11. Programs and data ... (keep) inside the computer in a place called memory.

12. Instructions written in a high-level language ... (transform) into machine code.

13. For outputting information a printer and a cathode-ray-tube display ... (use).

14. The pixel positions ... (pass on) to the computers pattern recognition software.

15. A computer cannot do anything unless it ... (tell) what to do and ... (give) the necessary information.

EVENTS

When we write or talk about past events, we use the Past Simple Passive.

Examples:

1. A lot of new devices **were created** last year.

2. A new version of IP **was developed** several years ago.

3. The Internet Society, a non-profit group, **was established** in 1992.

16. Put the verbs in brackets into the correct form.

1. In 1948 American scientists W.Shockly, J.Bardeen and W.Brattain ... (invent) the transistor.

2. In 1930 the first analog computer ... (build) by Vannevar Bush.

3. During that period, enormous advances ... (make) in computer technology.

4. The following year, twice as many PCs ... (sell).

5. Integrated circuit ... (discover) due to the efforts of John Kilby in 1958.

6. The first digital computer ... (build) by the University of Pennsylvania in 1946.

7. Last year, more software companies ... (launch) than ever before.

8. IBM's decision not to continue manufacturing mainframes ... (reverse) the year after it ... (take).

9. Vacuum tubes ... (invent) at the beginning of the 20^{th} century.

10. Microsoft ... (found) by Bill Gates.

11. In the 1980s, at least 100,000 LANs ... (set up) in laboratories and offices around the world.

12. The first real calculating machine ... (appear) in 1820 as the result of several people's experiments.

13. «The analytical engine» ... (show) at the Paris Exhibition in 1855.

14. Charles Babbage never ... (finish) his work, but many of his ideas ... (be) the basis for building today's computers.

15. In the fir part of the twentieth century electromechanical machines ... (use) for business data processing.

16. In 1890 Dr. Herman Hollerith ... (build) one machine to punch the holes and others to tabulate the collected data.

17. C language ... (develop) in the 1970s.

18. In 1946 two engineers at the University of Pennsilvania, J.Eckert and J.Mauchly, ... (create) their digital computer with vacuum tubes.

19. The idea of keeping instructions for the computer inside the computer's memory ... (develop) in 1947.

20. EDVAC ... (design) to store both data and instructions.

UNIT 10

PART 4. THE ETHERNET

In 1973, at Xerox Corporation's Palo Alto Research Center (more commonly known as PARC), researcher Bob Metcalfe designed and tested the first Ethernet network. While working on a way to link Xerox's «Alto» computer to a printer, Metcalfe developed the physical method of cabling that connected devices on the Ethernet as well as the standards that governed communication on the cable. Ethernet has since become the most popular and most widely deployed network technology in the world. Many of the issues involved with Ethernet are common to many network technologies, and understanding how Ethernet addressed these issues can provide a foundation that will improve your understanding of networking in general.

The Ethernet standard has grown to encompass new technologies as computer networking has matured, but the mechanics of operation for every Ethernet network today stem from Metcalfe's original design. The original Ethernet described communication over a single cable shared by all devices on the network. Once a device attached to this cable, it had the ability to communicate with any other attached device. This allows the network to expand to accommodate new devices without requiring any modification to those devices already on the network.

PART 5. ETHERNET BASICS

Ethernet is a local area technology, with networks traditionally operating within a single building, connecting devices in close proximity. At most, Ethernet devices could have only a few hundred meters of cable between them, making it impractical to connect geographically dispersed locations. Modern advancements have increased these distances considerably, allowing Ethernet networks to span tens of kilometers.

In networking, the term protocol refers to a set of rules that govern communications. Protocols are to computers what language is to humans. Since this article is in English, to understand it you must be able to read English. Similarly, for two devices on a network to successfully communicate, they must both understand the same protocols.

PART 6. ETHERNET TERMINOLOGY

Ethernet follows a simple set of rules that govern its basic operation. To better understand these rules, it is important to understand the basics of Ethernet terminology.

Medium — Ethernet devices attach to a common medium that provides a path along which the electronic signals will travel. Historically, this medium has been coaxial copper cable, but today it is more commonly a twisted pair or fiber optic cabling.

Segment — We refer to a single shared medium as an Ethernet segment.

Node — Devices that attach to that segment are stations or nodes.

Frame — The nodes communicate in short messages called frames, which are variably sized chunks of information.

Frames are analogous to sentences in human language. In English, we have rules for constructing our sentences: We know that each sentence must contain a subject and a predicate. The Ethernet protocol specifies a set of rules for constructing frames. There are explicit minimum and maximum lengths for frames, and a set of required pieces of information that must appear in the frame. Each frame must include, for example, both a destination address and a source address, which identify the recipient and the sender of the message. The address uniquely identifies the node, just as a name identifies a particular person. No two Ethernet devices should ever have the same address.

Essential vocabulary (4), (5), (6)

Words

analogous *adj*
coaxial *adj*
deploy *v*
disperse *v*
encompass *v*
Ethernet *n*
explicit *adj*
frame *n*
govern *v*
historically *adv*
impractical *adj*
involve *v*
issue *n*
mature *v*
medium *n*
modification *n*
node *n*
proximity *n*
recipient *n*
segment *n*
sender *n*
similarly *adv*
span *v*, *n*
stem (from) *v*
terminology *n*
uniquely *adv*

Word Combinations

to work on a way to do smth.
to be common to smth.
to address the issues
computer networking
to have the ability to do smth.
at most
to make smth. impractical
geographically dispersed
on the network
coaxial copper cable
a twisted pair
variably sized chunks of information
to be analogous to smth.
source address
destination address

EXERCISES

1. Find in parts 4, 5 and 6 of the text English equivalents for the following words and phrases:

разрабатывать и тестировать первую сеть Ethernet; физический способ соединения; управлять процессом передачи информации; наиболее широко используемая в мире сетевая технология; вопросы, касающиеся Ethernet; решать вопросы; обеспечивать основу; охватывать новые технологии; передача информации по одному кабелю; не требуя никаких изменений; традиционно работая в пределах одного здания; соединять устройства на близком расстоянии; несколько сотен метров кабеля между ними; значительно увеличивать расстояние; современное развитие; те же самые протоколы; следовать простому набору правил; обеспечивать маршрут, по которому передаются электронные сигналы; определять набор правил; точная минимальная и максимальная длина фреймов; набор требуемой информации; содержать как адрес назначения, так и исходный адрес; определять получателя сообщения; тот же самый адрес.

2. Transcribe and learn to read the following words:

issue, design, requiring, proximity, dispersed, medium, coaxial, analogous, identify, recipient.

3. Write the Past Indefinite and the Past Participle of the verbs:

know, govern, grow, expand, increase, refer, read, travel, have, appear, identify.

4. Find in parts 4, 5 and 6 of the text synonyms to the following words and word combinations:

scientist, to plan, mode, question, to supply, to make better, to originate from, capability, small change, nearness, progress, to enlarge, to control, to join, similar, to comprise, to define, definite, addressee, specific.

5. Write the expansion of the following abbreviation and learn it:

PARC.

6. Match the words on the left with their definitions on the right.

1. Research	a) A packet of transmitted data including control and route information.
2. Method	b) A unique number that identifies a device on a network.
3. Modification	c) Nearness in space or time.
4. Proximity	d) A part of the local area network between two nodes.
5. Medium	e) A change made to something.
6. Segment	f) A way of proceeding or doing something.
7. Address	g) Scientific investigation carried out in order to learn new facts about a field of study.
8. Frame	h) A substance in which signals can be transmitted.

7. Translate the passages in writing

A) Many of the issues involved with Ethernet are common to many network technologies, and understanding how Ethernet addressed these issues can provide a foundation that will improve your understanding of networking in general.

B) There are explicit minimum and maximum lengths for frames, and a set of required pieces of information that must appear in the frame. Each frame must include, for example, both a destination address and a source address, which identify the recipient and the sender of the message.

8. Answer the following questions using the information from parts 4, 5 and 6 of the text.

1. When did Bob Metcalfe design and test the first Ethernet network? 2. What did Metcalfe develop? 3. What did the original Ethernet describe? 4. Taking modern advancement into consideration, what distance can Ethernet devices have between them? 5. What does the term protocol refer to in networking? 6. What does a common medium provide? 7. What is the frame? 8. What must each frame include?

9. Look through parts 4, 5 and 6 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. In 1973 at IBM Corporation, researcher Bob Metcalfe designed and tested the first Ethernet network. ☐
2. Ethernet has since become the least popular and least deployed network technology in the world ☐
3. Once a device attached to the Ethernet, it had the ability to communicate with any other attached device. ☐
4. At most, Ethernet devices could have only a few hundred meters of cable between them. ☐
5. Historically, the medium has been a twisted pair or fiber optic cable, but today it is more commonly a coaxial copper cabling. ☐
6. Frames are analogous to sentences in human language ☐
7. There are no explicit minimum and maximum lengths for frames. ☐
8. Each frame must include only a destination address, which identifies the recipient of the message. ☐

10. Make summary of parts 4, 5 and 6 of the text using opening phrases on page 336–337.

11 Read the text and insert articles where necessary.

a) Give antonyms to the words in bold type.

b) Using the information from this text, enumerate all advantages and disadvantages of HomePNA in the table below and decide if there are more the former or latter in this type of networking.

Phone-line Networking	
advantages	disadvantages
1.	1.
2.	2.
…	…

Phone-line Networking

Phone-line networking is one of several ways to connect … computers in your home. If your computers are in **different** rooms, then phone-line networking could be … **good** solution for you. Phone-line networking is **easy** to install, **inexpensive** and **fast**, and it doesn't require … any additional wiring.

Phone-line networking, most commonly referred to as Home PNA, is based on … specifications developed by … Home Phone Networking Alliance (HPNA). The HPNA is … consortium of key networking technology companies that created … phone-line standard for … networking industry. HPNA 1.0, … original version of … standard, operated at a rather slow 1 megabit per second (Mbps). … current specification, HPNA 3.0, is based on technology developed by … Broadcom and … Copper Solutions. It operates at 128 Mbps.

HomePNA has … several distinct **advantages:**

- It's easy to install.
- It's inexpensive.
- It's standardized.
- It's **reliable.**
- It operates at a constant 128 Mbps, even when the phone is in use.

- It requires no additional networking equipment (such as hubs or routers).
- It supports up to 50 devices.
- It is fast enough for bandwidth-intensive applications, such as video.
- It is **compatible** with other networking technologies.
- It works on Macs and older PCs (in addition to Windows and Linux systems).

HomePNA does have … some drawbacks, though. You need … phone jack **close** to each computer. Otherwise, you will have to run phone extension cords or install new wiring. There is … physical limit of 1,000 feet (304.8 m) of wiring between devices, and … overall area of coverage should not exceed 10,000 square feet (929 m^2). **Rarely** (in fewer than 1 percent of U. S. homes), HomePNA will not work on … existing wiring. And while this author did not notice any interference with voice use, there have been reports of voices sounding «funny» or of … lot of noise on … phone once HomePNA is installed.

(By Jeff Tyson)

12. Choose the correct word in each of the following sentences.

1. The speed with which a modem can process data is measured in … .

a) bandwidth b) bits per second (bps) c) signal

2. Cables consisting of several copper wires each with a shield are known as … cables.

a) twisted pair b) optical fiber c) power cables

3. Computers that are connected together within one building form a … .

a) WAN b) ISP c) LAN

4. If you transfer a file from a remote computer to your computer, you … .

a) download b) upload c) run

5. To send out information is to … .

a) signal b) packet c) transmit

6. A document containing information and graphics that can be accessed on the internet is … .

a) a website b) a web page c) the World Wide Web

13. Render the following text in English.

Структура стандартов IEEE 802.X

В 1980-м году в институте IEEE был организован комитет 802 по стандартизации локальных сетей, в результате работы которого было принято семейство стандартов IEEE 802.X, которые содержат рекомендации по проектированию нижних уровней локальных сетей. Позже результаты работы этого комитета легли в основу комплекса международных стандартов ISO 8802-1…5. Эти стандарты были созданы на основе очень распространенных фирменных стандартов сетей *Ethernet*, *ArcNet* и *Token Ring*.

Помимо IEEE в работе по стандартизации протоколов локальных сетей принимали участие и другие организации. Так, для сетей, работающих на оптоволокне, американским институтом по стандартизации ANSI был разработан стандарт FDDI, обеспечивающий скорость передачи данных 100 Мбит/с. Работы по стандартизации протоколов ведутся также ассоциацией ECMA, которой приняты стандарты ECMA-80, 81, 82 для локальной сети типа Ethernet и впоследствии стандарты ECMA-89,90 по методу передачи маркера.

Стандарты семейства IEEE 802.X охватывают только два нижних уровня семиуровневой модели OSI — физический и канальный. Это связано с тем, что именно эти уровни в наибольшей степени отражают специфику локальных сетей. Старшие же уровни, начиная с сетевого, в значительной степени имеют общие черты, как для локальных, так и для глобальных сетей.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 10

EXPLANATIONS AND DEFINITIONS

If the purpose of the text is to inform specialists about new developments or to explain something to non-experts or students, the text usually contains definitions and explanations.

Definitions and explanations usually have the following words and expression:

is / are	by ... we mean
means	by ... is meant
is taken to be	in other words
denotes	that is (to say)
is / can be defined as	

Examples:

1. A tablet **is** a modern electronic device.
2. Printers and monitors **are** output devices.
3. The term protocol **refers to** a set of rules that machines follow to complete tasks.
4. A node **can be defined as** a device attached to the segment.
5. **By** packets **we mean** parts of a file that range between 1,000 and 1,500 bytes.

Definitions usually include three parts: the term to be defined, the group it belongs to, and the characteristics which distinguish it from other members of the group. For example:

Term	Group	Characteristics
A core	is a thin glass center of the fiber	where the light travels
Cladding	is the outer optical material surrounding the core	that reflects the light back into the core
Coating	is a plastic coating	which is used to protect the fiber from damage and moisture

14. Analyze the following definitions and identify their different parts:

a) by marking the term

b) by underlining the group once

c) by underlining the characteristics twice.

Example: **A computer** is a complicated device that stores and processes data.

1. A WAN is a network connected over long-distance telephone lines.
2. A computer virus — an unwanted program that has entered your system without you knowing about it — has two parts, which I'll call the infector and the detonator.
3. A «system» is a mixture of integrated parts working together to form a useful whole.

4. Internet is a global collection of networks, both big and small, connecting together in many different ways to form the single entity.

5. The part of the processor which controls data transfers between the various input and output devices is called the control unit.

6. A modem is a device which serves a dual purpose because it acts as a MOdulator (digital to analog) and a DEModulator (analog to digital).

7. The compiler is a systems program which may be written in any language, but the compiler's operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices.

8. A variable is a quantity that is referred to by name, such as a, b, c, d, and average in the above program.

9. Input is the information presented to the computer.

10. A LAN is a localized network, usually in one building or in a group of buildings close together.

11. The term «computer» includes those parts of hardware in which calculations and other data manipulations are performed, and the high-speed internal memory in which data and calculations are stored.

12. There are actually two kinds of antivirus programs: virus shields, which detect viruses as they are infecting your PC, and virus scanners, which detect viruses once they've infected you.

13. Large computer systems, or mainframes, as they are referred to in the field of computer science, are those computer systems found in computer installations processing immense amounts of data.

14. The POP is a place for local users to access the company's network, often through a local phone number or dedicated line.

UNIT 11

PART 7. ETHERNET MEDIUM

Since a signal on the Ethernet medium reaches every attached node, the destination address is critical to identify the intended recipient of the frame.

For example, in the figure 2, when computer B transmits to printer C, computers A and D will still receive and examine the frame. However, when a station first receives a frame, it checks the destination address to see if the frame is intended for itself. If it is not, the station discards the frame without even examining its contents.

One interesting thing about Ethernet addressing is the implementation of a broadcast address. A frame with a destination

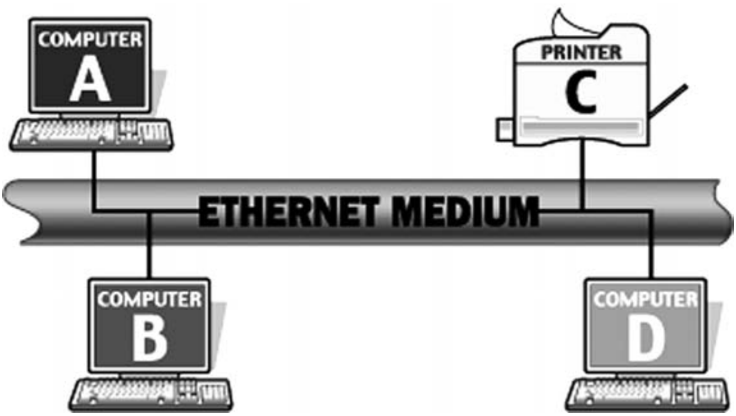


Fig. 2
A small Ethernet network

address equal to the broadcast address (simply called a broadcast, for short) is intended for every node on the network, and every node will both receive and process this type of frame.

PART 8. CSMA / CD

The acronym CSMA / CD signifies carrier-sense multiple access with collision detection and describes how the Ethernet protocol regulates communication among nodes. While the term may seem intimidating, if we break it apart into its component concepts we will see that it describes rules very similar to those that people use in polite conversation. To help illustrate the operation of Ethernet, we will use an analogy of a dinner table conversation.

Let's represent our Ethernet segment as a dinner table, and let several people engaged in polite conversation at the table represent the nodes. The term multiple access covers what we already discussed above: When one Ethernet station transmits, all the stations on the medium hear the transmission, just as when one person at the table talks, everyone present is able to hear him or her.

Now let's imagine that you are at the table and you have something you would like to say. At the moment, however, I am talking. Since this is a polite conversation, rather than immediately speak up and interrupt, you would wait until I finished talking before making your statement. This is the same concept described in the Ethernet protocol as carrier sense. Before a station transmits, it «listens» to the medium to determine if another station is transmitting. If the medium is quiet, the station recognizes that this is an appropriate time to transmit.

PART 9. COLLISION DETECTION

Carrier-sense multiple access gives us a good start in regulating our conversation, but there is one scenario we still need to address. Let's go back to our dinner table analogy and imagine that there is a momentary lull in the conversation. You and I both have something we would like to add, and we both «sense the carrier» based on the silence, so we begin speaking at approximately the same time. In Ethernet terminology, a collision occurs when we both spoke at once.

In our conversation, we can handle this situation gracefully. We both hear the other speak at the same time we are speaking, so we can stop to give the other person a chance to go on. Ethernet nodes also listen to the medium while they transmit to ensure that they are the only station transmitting at that time. If the stations hear their own transmission returning in a garbled form, as would happen if some other station had begun to transmit its own message at the same time, then they know that a collision occurred. A single Ethernet segment is sometimes called a collision domain because no two stations on the segment can transmit at the same time without causing a collision. When stations detect a collision, they cease transmission, wait a random amount of time, and attempt to transmit when they again detect silence on the medium.

The random pause and retry is an important part of the protocol. If two stations collide when transmitting once, then both will need to transmit again. At the next appropriate chance to transmit, both stations involved with the previous collision will have data ready to transmit. If they transmitted again at the first opportunity, they would most likely collide again and again indefinitely. Instead, the random delay makes it unlikely that any two stations will collide more than a few times in a row.

Essential vocabulary (7), (8), (9)

Words

analogy *n*
appropriate *adj*
attempt *v, n*
carrier *n*
cease *v*
collide *v*
collision *n*
content *n*
cover *v, n*
critical *adj*
delay *v, n*
detect *v*
detection *n*
discard *v*
examine *v*
gracefully *adv*
implementation *n*
indefinitely *adv*
interrupt *v*
intimidate *v*
recognize *v*
retry *v, n*
signify *v*
speak up *v*
station *n*
CSMA/CD

Word Combinations

broadcast address
to be intended for smth.
to seem intimidating
to break smth. apart into smth.
polite conversation
to be engaged in smth.
momentary lull
to give a chance to do smth.
in a garbled form
collision domain
a random amount of time
at the first opportunity
in a row
to make unlikely that ...

EXERCISES

1. Find in parts 7, 8 and 9 of the text English equivalents for the following words and phrases:

определять намеченного получателя; передающая среда; получать и проверять блок данных; проверять адрес назначения; отвергать фрейм, даже не проверяя его содержимое; использование широковещательного адреса; сокращенно; идентичный чему-л.; множественный доступ с контролем несущей и обнаружением конфликтов; регулировать передачу данных между узлами; термин «множественный доступ» охватывает то, что мы ... ; определять, передает ли информацию другой узел; подходящее время для передачи; обнаружение конфликтов; давайте вернемся к ... ; кратковременное затишье в разговоре; примерно, в одно и тоже время; происходить (случаться); обнаруживать конфликт; прекращать передачу; пытаться; произвольная пауза; произвольная задержка; несколько раз подряд.

2. Transcribe and learn to read the following words:

examine, equal, process, collision, intimidating, analogy, cause, determine, scenario, indefinitely.

3. Write the Past Indefinite and the Past Participle of the verbs:

reach, check, see, discard, describe, hear, say, speak, give, begin, occur, stop, go on, collide.

4. Find in parts 7, 8 and 9 of the text synonyms to the following words and word combinations:

to get to, vital, to verify, to get rid of, realization, identical, repeated, clash, to bully, to sunder, to explain, mannerly, to talk up, suitable, to happen, to continue, to stop, to try, break, occasion, repeatedly, in succession.

5. Write the expansion of the following abbreviation and learn it:

CSMA/CD.

6. Match the definitions on the right with the words they denote on the left.

1. Station	a) Discovery of a certain condition that affects a computer system or the data with which it works.

2. Content	b) A message or data sent to a group of users.
3. Broadcast	c) The interval between one event and another.
4. Collision	d) A microcomputer or terminal connected to a network.
5. Delay	e) An event that occurs when two electrical signals meet and interfere with each other over a network, normally causing an error.
6. Detection	f) Information, ideas, text, images or data that form a letter, document, web page, database or book.

7. Circle transitional markers and find the words they refer to (see Language Focus 2 in Unit 2). Translate the passages in writing.

A) However, when a station first receives a frame, it checks the destination address to see if the frame is intended for itself. If it is not, the station discards the frame without even examining its contents.

B) If the stations hear their own transmission returning in a garbled form, as would happen if some other station had begun to transmit its own message at the same time, then they know that a collision occurred. A single Ethernet segment is sometimes called a collision domain because no two stations on the segment can transmit at the same time without causing a collision.

8. Imagine that you are a network expert working for Business Network Solution and that a newspaper reporter is interviewing you. Use the information from parts 7, 8 and 9 of the text to complete the dialogue in your own words.

Reporter: What is critical to identify the intended recipient of the frame?

You: …

Reporter: What does a station do when it first receives a frame?

You: …

Reporter: What is one interesting thing about Ethernet addressing?

You: …

Reporter: Is a frame with a destination address equal to the broadcast address intended for every nod on the network?

You: Yes.

Reporter: What does the acronym CSMA/CD signify?

You: …

Reporter: When one Ethernet station transmits, do all the stations on the medium hear the transmission?

You: Yes.

Reporter: Why does a station «listen» to the medium before it transmits?

You: …

Reporter: What do stations do when they detect a collision?

You: …

Reporter: And the last question, what makes it unlikely that any two stations will collide more than a few times in a row?

You: …

9. Look through parts 7, 8 and 9 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. The destination address is of no importance in identifying the intended recipient of the frame.	☐
2. The station discards the frame without even examining its contents if the frame is not intended for this station.	☐
3. A frame with a destination address equal to the broadcast address is not intended for every node, but for specific station on the network.	☐
4. The CSMA/CD describes how the Ethernet protocol regulates communication among nodes.	☐
5. If the medium is quiet, the station knows that it should wait before transmitting.	☐
6. If a station hears its own transmission returning in a garbled form, then it knows that everything was OK.	☐
7. A single Ethernet segment is sometimes called a collision domain because no two stations on the segment can transmit at the same time without causing a collision.	☐
8. If two stations collide when transmitting once, then both will not transmit the same data again.	☐

10. Make summary of parts 7, 8 and 9 of the text using opening phrases on pages 336—337.

11. Read the text and put the verbs in brackets into the correct tense-aspect form. Be careful with non-finite forms.

a) Give definitions to the words and word combinations in bold type (see Language Focus 10 in Unit 10).

b) Find the passages in the text where the following ideas are expressed:

a) Phone line capacity. ☐
b) Transceiver work description. ☐
c) HomePNA underlying technology. ☐
d) Controller chip work description. ☐
e) Broadcom's two chips. ☐

HomePNA Technology

1. HomePNA (to use) a method (to know) as frequency-division multiplexing (FDM). FDM (to put) computer data on separate frequencies from the voice signals (to carry) by the phone line. FDM (to separate) the extra signal space on a typical phone line into distinct data channels by (to split) it into uniform chunks of bandwidth. To better understand FDM, (to think) of radio stations — each station (to send) its signal at a different frequency within the available band.

2. In HomePNA, voice and data (to travel) on the same wires without (to interfere) with each other. In fact, a standard phone line (to have) enough room (to support) voice, a high-speed **DSL modem** and a home phone-line network.

3. Two custom chips (to design) using the HPNA specifications (to develop) by Broadcom and (to make up) the core of the HomePNA card's architecture:

4. The small 4100 chip (to act) as a transceiver between the larger chip and the signal (to receive) over the phone line from another computer. It can (to send) and (to receive) signals over 1,000 ft (305 m) on a typical phone line. Think of it as an interpreter, (to translate) the analog messages it (to get) from the phone line into a digital format that the **PCI/MSI controller chip** can (to understand). The 4100 (not to try) to understand what it (to interpret), it just (to send) it along.

5. Since many phone lines in existing homes (to vary) greatly in length and signal quality, the larger 4210 controller chip (to have) to be able to adapt to a variety of challenges. Because the 4210 (to do) this so well, the HPNA (to estimate) that more than 99 percent of U. S. homes (to have) phone wiring that can

(to support) HomePNA. Basically, it (to work) this way: First, the controller chip (to take) the unfiltered content it (to receive) from the smaller chip and (to strip away) all the noise. It then (to take) what (to leave) and (to pass) it on to the computer for processing. Once the computer (to process) the information, it (to return) an **acknowledgment** to the sending computer so it (to know) that the data (to receive). This (to happen) thousands of times each second as the computers (to communicate).

(By Jeff Tyson)

12. Complete the bold typed words in the following sentences by adding the prefix *inter-, intra-, trans-, com-, con-, up-* *or down-*. **This table will help you.**

prefix	meaning of prefix	examples of use
inter-	between	internet, interconnect, interactive, international
intra-	within	intranet, e. g. company intranet
trans-	across	transmit, transfer, transaction
co-/com-/con-	with	combine, compatible, connect, configure
up-	up (to Internet)	upload
down-	down (from Internet)	download, downtime, i. e. when the network is down (not working)

1. Last month computer ...**time** cost the company over ´ 10,000 in lost production.

2. The computers in the production department have now been successfully ... **connected** with those in the planning department.

3. Once you have completed payment details the data will be ...**mitted** via a secure link.

4. We cannot network these computers because the systems are not ...**patible.**

5. Many companies distribute internal documents on their own ...**net.**

6. Once the home page has been completed, we'll be ready to ...**load** the site.

7. Cables are being laid throughout the building as the network requires physical ...**nections.**

8. Using the network he was able to ...**bine** the data from different reports.

13. Render the following text in English

Метод доступа CSMA / CD

В сетях Ethernet используется метод доступа к среде передачи данных, называемый методом коллективного доступа с опознаванием несущей и обнаружением коллизий.

Этот метод применяется исключительно в сетях с логической общей шиной (к которым относятся и радиосети, породившие этот метод). Все компьютеры такой сети имеют непосредственный доступ к общей шине, поэтому она может быть использована для передачи данных между любыми двумя узлами сети. Одновременно все компьютеры сети имеют возможность немедленно (с учетом задержки распространения сигнала по физической среде) получить данные, которые любой из компьютеров начал передавать на общую шину. Простота схемы подключения — это один из факторов, определивших успех стандарта Ethernet. Говорят, что кабель, к которому подключены все станции, работает в режиме коллективного доступа.

Все данные, передаваемые по сети, помещаются в кадры определенной структуры и снабжаются уникальным адресом станции назначения.

Чтобы получить возможность передавать кадр, станция должна убедиться, что разделяемая среда свободна. Это достигается прослушиванием основной гармоники сигнала, которая также называется несущей частотой. Признаком незанятости среды является отсутствие на ней несущей частоты, которая при манчестерском способе кодирования равна 5–10 МГц, в зависимости от последовательности единиц и нулей, передаваемых в данный момент.

(Олифер В. Г., Олифер Н. А.
«Компьютерные *сети. Принципы,*
технологии, протоколы»)

LANGUAGE FOCUS 11

CAUSE AND EFFECT

It is very important to understand the different ways of expressing the relationship between the cause and the effect of an action when you are reading English.

It should be noted that we can mention the cause before the effect.

Example:

(cause) (effect)

A lot of traffic often **causes** congestion problems.

We can also mention the effect before the cause.

Example:

(effect) (cause)

Congestion problems **is** often **due to** a lot of traffic.

In English, we can express cause and effect in different ways.

1. Verbs linking cause and effect:

result	cause
produce	result in
allow	result from
prevent	bring about
enable	

Examples:

1. The extensive use of computers in schools is **resulting in** a new generation of computer-literate students. (cause → effect)

2. Computers can create artificial objects in their memories. This **allows** developers to test product design without actually creating a real prototype. (cause → effect)

3. The introduction of computer technology **brought about** significant changes in office routines. (cause → effect)

4. The problems **were caused by** the volume of network traffic. (effect ← cause)

2. Connectives introducing cause:

due to	because
as the / a result of	in response to
since	as

Examples:

1. Teachers must rethink their roles **as** computer technology is creating a revolution in the classroom. (effect ← cause)

2. Early computers developed quickly **as a result of** their use in military applications. (effect ← cause)

3. **Because** off-the-shelf programs do not always fit a company's needs, software often has to be specially developed. (cause → effect)

3. Connectives introducing result:

with the result that	consequently
so that	hence
thus	for this reason
therefore	thereby

Examples:

1. When using an online database service, you must pay for the time you use. **Consequently**, you should have a good idea of what you want before you log on. (cause → effect)

2. Carpel tunnel syndrome is a serious medical condition. **For this reason**, computer users should be careful of their posture and take frequent breaks. (cause → effect)

3. Computers can remove many of the routine and boring tasks, **thereby** leaving us with more time for interesting, creative work. (cause → effect)

4. Another way of showing causal relationship is by introducing the cause with if. Both the cause clause and the effect clause verbs are in the present tense.

Examples:

1. **If** your company has a LAN, you can share the use of a printer with your colleagues. (cause → effect)

2. It is easy to transport your data to another location **if** it is stored on a disk. (effect ← cause)

14. Read the following sentences and underline the part which expresses the *cause*.

1. Since a signal on the Ethernet medium reaches every attached node, the destination address is critical to identify the intended recipient of the frame.

2. Voice-recognition systems are becoming more sophisticated. Thus, keyboards may be unnecessary in the future.

3. When robots malfunction, it is usually due to mistakes in the programming or the design.

4. Laser printers can be quite expensive and are therefore often shared through networks.

5. Many people do not explore new software because they are comfortable with what they already have.

6. Because a modem can be used for inter-computer communication, many people can now do their office work on their computer at home.

15. Read the following sentences and underline the part which expresses the *effect / result*.

1. Because packets can travel multiple paths to get to their destination, it's possible for information to route around congested areas on the Internet.

2. Fax boards are available to plug into your computer, so you do not have to buy a fax machine.

3. Since anyone can consult your files on a computer, it is a good idea to protect sensitive files with a password.

4. Because there are many different types of printers, you must analyze your needs before making a purchase.

5. Computers have been reduced in both size and cost as a result of advances in design and technology.

6. Computers can remove many of the routine and boring tasks from our lives, thereby leaving us with more time for interesting and creative work.

16. Read the sentences below and point out the marker showing a cause-effect relationship and underline the part of the sentence that expresses the cause. The first one has been done for you.

1. By 1980, <u>IBM decided there was a market for 250,000 PCs</u>, **so** they set up a special team to develop the first IBM PC.

2. As they became more proficient on the computer, some showed gains in their overall self-confidence, as well.

3. Binary code simplified computer design. Thus computers use 1s and 0s to translate symbols into unique combinations of electrical pulses.

4. One of the features of a computer virus that separates it from other kinds of computer program is that it replicates itself, so that it can spread to other computers.

5. Lehigh is waiting to infect other unsuspecting computers if you boot from one of those four infected floppies.

6. Because of these and so many other different judgements, there can be no absolute.

7. Robots are better at this task, not because they are faster or cheaper than humans, but because they work in a place where humans cannot.

8. This automatic accuracy is particularly valuable in this kind of industry because locating and fixing mistakes is costly.

9. Artificial worlds are being built up in a computer memory so that people can walk through at will, look around, and even touch objects.

10. Global communication and computer networks will become more and more a part of professional and personal lives as the price of microcomputers and network access drops.

UNIT 12

PART 10. LIMITATIONS OF ETHERNET

A single shared cable can serve as the basis for a complete Ethernet network, which is what we discussed above. However, there are practical limits to the size of our Ethernet network in this case. A primary concern is the length of the shared cable.

Electrical signals propagate along a cable very quickly, but they weaken as they travel, and electrical interference from neighboring devices (fluorescent lights, for example) can scramble the signal. A network cable must be short enough that devices at opposite ends can receive each other's signals clearly and with minimal delay. This places a distance limitation on the maximum separation between two devices (called the network diameter) on an Ethernet network. Additionally, since in CSMA/CD only a single device can transmit at a given time, there are practical limits to the number of devices that can coexist in a single network. Attach too many devices to one shared segment and contention for the medium will increase. Every device may have to wait an inordinately long time before getting a chance to transmit.

Engineers have developed a number of network devices that alleviate these difficulties. Many of these devices are not specific to Ethernet, but play roles in other network technologies as well.

PART 11. NETWORK ELEMENTS

Repeaters

The first popular Ethernet medium was a copper coaxial cable known as «thicknet». The maximum length of a thicknet cable was 500 meters. In large building or campus environments, a 500-meter cable could not always reach every network device. A repeater addresses this problem.

Repeaters connect multiple Ethernet segments, listening to each segment and repeating the signal heard on one segment onto every other segment connected to the repeater. By running multiple cables and joining them with repeaters, you can significantly increase your network diameter.

Segmentation

In our dinner table analogy, we had only a few people at a table carrying out the conversation, so restricting ourselves to a single speaker at any given time was not a significant barrier to communication. But what if there were many people at the table and only one were allowed to speak at any given time?

In practice, we know that the analogy breaks down in circumstances such as these. With larger groups of people, it is common for several different conversations to occur simultaneously. If only one person in a crowded room or at a banquet dinner were able to speak at any time, many people would get frustrated waiting for a chance to talk. For humans, the problem is self-correcting: Voices only carry so far, and the ear is adept at picking out a particular conversation from the surrounding noise. This makes it easy for us to have many small groups at a party converse in the same room; but network cables carry signals quickly and efficiently over long distances, so this natural segregation of conversations does not occur.

Ethernet networks faced congestion problems as they increased in size. If a large number of stations connected to the same segment and each generated a sizable amount of traffic, many stations may attempt to transmit whenever there was an opportunity. Under these circumstances, collisions would become more frequent and could begin to choke out successful transmissions, which could take inordinately large amounts of time to complete. One way to reduce congestion would be to split a single segment into multiple segments, thus creating multiple collision domains. This solution creates a different problem, as now these now separate segments are not able to share information with each other.

Bridges

To alleviate problems with segmentation, Ethernet networks implemented bridges. Bridges connect two or more network segments, increasing the network diameter as a repeater does, but bridges also help regulate traffic. They can send and receive transmissions just like any other node, but they do not function the same as a normal node. The bridge does not originate any traffic of its own; like a repeater, it only echoes what it hears from other stations. (That last statement is not entirely accurate: Bridges do create a special Ethernet frame that allows them to communicate with other bridges, but that is outside the scope of this article.)

Remember how the multiple access and shared medium of Ethernet meant that every station on the wire received every transmission, whether it was the intended recipient or not? Bridges make use of this feature to relay traffic between segments. In the figure 3 below, the bridge connects segments 1 and 2. If station A or B were to transmit, the bridge would also receive the transmission on segment 1. How should the bridge respond to this traffic? It could automatically transmit the frame onto segment 2, like a repeater, but that would not relieve congestion, as the network would behave like one long segment.

One goal of the bridge is to reduce unnecessary traffic on both segments. It does this by examining the destination address of the frame before deciding how to handle it. If the destination address is that of station A or B, then there is no need for the frame to appear on segment 2. In this case, the bridge does nothing. We can say that the bridge filters or drops the frame. If the destination address is that of station C or D, or if it is the broadcast address, then the bridge will transmit, or forward the frame on to segment 2. By forwarding packets, the bridge allows any of

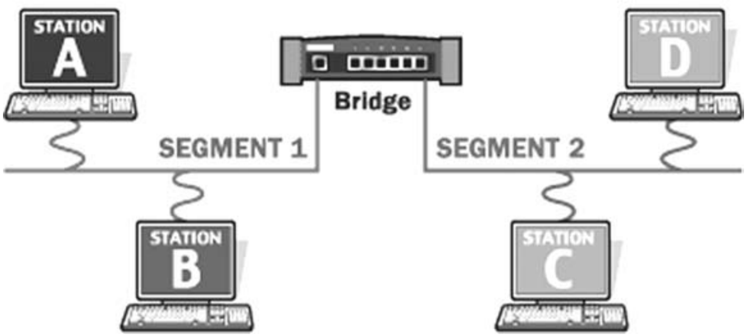


Fig. 3
An Ethernet bridge connecting two segments

the four devices in the figure to communicate. Additionally, by filtering packets when appropriate, the bridge makes it possible for station A to transmit to station B at the same time that station C transmits to station D, allowing two conversations to occur simultaneously!

Switches are the modern counterparts of bridges, functionally equivalent but offering a dedicated segment for every node on the network.

Routers : Logical Segmentation

Bridges can reduce congestion by allowing multiple conversations to occur on different segments simultaneously, but they have their limits in segmenting traffic as well.

An important characteristic of bridges is that they forward Ethernet broadcasts to all connected segments. This behavior is necessary, as Ethernet broadcasts are destined for every node on the network, but it can pose problems for bridged networks that grow too large. When a large number of stations broadcast on a bridged network, congestion can be as bad as if all those devices were on a single segment.

Routers are advanced networking components that can divide a single network into two logically separate networks. While Ethernet broadcasts cross bridges in their search to find every node on the network, they do not cross routers, because the router forms a logical boundary for the network.

Routers operate based on protocols that are independent of the specific networking technology, like Ethernet or token ring (we'll discuss token ring later). This allows routers to easily interconnect various network technologies, both local and wide area, and has led to their widespread deployment in connecting devices around the world as part of the global Internet.

Essential vocabulary (10), (11)

Words

alleviate *v*	filter *v, n*	repeater *n*
boundary *n*	frequent *adj*	respond (to) *v*
bridge *n*	increase *v*	restrict *v*
carry out *v*	inordinately *adv*	router *n*
choke *v*	interference *n*	self-correcting *adj*
coexist *v*	limitation *n*	segmentation *n*
concern *n, v*	pick out *v*	segregation *n*

congestion *n*	propagate *v*	separation *n*
contention *n*	reduce *v*	significantly *adv*
counterpart *n*	relay *v*	split (into) *v*
deployment *n*	relieve *v*	thicknet *n*

Word Combinations

fluorescent light	to generate traffic
to place limitations on smth.	multiple collision domains
to be specific to smth.	to be outside the scope
network diameter	to occur simultaneously
to alleviate difficulties	to be destined for smth.
to address the problem	to pose a problem
to be a barrier to smth.	to form a logical boundary
to be adept at smth./doing smth.	to be independent of smth.
to face the problem	token ring

EXERCISES

1. Find in parts 10 and 11 of the text English equivalents for the following words and phrases:

служить основой для чего-л.; практические ограничения; главная проблема; распространяться по кабелю; лампа дневного света; электрические помехи; ограничения максимального расстояния; сосуществовать; чрезмерно долго ждать; облегчать трудности; играть важную роль в других сетевых технологиях; максимальная длина; значительно увеличивать диаметр сети; повторять сигнал; в обстоятельствах, подобных этим; расстраиваться; выделять отдельный разговор от окружающего шума; сталкиваться с проблемами затора; формировать значительный поток данных; при этих обстоятельствах; таким образом, создавая множество областей конфликтов; уменьшать затор; решать проблемы с … ; регулировать поток данных; создавать свой трафик; отражать; использовать эту особенность; задача моста заключается в том, чтобы; оба сегмента; нет необходимости для … ; фильтровать фрейм; современный аналог; логическая сегментация; происходить одновременно в разных сегментах; усовершенствованный элемент сети; разделять на две логически отдельные сети; работать, основываясь на протоколах; кольцевая сеть с маркерным доступом; соединять различные сетевые технологии; широко распространённое применение.

2. Transcribe and learn to read the following words:

complete, primary, interference, diameter, alleviate, environment, circumstance, natural, congestion, echo, feature, router, characteristic, deployment.

3. Write the Past Indefinite and the Past Participle of the verbs:

serve, propagate, coexist, alleviate, play, break down, get, do, split, create, mean, relay, filter, drop, reduce, divide, lead.

4. Find in parts 10 and 11 of the text synonyms to the following words and word combinations:

anxiety, to debate, to move through, restriction, hold-up, to lessen, serious, rationally, separation, to produce, jam, to divide, completely, to react, present-day.

5. Give definitions of the following words (see Language Focus 10 in Unit 10):

repeater, segmentation, bridge, router.

6. Match the verbs on the left with their synonyms on the right.

1. Propagate	a) To lessen.
2. Reduce	b) To block or clog up.
3. Coexist	c) To imitate.
4. Alleviate	d) To move through.
5. Attempt	e) To make smaller.
6. Choke	f) To exist together.
7. Implement	g) To retransmit.
8. Echo	h) To make an effort.
9. Relay	i) To carry out.

7. Circle transitional markers and find the words they refer to (see Language Focus 2 in Unit 2). Translate the passages in writing.

A) Electrical signals propagate along a cable very quickly, but they weaken as they travel, and electrical interference from neighboring devices can scramble the signal.

B) Under these circumstances, collisions would become more frequent and could begin to choke out successful transmissions, which could take inordinately large amounts of time to complete.

C) The bridge does not originate any traffic of its own; like a repeater, it only echoes what it hears from other stations.

D) Routers are advanced networking components that can divide a single network into two logically separate networks. While Ethernet broadcasts cross bridges in their search to find every node on the network, they do not cross routers, because the router forms a logical boundary for the network.

8. Answer the following questions using the information from parts 10 and 11 of the text.

1. Are there any practical limits to the size of the Ethernet network? What is a primary concern? 2. What can scramble the signal? 3. What another practical limit is there on an Ethernet network? 4. What is the function of repeaters in the network? 5. How can we reduce congestion in a segment? 6. What do we use bridges for? 7. How does the bridge reduce unnecessary traffic on both segments? 8. What is a router? 9. What allows routers to easily interconnect various network technologies?

9. Look through parts 10 and 11 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. A primary practical limitation concerns the length of the shared cable. ☐
2. Electrical interference from neighboring devices can intensify the signal. ☐
3. Network diameter is a practical limit to the number of devices that can coexist in a single network. ☐
4. Using repeaters, you can significantly increase your network diameter. ☐
5. When a number of stations connected to the same segment increased, Ethernet networks faced congestion problems. ☐
6. To alleviate problems with transmission speed Ethernet network implemented bridges. ☐
7. One goal of the bridge is to reduce any traffic on both segments. ☐
8. While Ethernet broadcasts cross bridges, they do not cross routers, because the router forms a logical boundary for the network. ☐

10. Make summary of parts 10 and 11 of the text using opening phrases on pages 336–337.

11. Read the following text and fill in suitable words from the box.

access, standards, servers, routers, Ethernet, LAN, components, wireless, hybrid, laptop, case, share, checking

Hybrid Networks

1. Wires are for work. Wireless is for play. A few years ago, that was the conventional wisdom on wired versus ... networks. Wi-Fi was great for ... e-mail, but it wasn't fast enough or secure enough for an office setting — even a home office. For speed and security, ... cables were the only way to go.

2. Things are changing. Now people are viewing Ethernet and Wi-Fi as important ... of the same local area network (LAN). Wires are great for linking ... and desktop computers, but Wi-Fi is ideal for extending that network seamlessly into the conference room, the lunch room, and yes, even the bathroom.

3. Think about the typical college or university ... . According to a 2007 survey, 73.7 percent of college students own a ... . And they expect to be able to ... the Internet and ... files across the college network, whether they're in the physics lab or sunbathing in the quad. That's the role of a ... network.

4 A hybrid network refers to any computer network that contains two or more different communications ... . In this ... , the hybrid network uses both Ethernet (802,3) and Wi-Fi (802,11 a/b/g) standards. A hybrid network relies on special hybrid ... , hubs and switches to connect both wired and wireless computers and other network-enabled devices.

(By Dave Roos)

Look through the text above once more and match each paragraph with the appropriate summary.

a) With wireless network you can access the Internet and download files across, for example, the college network, no matter where you are. ☐
b) Speed and security — the wired network characteristics. ☐
c) A hybrid network uses both wired and wireless standards. ☐
d) Ethernet and Wi-Fi are now combined into the same LAN. ☐

12. Here is a list of instructions for someone wanting to set up a small network. Put the instructions in the correct order.

a) Make wiring and layout plans for your network.
b) Hook up the network cables by connecting everything to the hub.
c) Check that each computer has an IP address and give it a name.
d) If you're installing a small network, twisted pair will be adequate. However, in order to span greater distances and to minimize magnetic and electrical interference use fiber optic cable.
e) Decide on the type of network you want to install. To enable you to transfer large amounts of data, choose Fast Ethernet (100 BaseT).
f) Install network adapters in the computers.
g) Add an Internet gateway to your network to set up a shared internet connection.
h) Install driver software for the adapter driver and install client software to share printers and files.
i) Check which protocols are installed and add any other protocols you require.
j) Get the hardware you need: an Ethernet adapter card for each computer that doesn't have an Ethernet port, a hub if you've got more than two computers, cables and wall jacks.

13. Render the following text in English.

Важные элементы сети

Повторители

Повторитель предназначен для соединения разнородных сегментов сети *Ethernet* и преодоления ограничения длины кабеля. Правда, при этом не обеспечивается логическая изоляция сегментов. Повторители представляют собой устройства с двумя портами. Выпускаются с любым сочетанием портов (двумя портами *AUI*, портом *Thinnet* и портом *AUI*, одним оптоволоконным портом *ST* и одним портом *AUI*). Не стоит увлекаться увеличением протяженности сети при помощи большого количества повторителей, т. к. поддержание ее работоспособности превратится в этом случае в сущий ад.

Концентраторы

Как только в сети 10Base-T становится больше двух компьютеров или возникает необходимость перехода от сети на коаксиальном кабеле к технологии 10Base-T, придется использовать концентратор. Правда, при введении хаба в сеть на витой паре, она теряет возможность полнодуплексной работы и становится аналогично 10Base-2 и 10Base-5 полудуплексной со всеми вытекающими отсюда последствиями. Концентратор представляет собой устройство, имеющее, как правило, некоторое количество портов для подключения отдельных компьютеров (режим *MDI-X*) и порт, выделяемый каким-либо образом, для соединения с другими хабами (режим *MDI*).

Концентраторы подразделяются на 10-, 100- и 10/100-Мбитные, активные и пассивные. Многие 10-Мбитные хабы имеют разъемы и под витую пару (*RJ*-45), и под коаксиальный кабель (*BNC* или *AUI*). Отличие активного хаба от пассивного заключается в том, что первый усиливает передаваемый сигнал, а второй нет. С помощью пассивного хаба можно решить проблему нехватки портов, но нельзя увеличить максимальный радиус сети.

Мосты

Если ваша сеть достигла приличных размеров, то неизбежен тот момент, когда ее производительность станет неприлично низкой. Преодоление проблемы возможно несколькими способами. Один из них — введение в состав сети устройства под названием мост. Мост представляет собой концентратор, усовершенствованный добавлением процессора и памяти, и позволяет объединять между собой физически несовместимые сегменты Ethernet (например, сегмент 10Base-T с сегментом 10Base-2). Мост разбивает сеть на отдельные сегменты. Полученные сегменты соединяются с помощью мостов. Мост определяет, осуществляется ли обмен между различными сегментами или же внутри одного. В случае внутрисегментного обмена, информация не проходит в другие. Таким образом и достигается уменьшение загрузки сети. Если же обмен осуществляется между разными сегментами, то мост не дает никаких преимуществ. Он также не влияет на производительность внутри локальной области. К минусам данного устройства следует отнести то, что не осуществляется контроль доступа и вряд ли удастся через него подключиться к *Internet* или другой глобальной сети.

Коммутаторы

Другой способ повысить производительность ЛВС – это установить коммутатор. Данное устройство, в отличие от моста, который соединяет входной сегмент со всеми выходными, позволяет соединить два сегмента, не подключая остальные. Такое возможно за счет того, что каждый порт коммутатора представляет собой отдельный независимый сегмент производительностью 10 (или 100) Мбит/с.

С помощью коммутатора можно построить иерархическую структуру, аналогичную структуре, создаваемой на концентраторах. Подразделяются на коммутаторы узлов и коммутаторы сегментов. Первые позволяют подключать непосредственно к портам отдельные компьютеры, а вторые — концентраторы. В домашних сетях данные устройства почти не используются, т. к. их стоимость исчисляется сотнями и тысячами долларов.

Маршрутизаторы

Маршрутизаторы применяются, главным образом, в крупных центрах коммутации компаний и *Internet*-провайдеров. Причина этому — очень высокая цена (несколько тысяч долларов). Хотя, например, компания *Cisco Systems* предлагает ряд устройств для небольших фирм. Маршрутизатор может понадобиться, если есть необходимость подключиться к сети, безопасность работы с которой не контролируется, если таблицы физических адресов, используемые мостами и коммутаторами для идентификации принадлежности физических адресов и сегментов сети, стали чрезмерно большими и неуправляемыми, а также для соединения двух различных сетей, не имеющих физической совместимости. Маршрутизатор функционирует на сетевом уровне, что и позволяет использовать его для вышеуказанных действий. Функционирующие на канальном уровне мосты и коммутаторы могут объединять только сети, использующие одни физические характеристики (например, различные версии сети *Ethernet* — на тонком коаксиальном кабеле, витой паре и оптическом волокне).

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 12

COMPOUND NOUN PHRASES

In English there is an ever-increasing number of compound noun phrases in the language of computing and networking. By a compound noun phrase we mean a group of two or more nouns which act as a single noun.

Examples:

memory capacity	an addressbus	an arithmetic unit
information systems	a bar code scanner	a fiber optic cable

In order to understand what they mean, it is important to be able to recognize how such compound noun phrases are formed.

The exact relationship between the words depends on the particular expression, but all these expressions have one thing in common: the last word in the chain says what the thing is, while the preceding word or group of words describes the thing. So when we read compound noun phrases, we have to start with the last word and work backwards.

Examples:

The **Ethernet standard** is a standard designed for LANs.

A **destination address** is an address which identifies the recipient of the message.

With the help of compound noun phrases we can express a large number of meanings. For instance, the first noun or group of nouns can tell us what the second noun is made of, what it is for, or what it is part of.

Material: the first noun tells us what the second consists of.

Examples:

a silicon chip (a chip made of silicon)

a copper cable (a cable made of copper)

Function: the first noun tells us what the second noun is for.

Examples:

an address bus (a bus dedicated to address information)

an input device (a device for inputting)

an arithmetic unit (a unit which performs arithmetic functions)

Part: the second noun refers to a part of the first noun.

Examples:

a computer keyboard *(the keyboard of a computer)* a monitor screen *(the screen of a monitor)*

a network segment *(a segment of a network)*

Activity or person: the second noun refers to an activity or person related to the first noun.

Examples:

computer programming *(the programming of computers)*

a computer programmer *(a person who programs computers)*

systems analysis *(the analysis of organizational systems)*

a systems analyst *(a person who analyzes organizational systems)*

Multiple nouns: sometimes a compound noun phrase will join together with one or more other nouns to give an expression that has three or four words. In such cases, it is important to examine the expression very carefully to break it into its constituent parts. The secret, as always, is to read the expression from the back towards the front.

Example:

4 3 2 1

a document-image-processing program (*a program which processes images of documents*)

Note: some expressions are written separately, while others are joined by hyphens. There are no clear rules for this. Sometimes you will see the same expression written in different ways in different texts.

Example:

document-image-processing program

document image-processing program

document image processing program

However, it is important to be consistent within a single text.

14. Give names to the following explanations:

E. g. A device that scans bar codes. — A device that scans bar codes is called a *bar code scanner*.

1. A device that prints using a laser as the light source.
2. A unit that holds magnetic disks.
3. A device that plots graphs.
4. A unit that gives a visual display of information on a screen.
5. A device that reads magnetic cards.
6. A program which processes data in batches.
7. The rate of transmission of data.

8. A package for making presentations using multimedia.
9. A device that prints using a jet of ink.
10. The process for the conversion of disks for computers.

15. Using the explanations in the previous exercise as models, write short simple explanations of the following items:

1. A copper coaxial cable.
2. A liquid crystal display.
3. A graphics stylus.
4. A multimedia editing software package.
5. A fiber optics transmission system.
6. A sequence control register.
7. An optical character reader.
8. Network configuration information.
9. A desktop document manager.
10. A document sorter.
11. An input device.
12. Congestion problems.

UNIT 13

PART 12. SWITCHED ETHERNET

Modern Ethernet implementations often look nothing like their historical counterparts. Where long runs of coaxial cable provided attachments for multiple stations in legacy Ethernet, modern Ethernet networks use twisted pair wiring or fiber optics to connect stations in a radial pattern. Where legacy Ethernet

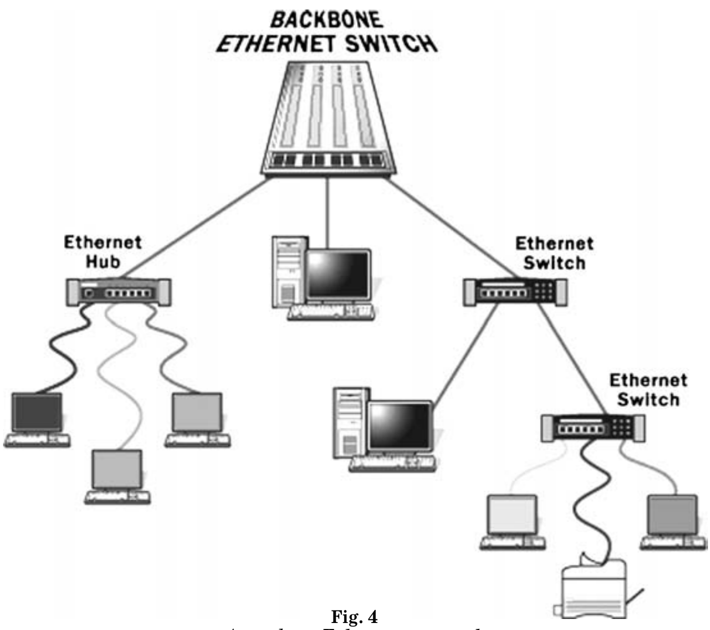


Fig. 4
A modern Ethernet network

networks transmitted data at 10 megabits per second (Mbps), modern networks can operate at 100 or even 1,000 Mbps!

Perhaps the most striking advancement in contemporary Ethernet networks is the use of switched Ethernet. Switched networks replace the shared medium of legacy Ethernet with a dedicated segment for each station (Fig. 4).

These segments connect to a switch, which acts much like an Ethernet bridge, but can connect many of these single station segments. Some switches today can support hundreds of dedicated segments. Since the only devices on the segments are the switch and the end station, the switch picks up every transmission before it reaches another node. The switch then forwards the frame over the appropriate segment, just like a bridge, but since any segment contains only a single node, the frame only reaches the intended recipient. This allows many conversations to occur simultaneously on a switched network.

PART 13. FULL-DUPLEX ETHERNET

Ethernet switching gave rise to another advancement, full-duplex Ethernet. Full-duplex is a data communications term that refers to the ability to send and receive data at the same time.

Legacy Ethernet is half-duplex, meaning information can move in only one direction at a time. In a totally switched network, nodes only communicate with the switch and never directly with each other. Switched networks also employ either twisted pair or fiber optic cabling, both of which use separate conductors for sending and receiving data. In this type of environment, Ethernet stations can forgo the collision detection process and transmit at will, since they are the only potential devices that can access the medium. This allows end stations to transmit to the switch at the same time that the switch transmits to them, achieving a collision-free environment.

PART 14. ETHERNET OR 802.3?

You may have heard the term 802.3 used in place of or in conjunction with the term Ethernet. «Ethernet» originally referred to a networking implementation standardized by Digital, Intel and Xerox. (For this reason, it is also known as the DIX standard.)

In February 1980, the Institute of Electrical and Electronics Engineers, or IEEE (pronounced «I triple E»), created a committee to standardize network technologies. The IEEE titled this the 802 working group, named after the year and month of its formation. Subcommittees of the 802 working group separately addressed different aspects of networking. The IEEE distinguished each subcommittee by numbering it 802.X, with X representing a unique number for each subcommittee. The 802.3 group standardized the operation of a CSMA / CD network that was functionally equivalent to the DIX Ethernet.

Ethernet and 802.3 differ slightly in their terminology and the data format for their frames, but are in most respects identical. Today, the term Ethernet refers generically to both the DIX Ethernet implementation and the IEEE 802.3 standard.

Essential vocabulary (12), (13), (14)

Words

achieve *v*	environment *n*	pattern *n*
collision *n*	forgo *v*	slightly *adv*
committee *n*	full-duplex *adj*	striking *adj*
conductor *n*	generically *adv*	subcommittee *n*
contemporary *adj*	half-duplex *adj*	totally *adv*
distinguish *v*	legacy *adj*	IEEE
employ *v, n*	originally *adv*	

Word Combinations

radial pattern	at will
to look nothing like	collision-free environment
switched Ethernet / network	in place of
to act like	in conjunction with
to give rise	DIX standard
full-duplex Ethernet	working group
at a time	to be named after …
to communicate directly with …	in most respects

EXERCISES

1. Find in parts 12, 13 and 14 of the text English equivalents for the following words and phrases:

исторический аналог; устаревший Ethernet; использовать витую пару; радиальная модель; передавать данные со скоростью 10 Мбит/с; в современных сетях Ethernet; коммутируемые сети заменяют … ; поддерживать сотню отдельных сегментов; пересылать фрейм в нужный сегмент; но, так как; доходить до намеченного получателя; дуплексный Ethernet; термин в передаче данных; способность одновременно передавать и принимать данные; перемещаться за раз только в одном направлении; полностью коммутируемая сеть; использовать или витую пару, или оптиковолокно; использовать отдельные провода; в этом режиме работы; отказываться от процесса выявления конфликтов; режим работы, исключающий конфликты; использовать вместо чего-л.; первоначально относился к сетевым разработкам; институт инженеров по электронике и радиоэлектронике; создавать комитет; стандартизировать сетевые технологии; исследовать различные аспекты создания сети; различать каждый подкомитет; слегка отличаться в терминологии.

2. Transcribe and learn to read the following words:

legacy, advancement, switched, duplex, conductor, conjunction, standardize, Xerox, committee, distinguish, slightly, identical.

3. Write the Past Indefinite and the Past Participle of the verbs:

look, run, use, replace, support, move, employ, forgo, distinguish, title, standardize.

4. Find in parts 12, 13 and 14 of the text synonyms to the following words and word combinations:

to work, remarkable, assistance, detached, to give up, to reach, instead of, working-team, creation.

5. Write the expansions of the following abbreviations and learn them:

DIX standard, IEEE.

6. Match the words on the left with their definitions on the right.

1. Counterpart	a) Improvement; progress in development.
2. Attachment	b) A distinct feature or element in a problem, situation.
3. Advancement	c) The act of putting into action.
4. Environment	d) A thing identical to or closely resembling another.
5. Implementation	e) The act of attaching or the state of being attached.

6. Aspect	f) An operating system, program, or integrated suite of programs that provides all the facilities necessary for a particular application.

7. Translate the passages in writing:

A) In this type of environment, Ethernet stations can forgo the collision detection process and transmit at will, since they are the only potential devices that can access the medium. This allows end stations to transmit to the switch at the same time that the switch transmits to them, achieving a collision-free environment.

B) The IEEE titled this the 802 working group, named after the year and month of its formation. Subcommittees of the 802 working group separately addressed different aspects of networking.

8. Use the information from parts 12, 13 and 14 of the text to complete the dialogue in your own words.

A : What is the most striking advancement in contemporary Ethernet network?

B : ...

A : What is the difference between a switch and a bridge?

B : ...

A : What does the term full-duplex mean?

B : ...

A : What did “Ethernet” originally refer to?

B : ...

A : When did the IEEE create a committee to standardize network technologies?

B : ...

A : Why was this working group titled 802?

B : ...

A : Do Ethernet and 802.3 differ?

B : ...

9. Look through parts 12, 13 and 14 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Modern network can operate at 100 or even 1,000 Mbps. ☐
2. Switched networks replace the shared medium with a dedicated segment for each five stations. ☐

3. In full-duplex Ethernet information can move in only one direction at a time. ☐

4. A collision-free environment allows end stations to transmit to the switch at the same time that the switch transmits to them. ☐

5. The term 802.5 is used in place of the term «Ethernet». ☐

6. In 1980 the Institute of Ethernet Efficiency Employment created a committee to standardize network technologies. ☐

7. The IEEE distinguished each subcommittee by numbering it 802.X. ☐

8. Ethernet and 802.3 have no difference at all. ☐

10. Make summary of parts 12, 13 and 14 of the text using opening phrases on pages 336–337.

11. Read the text and fill in prepositions from the box.

in, by, into, with, through, with, over, among, for, with, at, of, into, for, into, with, in, to, without, over, into, for, to

Understanding Hybrid Networks

1. In a wired computer network, all devices need to be connected ... physical cable. A typical **configuration** uses a central access point. In networking terms, this is called a star topology, where information must travel ... the center to reach other points of the star.

2. The central access point ... a wired network can be a router, hub or a switch. The access point's function is to share a network connection ... several devices. All the devices are plugged ... the access point using individual Ethernet (CAT 5) cables. If the devices want to **share** an Internet connection as well, then the access point needs to be plugged ... a broadband Internet modem, either cable or DSL.

3. In a standard wireless network, all networked devices communicate ... a central wireless **access** point. The devices themselves need to contain wireless modems or cards that conform ... one or more Wi-Fi standards, either 802.11 a, b or g. In this configuration, all wireless devices can share files with each other ... the network. If they also want to share an Internet connection, then the wireless access point needs to be plugged ... a broadband modem.

4. A standard hybrid network uses something called a hybrid access point, a networking device that both broadcasts a **wireless signal** and contains wired access ports. The most common hybrid access point is a hybrid router. The typical hybrid router broadcasts a Wi-Fi signal using 802.11 a, b or g and contains four Ethernet ports ... connecting wired devices. The hybrid router also has a port for connecting ... a cable or DSL modem via Ethernet cable.

5. When shopping ... a hybrid router, you might not see the word «hybrid» anywhere. You're more likely to see the router advertised as a wireless or Wi-Fi router ... Ethernet ports or «LAN ports». Hybrid routers start ... around $50 for a basic model with four Ethernet ports and a **network speed** ... 54 Mbps (megabits per second).

6. There are several different possible network configurations ... a hybrid network. The most basic configuration has all the wired devices plugged ... the Ethernet ports of the hybrid router. Then the wireless devices communicate ... the wired devices via the wireless router.

7. But maybe you want to network more than four wired devices. In that case, you could string several routers together, both wired and wireless, ... a daisy chain formation. You'd need enough wired routers to handle all of the wired devices (number of devices divided by four) and enough wireless routers — in the right physical locations — to broadcast a Wi-Fi signal ... every corner of the network.

8. Computers aren't the only devices that can be linked over a hybrid network. You can now buy both wired and wireless **peripheral devices** like printers, Web cams and fax machines. An office worker with a laptop, for example, can print a document ... plugging directly into the printer. He can send the document ... the hybrid network to the networked printer of his choice.

(By Dave Roos)

a) Each of the sentences below summarizes an individual paragraph of the text. Order the sentences so that they form a summary of the text. One of the sentences contains information which is not in the text.

a Wireless access point is the core of a wireless network. ☐

b Hybrid router is sometimes advertised as a wireless router with Ethernet ports. ☐

c Today there are a lot of both wired and wireless peripheral devices that can be linked over a hybrid network. ☐

d To share a connection among several devices is the central access point function. ☐

e When we want to network more than four wired devices, we could connect several routers together. ☐

f There is one important disadvantage of hybrid networking: They are expensive. ☐

g All the nodes in the wired network are connected by physical cable. ☐

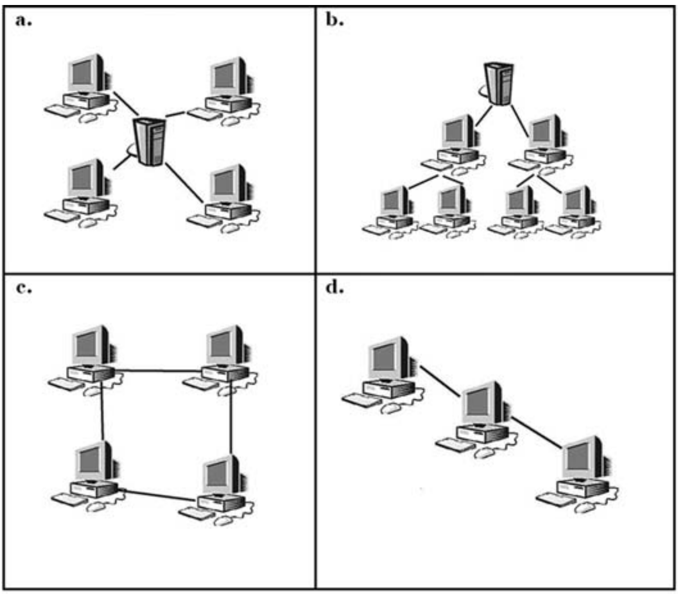
h Hybrid router usually has four Ethernet ports and broadcasts a Wi-Fi signal. ☐

i In one of the hybrid network configurations we plug all the wired devices into the Ethernet ports of the hybrid router. ☐

b) Make your own sentences with the words and phrases in bold type.

12. Match the following network topologies with their pictures below.

1. line (or bus) — 2. ring — 3. star — 4. hierarchical



13. Render the following text in English:

Технология FDDI

Технология *FDDI* — оптоволоконный интерфейс распределенных данных — это первая технология локальных сетей, в которой средой передачи данных является волоконно-оптический кабель. Работы по созданию технологий и устройств для использования волоконно-оптических каналов в локальных сетях начались в 80-е годы, вскоре после начала промышленной эксплуатации подобных каналов в территориальных сетях. Рабочая группа института *ANSI* разработала в период с 1986 по 1988 гг. начальные версии стандарта *FDD*I, который обеспечивает передачу кадров со скоростью 100 Мбит/с по двойному волоконно-оптическому кольцу длиной до 100 км.

Технология *FDDI* во многом основывается на технологии *Token Ring*, развивая и совершенствуя ее основные идеи. Разработчики технологии *FDDI* ставили перед собой в качестве наиболее приоритетных следующие цели:

- повысить битовую скорость передачи данных до 100 Мбит/с;
- повысить отказоустойчивость сети за счет стандартных процедур восстановления ее после отказов различного рода — повреждения кабеля, некорректной работы узла, концентратора, возникновения высокого уровня помех на линии и т. п.;
- максимально эффективно использовать потенциальную пропускную способность сети, как для асинхронного, так и для синхронного (чувствительного к задержкам) трафиков.

Сеть *FDDI* строится на основе двух оптоволоконных колец, которые образуют основной и резервный пути передачи данных между узлами сети. Наличие двух колец — это основной способ повышения отказоустойчивости в сети *FDDI*, и узлы, которые хотят воспользоваться этим повышенным потенциалом надежности, должны быть подключены к обоим кольцам.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 13

IF-SENTENCES

Study these uses of *if*-sentences.

1. Action and effect.

We can use an *if*-sentence to link an action and its effect.

Examples:

1. If the server doesn't find a match (action), it will send the request further up the chain to a server that has more information (effect).

2. If you use an FTP server (action), you rely on the file transfer protocol (effect).

The action is in the Present Simple and the effect is in the Present Simple or described using **will, can**, or **may** depending how certain it is to follow.

2. Polite instructions.

We use the action part of *if*-sentences, especially in spoken English, to give instructions in a polite way. The effect part is assumed.

Examples:

3. If you bring your cursor down to the very bottom (*you'll find the Start button*).

4. If you just hit Enter (*that will activate the program*).

3. Imagined action and effect.

We can use an *if*-sentence to describe the possible effect of an imagined action.

Examples:

5. If you connected to this ISP (imagined action), you would become part of their network (possible effect).

6. If this station transmitted data (imagined action), the bridge would also receive the transmission (possible effect).

To show this imagined, not real, events the action is in the Past Simple and the effect is described using **would, could**, and **might** depending how certain it is to follow.

14. Match the actions in Column A with appropriate effects from Column B. Then join each action and effect using an *if*-sentence.

Column A	Column B
1. You press Print Screen	a) You can drag it across the screen.
2. You press Ctrl + Alt + Del in Windows 98	b) They both will need to transmit again.
3. The DNS finds a match	c) You may lose data.
4. You installed a modem	d) You would have more space at your desk.
5. You used a better search engine	e) You would be able to connect to a telephone line.
6. Attach too many devices to one shared segment	f) You can make a copy of the screen.
7. You hold down the mouse button over an icon	g) You would find more relevant results.
8. You used an LCD display	h) It displays a list of active programs.
9. You forget to save regularly	i) Contention for the medium will increase.
10. Two stations collide when transmitting once	j) It would speed up the computer.
11. Two libraries at the opposite ends of a city wanted to share their book catalog information	k) They would most likely make use of a wide area network technology.
12. You added more memory	l) It will direct your request to the proper server's IP address.

15. Describe the effects of these actions using an *if*-sentence.

1) you press the delete key
2) there was a power cut while you were using your computer
3) you use a search engine
4) you forgot your password
5) you don't virus-check floppies
6) you install a faster processor
7) you double-click on an icon
8) you alleviate congestion problems
9) you use power-saving options
10) you make use of this feature

UNIT 14

PART 15. ALTERNATIVE NETWORK TECHNOLOGIES: TOKEN RING

The most common local area network alternative to Ethernet is a network technology developed by IBM, called token ring. Where Ethernet relies on the random gaps between transmissions to regulate access to the medium, token ring implements a strict, orderly access method. A token-ring network arranges nodes in a logical ring, as shown in figure 5. The nodes forward frames in one direction around the ring, removing a frame when it has circled the ring once.

The ring initializes by creating a token, which is a special type of frame that gives a station permission to transmit.

The token circles the ring like any frame until it encounters a station that wishes to transmit data.

This station then «captures» the token by replacing the token frame with a data-carrying frame, which encircles the network.

Once that data frame returns to the transmitting station, that station removes the data frame, creates a new token and forwards that token on to the next node in the ring.

Fig. 5
A small token ring network

Token-ring nodes do not look for a carrier signal or listen for collisions; the presence of the token frame provides assurance that the station can transmit a data frame without fear of another station interrupting. Because a station transmits only a single data frame before passing the token along, each station on the ring will get a turn to communicate in a deterministic and fair manner. Token-ring networks typically transmit data at either 4 or 16 Mbps.

Fiber-distributed data interface (FDDI) is another token-passing technology that operates over a pair of fiber optic rings, with each ring passing a token in opposite directions. FDDI networks offered transmission speeds of 100 Mbps, which initially made them quite popular for high-speed networking. With the advent of 100 Mbps Ethernet, which is cheaper and easier to administer, FDDI has waned in popularity.

PART 16. ALTERNATIVE NETWORK TECHNOLOGIES: ASYNCHRONOUS TRANSFER MODE

A final network technology that bears mentioning is asynchronous transfer mode, or ATM. ATM networks blur the line between local and wide area networking, being able to attach many different devices with high reliability and at high speeds, even across the country. ATM networks are suitable for carrying not only data, but voice and video traffic as well, making them versatile and expandable. While ATM has not gained acceptance as rapidly as originally predicted, it is nonetheless a solid network technology for the future.

Ethernet's popularity continues to grow. With almost 30 years of industry acceptance, the standard is well known and well understood, which makes configuration and troubleshooting easier. As other technologies advanced, Ethernet has evolved to keep pace, increasing in speed and functionality.

(By Nick Pidgeon)

Essential vocabulary (15), (16)

Words

advent *n*
alternative *adj, n*
asynchronous *adj*
capture *v, n*
circle *v, n*
encircle *v*
encounter *v*
expandable *adj*
implement *v, n*
initialize *v*
interrupt *v*
orderly *adv*
pass (along) *v*
remove *v*
strict *adj*
token *n*
troubleshooting *n*
versatile *adj*
ATM
FDDI

Word Combinations

random gap	high-speed networking
logical ring	with the advent of smb. / smth.
to give permission	to wane in popularity
data-carrying frame	with high reliability
to provide assurance	to be suitable for smb. / smth.
without fear of smb. / smth.	to gain acceptance
to get a turn	solid network technology
token-passing technology	to keep pace with smb. / smth.

EXERCISES

1. Find in parts 15 and 16 of the text English equivalents for the following words and phrases:

альтернативные сетевые технологии; кольцевая сеть с маркерным доступом; случайный интервал; использовать строго упорядоченный метод доступа; организовывать узлы в логическое кольцо; удалять фрейм; один раз; создавать маркер; давать разрешение на передачу; заменять на фрейм, содержащий данные; присутствие маркера даёт гарантию того, что ... ; получать очередь на передачу данных; передавать данные со скоростью или 4 или 16 Мбит/с; интерфейс для передачи распределённых данных по волоконно-оптическим каналам; в противоположных направлениях; с появлением чего-л.; терять популярность; асинхронный режим передачи данных; подключать с высокой надёжностью множество различных устройств; по всей стране; делая их универсальными; быстро получать признание; хотя; тем не менее (однако); надёжная сетевая технология на будущее; промышленное признание; делать поиск и устранение неполадок более лёгкими; развиваться, чтобы не отставать.

2. Transcribe and learn to read the following words:

alternative, circle, initialize, assurance, deterministic, either, asynchronous, suitable, versatile, acceptance, functionality.

3. Write the Past Indefinite and the Past Participle of the verbs:

rely, arrange, show, initialize, encounter, forward, return, provide, wane, bear, gain, keep.

4. Find in parts 15 and 16 of the text synonyms to the following words:

casual, exact, to meet, to delete, confidence, to propose, arrival, to control, to get, approval, quickly, to forecast, however.

5. Write the expansions of the following abbreviations and learn them:

FDDI, ATM.

6. Match network technologies on the left with their descriptions on the right. Speak on these technologies using the information of the exercise.

1. Token ring network	**A)** A standard developed by the American National Standards Institute (ANSI) for high-speed fiber-optic LANs (local area networks). This technology provides specifications for transmission rates of 100 megabits (100 million bits) per second on networks based on the token ring standard.
2. Fiber-distributed data interface	**B)** A network technology capable of transmitting data, voice, audio, video, and frame relay traffic in real time. Data, including frame relay data, is broken into packets containing 53 bytes each, which are switched between any two nodes in the system at rates ranging from 1.5 Mbps to 622 Mbps (over fiber optic cable). The basic unit of … transmission is known as a cell, a packet consisting of 5 bytes routing information and a 48-byte payload (data). These cells are transmitted to their destination, where they are reassembled into the original traffic. During transmission, cells from different users may be intermixed asynchronously to maximize utilization of network resources. It is currently used in LANs (local area networks) involving workstations and personal computers, but it is expected to be adopted by the telephone companies, which will be able to charge customers for the data they transmit rather than for their connect time.
3. Asynchronous transfer mode	**C)** A LAN (local area network) formed in a ring (closed loop) topology that uses token passing as a means of regulating traffic on the line. On a ... network, a token governing the right to transmit is passed from one station to the next in a physical circle. If a station has information to transmit, it «seizes» the token, marks it as being in use, and inserts the information. The «busy» token, plus message, is then passed around the circle, copied when it arrives at its destination, and eventually returned to the sender. The sender removes the attached message and then passes the freed token to the next station in line. This type of networks is defined in the IEEE 802.5 standard.

7. Translate the passages in writing:

A) Where Ethernet relies on the random gaps between transmissions to regulate access to the medium, token ring implements a strict, orderly access method.

B) Token-ring nodes do not look for a carrier signal or listen for collisions; the presence of the token frame provides assurance that the station can transmit a data frame without fear of another station interrupting.

C) ATM networks blur the line between local and wide area networking, being able to attach many different devices with high reliability and at high speeds, even across the country.

8. Answer the following questions using the information from parts 15 and 16 of the text.

1. What is the most common local area network alternative to Ethernet? 2. What access method does token ring implement? 3. What is a token ring? 4. What does the presence of the token ring provide? 5. What is FDDI? How does it differ from token ring? 6. What are ATM networks suitable for?

9. Look through parts 15 and 16 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Token ring is an alternative network technology to Ethernet developed by Xerox. ☐
2. A token-ring network arranges nodes in a logical ring. ☐
3. Token is a special type of frame that prohibits the station from transmitting. ☐
4. Token-ring nodes always look for a carrier signal or listen for collisions. ☐
5. FDDI is another token-passing technology that operates over a pair of fiber optic rings. ☐
6. FDDI networks offered transmission speeds of 1,000 Mbps. ☐
7. ATM networks are able to attach many different devices with high reliability and at high speeds, even across the country. ☐
8. ATM networks are suitable for carrying only data, that's why they have not gained acceptance as rapidly as predicted. ☐

10. Make summary of parts 15 and 16 of the text using opening phrases on pages 336–337.

11. Read the following text and fill in suitable words from the box. Each word can be used once only.

wizard, physical, connections, maximum, management, network, wireless, encryption, Wi-Fi, upcoming, advantage, wirelessly, the Internet, cable, chance, expensive, hybrid, mobility, security, complexity, access

Hybrid Networks: Wired vs. Wireless

The chief ... of a wired network is speed. So-called «Fast Ethernet» cables can send data at 100 Mbps while most ... networks max out at 54 Mbps. So if you want to set up a LAN gaming party or share large files in an office environment, it's better to stick with wired ... for optimum speed. Take note, however, that the ... 802.11 n Wi-Fi standard claims throughput speeds of 150 to 300 Mbps.

The chief advantage of a wireless network is ... and flexibility. You can be anywhere in the office and access ... and any files on the LAN. You can also use a wider selection of devices to access the network, like Wi-Fi-enabled handhelds and PDAs.

Another advantage of ... networks is that they're comparatively cheaper to set up, especially in a large office or college environment. Ethernet cables and routers are ... . So is drilling through walls and running cable through ceilings. A few well-placed wireless ... points — or even better, a wireless mesh network — can reach far more devices with far less money.

Other than that, both wired and wireless networks are equally easy (or difficult) to set up, depending on the organization's size and ... . For a small office or home network, the most popular operating systems — Windows XP, Vista and Mac OS 10 — can guide you through the process with a networking ... . Installing and administering a large office or organizational ... is equally tricky whether you're using wired or wireless. Although with wireless connections, you don't have to go around checking ... Ethernet connections.

As for ... , wired is generally viewed as more secure, since someone would have to physically hack into your network. With wireless, there's always a ... that a hacker could use packet-sniffing software to spy on information traveling over your wireless network. But with new wireless … standards like WEP (Wired Equivalent Privacy) and WPA (Wi-Fi Protected Access) built into most Wi-Fi routers, wireless networking is nearly as secure as wired.

A … wired/Wi-Fi network would seem to offer the best of both worlds in terms of speed, mobility, affordability and security. If a user needs … Internet and file-sharing speed, then he can plug into the network with an Ethernet cable. If he needs to show a streaming video to his buddy in the hallway, he can access the network … . With the right planning, an organization can save money on CAT 5 … and routers by maximizing the reach of the wireless network. And with the right encryption and password … in place, the wireless portion of the network can be just as secure as the wired.

(By Dave Roos)

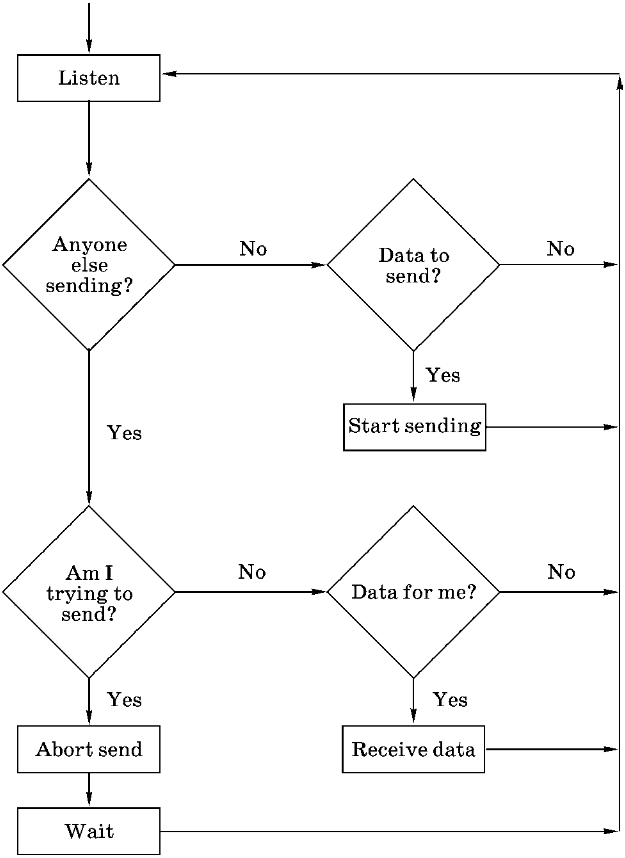
Fill in the table below using the information from the text. What does the author tell us in the final paragraph of the text? Do you share his point of view? Using your table, make short summary of this text.

network / feature	wired	wireless
speed	…	…
flexibility	…	…
cost	…	…
setting up	…	…
security	…	…

12. Which of the network configurations does this flowchart refer to?

Star

In the star configuration, the central computer performs all processing and control functions. All access devices are linked directly to the central computer. The star configuration has two major limitations. First of all, the remote devices are unable to communicate directly. Instead, they must communicate via the central computer only. Secondly, the star network is very suscep-



tible to failure, either in the central computer or the transmission links.

Ring

Each device is attached to a network shaped as a continuous loop. Data proceeds in only one direction and at a constant speed round the loop. Devices may send information only when they are in control of the 'token'. The token is a package of data which indicates which device has control. The receiving device picks up the token, then clears it for another's use once it has received the message. Only one device may send data at any given moment, and each device must be working for the network to function.

Bus / Ethernet

A bus network consists of one piece of cable terminated at each end to which all devices are connected. In a bus-based network, each device is able to broadcast a message when it has detected silence for a fixed period of time. All devices receive the broadcast and determine from the content of the message whether it was intended for them. The only problem occurs when two devices try to send at the same time. When a sending device detects another's transmission, it aborts its own.

Switched

The central switch, which could be a telephone exchange, is used to connect different devices on the network directly. Once the link is established, the two devices communicate as though they were directly linked without interference from any other device. At the end of the session, the connection is closed, freeing capacity for other users and allowing access to other devices. Multiple switches can be used to create alternative transmission routes.

13. Render the following text in English.

Технология *Token Ring* (802.5)

Сети *Token Ring*, также как и сети *Ethernet*, характеризует разделяемая среда передачи данных, которая, в данном случае, состоит из отрезков кабеля, соединяющих все станции сети в кольцо. Кольцо рассматривается как общий разделяемый ресурс, и для доступа к нему требуется не случайный алгоритм, как в сетях *Ethernet*, а детерминированный, основанный на передаче станциям права на использование кольца в определенном порядке. Это право передается с помощью кадра специального формата, называемого маркером или токеном.

Технология *Token Ring* была разработана компанией *IBM* в 1984 году, а затем передана в качестве проекта стандарта в комитет IEEE 802, который на ее основе принял в 1985 году стандарт 802.5. Компания IBM использует технологию *Token Ring* в качестве своей основной сетевой технологии для построения локальных сетей на основе компьютеров различных классов — мэйнфреймов, мини-компьютеров и персональных компьютеров. В настоящее время именно компания

IBM является основным законодателем моды технологии *Token Ring*, производя около 60 % сетевых адаптеров этой технологии.

Сети *Token Ring* работают с двумя битовыми скоростями — 4 и 16 Мбит/с. Смешение станций, работающих на различных скоростях, в одном кольце не допускается. Сети *Token Ring*, работающие со скоростью 16 Мбит/с, имеют некоторые усовершенствования в алгоритме доступа по сравнению со стандартом 4 Мбит/с.

Технология *Token Ring* является более сложной технологией, чем *Ethernet*. Она обладает свойствами отказоустойчивости. В сети *Token Ring* определены процедуры контроля работы сети, которые используют обратную связь кольцеобразной структуры — посланный кадр всегда возвращается в станцию-отправитель. В некоторых случаях, обнаруженные ошибки в работе сети устраняются автоматически, например, может быть восстановлен потерянный маркер. В других случаях ошибки только фиксируются, а их устранение выполняется вручную обслуживающим персоналом.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 14

CLASSIFYING

The term «classifying» means arranging objects in classes or groups according to shared characteristics.

Classifying, then, is a process of bringing order out of confusion by organizing information in a logical fashion. There are often several ways of classifying the same information.

1. From general to specific: focusing on the large or high-level category and talking about its parts, that is from general to specific, the following expressions can be used:

is	is made up of
can be divided into	is composed of
is of	comprises
has	consists of

A general-to-specific classification will usually have singular main verbs, unless two or more things are being analyzed simultaneously.

Examples:

1. Data storage hierarchy **is divided into** four groupings: characters, data elements, records, and files.

2. Data storage hierarchy **has** four groupings: characters, data elements, records, and files.

3. Data storage hierarchy **is made up of** four groupings: characters, data elements, records, and files.

4. Data storage hierarchy **is composed of** four groupings: characters, data elements, records, and files.

5. Data storage hierarchy **consists of** four groupings: characters, data elements, records, and files.

2. From specific to general: what the smaller (or lower-level) components make when they are put together. This kind of classification uses the following expressions:

make up	may be
form	can be
constitute	are classified as

A specific-to-general classification will have plural verbs, because two or more lower-level categories are the focus of classification.

Examples:

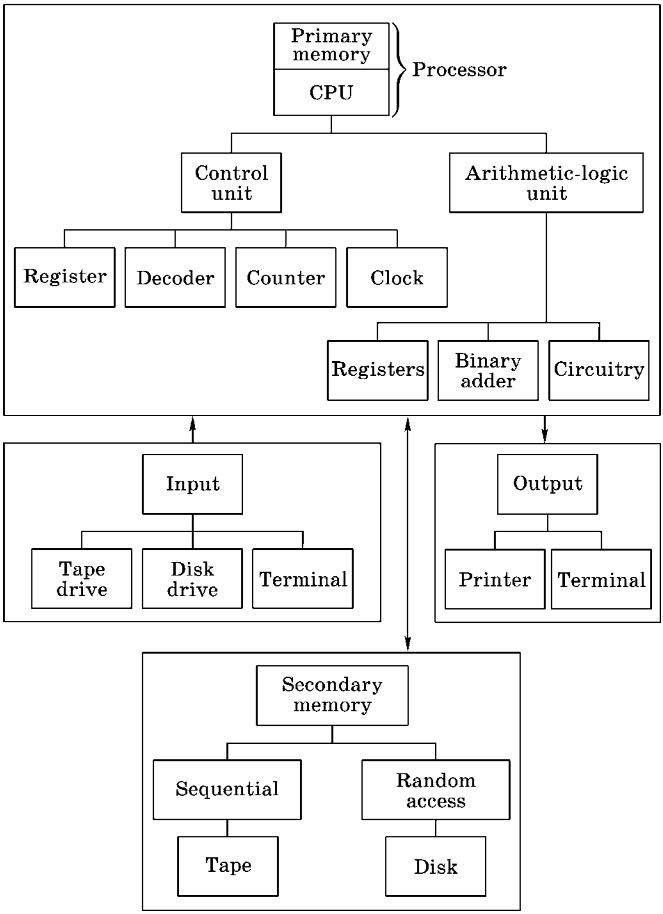
1. Characters, data elements, records, and files are four groupings that **make up** data storage hierarchy.

2. Characters, data elements, records, and files are four groupings that **form** data storage hierarchy.

14. Using the diagram on the following page, complete the paragraph below.

A computer has four basic components: input, processor, memory, and output. The CPU consists of two parts: the (1) ... , which directs and controls the signals and commands inside the processor, and the (2) ... unit, which does the arithmetic operations and the decision-making operations. While the (3) ... is made up of a (4) ... , a (5) ... , a (6) ... , and a (7) ... , the (8) ... is composed of (9) ... , a (10) ... , and (11) ... . In a computer, internal memory or (12) ... refers to the storage locations inside

A Computer system



the computer, whereas (13) … refers to the storage embodied in the peripherals. (14) … may be divided into (15) … [(16) …] and (17) … [(18) …]. The (19) … devices can be either a (20) … , a (21) … , or a (22) … . These devices enter information into the computer. After the processor has operated on it, the (23) … devices display the results of the computations on either a (24) … or a (25) … , or store them on tape or disk for future use.

SECTION THREE

THE SWITCH

Switch is a network device joining many systems together at a low-level layer of the network protocol.
(Webster's New World TM Hacker Dictionary)

UNIT 15

LAN SWITCHES

PART 1. INTRODUCTION TO LAN SWITCHES

If you have read other articles on networking or the Internet, then you know that a typical network consists of:

- nodes (computers);
- a connecting medium (wired or wireless);
- specialized network equipment like routers or hubs.

In the case of the Internet, all of these pieces work together to allow your computer to send information to another computer that could be on the other side of the world!

Switches are another fundamental part of many networks because they speed things up. Switches allow different nodes (a network connection point, typically a computer) of a network to communicate directly with one another in a smooth and efficient manner.

There are many different types of switches and networks. Switches that provide a separate connection for each node in a company's internal network are called LAN switches. Essentially, a LAN switch creates a series of instant networks that contain only the two devices communicating with each other at that particular moment. In this article, we will focus on Ethernet networks that use LAN switches. You will learn what a LAN switch is and how transparent bridging works, as well as about VLANs, trunking and spanning trees.

PART 2. NETWORKING BASICS

Here are some of the fundamental parts of a network (Fig. 6):

- **Network** — A network is a group of computers connected together in a way that allows information to be exchanged between the computers.

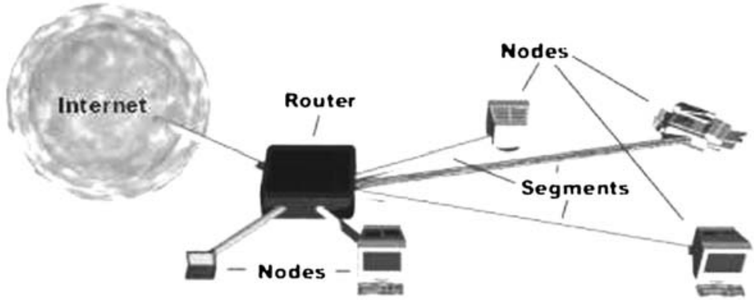


Fig. 6
Fundamental parts of a network

- **Node** — A node is anything that is connected to the network. While a node is typically a computer, it can also be something like a printer or CD-ROM tower.
- **Segment** — A segment is any portion of a network that is separated, by a switch, bridge or router, from other parts of the network.
- **Backbone** — The backbone is the main cabling of a network that all of the segments connect to. Typically, the backbone is capable of carrying more information than the individual segments. For example, each segment may have a transfer rate of 10 Mbps (megabits per second), while the backbone may operate at 100 Mbps.
- **Topology** — Topology is the way that each node is physically connected to the network (more on this in the next part).
- **Local Area Network (LAN)** — A LAN is a network of computers that are in the same general physical location, usually within a building or a campus. If the computers are far apart (such as across town or in different cities), then a **Wide Area Network** (WAN) is typically used.
- **Network Interface Card (NIC)** — Every computer (and most other devices) is connected to a network through a NIC. In most desktop computers, this is an Ethernet card (normally 10 or 100 Mbps) that is plugged into a slot on the computer's motherboard.
- **Media Access Control (MAC) address** — This is the physical address of any device — such as the NIC in a computer — on the network. The MAC address, which is made up of two equal parts, is 6 bytes long. The first 3 bytes identify the company

that made the NIC. The second 3 bytes are the serial number of the NIC itself.

- **Unicast** — A unicast is a transmission from one node addressed specifically to another node.
- **Multicast** — In a multicast, a node sends a packet addressed to a special group address. Devices that are interested in this group register to receive packets addressed to the group. An example might be a Cisco router sending out an update to all of the other Cisco routers.
- **Broadcast** — In a broadcast, a node sends out a packet that is intended for transmission to all other nodes on the network.

In the next part, we'll discuss some of the most common network topologies.

PART 3. NETWORK TOPOLOGIES

Some of the most common topologies in use today include.

Bus — Each node is daisy-chained (connected one right after the other) along the same backbone, similar to Christmas lights (Fig. 7). Information sent from a node travels along the backbone until it reaches its destination node. Each end of a bus network must be terminated with a resistor to keep the signal that is sent by a node across the network from bouncing back when it reaches the end of the cable.

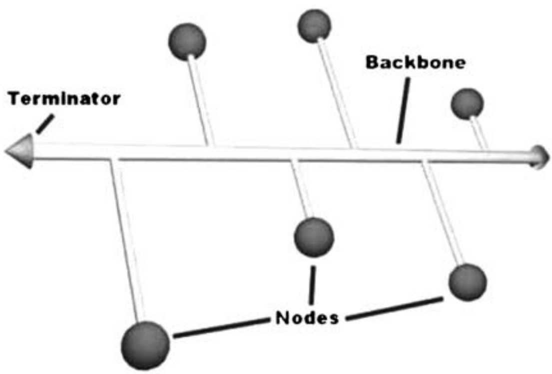


Fig. 7
Bus network topology

Ring — Like a bus network, rings have the nodes daisy-chained. The difference is that the end of the network comes back around to the first node, creating a complete circuit (Fig. 8). In a ring network, each node takes a turn sending and receiving information through the use of a token. The token, along with any data, is sent from the first node to the second node, which extracts the data addressed to it and adds any data it wishes to send. Then, the second node passes the token and data to the third node, and so on until it comes back around to the first node again. Only the node with the token is allowed to send data. All other nodes must wait for the token to come to them.

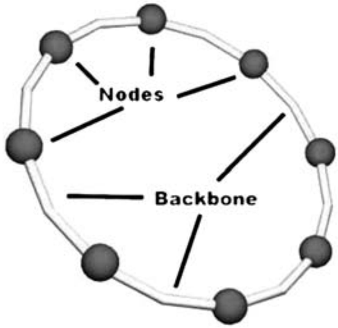


Fig. 8
Ring network topology

Star — In a star network, each node is connected to a central device called a hub (Fig. 9). The hub takes a signal that comes from any node and passes it along to all the other nodes in the network. A hub does not perform any type of filtering or routing of the data. It is simply a junction that joins all the different nodes together.

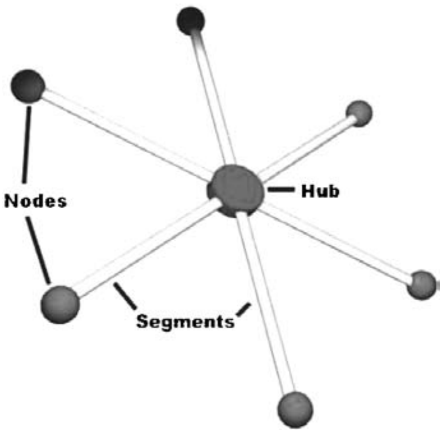


Fig. 9
Star network topology

Star bus — Probably the most common network topology in use today, star bus combines elements of the star and bus topolo-

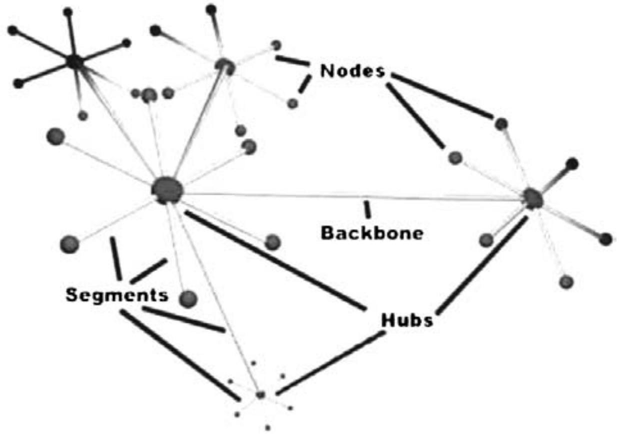


Fig. 10
A typical star bus network

gies to create a versatile network environment (Fig. 10). Nodes in particular areas are connected to hubs (creating stars), and the hubs are connected together along the network backbone (like a bus network). Quite often, stars are nested within stars, as seen in the example below:

Essential vocabulary (1), (2), (3)

Words

backbone *n*
bounce *v, n*
broadcast *n, v*
bus *n*
CD-ROM tower *n*
daisy-chain *n*
efficient *adj*
equipment *n*
exchange *v, n*
extract *v*
fundamental *adj*
hub *n*
instant *adj*
join *v*
junction *n*
MAC address *n*
multicast *n*
nest *v*
NIC
operate *v*
register *v*
segment *n*
specifically *adv*
speed up *v*
switch *n*
terminate *v*
token *n*
topology *n*
trunking *n*
versatile *adj*
VLAN

Word Combinations

transparent bridging
spanning tree
portion of a network
transfer rate of ...

group address	to be within a building
a Cisco router	serial number
to send out an update to smth.	a slot on the computer's motherboard
connecting medium	in use
to be on the other side of the world	to be daisy-chained
specialized network equipment	to be terminated with smth.
in a smooth and efficient manner	to create a complete circuit
company's internal network	to join different nodes together versatile network environment

EXERCISES

1. Find in parts 1, 2 and 3 of the text English equivalents for the following words and phrases:

статьи о построении компьютерной сети; специализированное сетевое оборудование; в отношении чего-л.; коммутатор ЛВС; основной компонент; беспрепятственно и эффективно; сосредоточиваться на сетях Ethernet; прозрачная маршрутизация; связующее дерево (сети); основной сетевой кабель; передавать больше информации, чем отдельные сегменты; иметь скорость передачи 10 Мбит/с; топология сети; находиться в пределах здания; сетевая интерфейсная плата; физический адрес любого устройства в сети; состоять из двух равных частей; предназначенный для определённого адреса выделенной группы пользователей; предназначенный для передачи всем узлам в сети; топология типа «шина»; последовательное подключение; достигать целевого узла; заканчиваться резистором; предотвращать возврат сигнала; топология типа «кольцо»; использование маркера; и так далее; передавать и получать информацию по очереди; топология типа «звезда»; сетевой концентратор; осуществлять фильтрацию и маршрутизацию данных; соединять все другие узлы; объединять элементы звездообразной и шинной топологий; создавать универсальную сетевую среду.

2. Transcribe and learn to read the following words:

medium, portion, identify, specifically, multicast, bouncing, circuit, combine, versatile, through.

3. Write the Past Indefinite and the Past Participle of the verbs:

allow, speed, provide, learn, operate, carry, plug, travel, keep, join, come.

4. Find in parts 1, 2 and 3 of the text antonyms to the following words:

to forbid, external, to separate, secondary, common, beyond, resemblance, peripheral, undoubtedly, special, above.

5. Give all possible derivatives of the following words. Use dictionary if necessary.

To connect, information, different, to create, to identify, to intend, to terminate.

6. Write the expansions of the following abbreviations and learn them:

LAN switch, WAN, VLAN, NIC, MAC address.

7. Match the definitions on the left with the words they denote on the right.

1. A group of computers and other devices dispersed over a relatively limited area and connected by a communications link that enables any device to interact with any other on the network.	a) Network
2. A device capable of forwarding packets directly to the ports associated with particular network addresses.	b) Nod
3. An expansion card or other device used to provide network access to a computer or other device, such as a printer.	c) Switch
4. A geographically widespread network, one that relies on communications capabilities to link the various network segments.	d) Backbone
5. Transmission between a single sender and a single receiver over a network.	e) Topology
6. In networking, a device, such as a client computer, a server, or a shared printer, that is connected to the network and is capable of communicating with other network devices.	f) LAN
7. The wires that carry major communications traffic within a network.	g) WAN
8. Sending a message simultaneously to more than one destination on a network.	h) Network Interface Card

9. The configuration or layout of a network formed by the connections between devices on a LAN or between two or more LANs.	i) Medium
10. In communications and on networks, a message distributed to all stations.	j) Unicast
11. A group of computers and associated devices that are connected by communications facilities.	k) Multicast
12. A substance in which signals can be transmitted, such as a wire or fiber-optic cable.	l) Broadcast

8. Translate the passages in writing.

A) There are many different types of switches and networks. Switches that provide a separate connection for each node in a company's internal network are called LAN switches. Essentially, a LAN switch creates a series of instant networks that contain only the two devices communicating with each other at that particular moment.

B) Information sent from a node travels along the backbone until it reaches its destination node. Each end of a bus network must be terminated with a resistor to keep the signal that is sent by a node across the network from bouncing back when it reaches the end of the cable.

C) In a ring network, each node takes a turn sending and receiving information through the use of a token. The token, along with any data, is sent from the first node to the second node, which extracts the data addressed to it and adds any data it wishes to send.

9. Answer the following questions using the information from parts 1, 2 and 3 of the text.

1. What elements does a typical network consist of? 2. What are the functions of switches? 3. What is a LAN switch? 4. What is a segment? 5. What can you say about the backbone of a network? 6. What is the difference between LAN and WAN? 7. Through what equipment is every computer connected to a network? 8. What is the physical address of any device on the network? How long is it? 9. What do the terms «unicast», «multicast» and «broadcast» mean? 10. What are the most common topologies in use today? 11. Please, describe a bus topology. 12. What can you say about a ring topology? 13. Could you tell some words about star topology? 14. What does a star bus topology combine?

10. Look through parts 1, 2 and 3 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. A typical network consists of nodes, a connecting medium and specialized network equipment like routers or hubs. ☐
2. Switches are unimportant part of any networks because they slow things down. ☐
3. LAN switches provide a separate connection for each node in a company's internal network. ☐
4. The backbone is not the main cabling of a network that two or three nodes connect to. ☐
5. Topology is the specification of a switch used on the network. ☐
6. Every computer (and most other devices) is connected to a network through a USB. ☐
7. The MAC address, which is made up of two equal parts, is 6 bytes long. ☐
8. Multicast is a transmission from one node addressed to all other nodes on the network. ☐
9. In a bus network, information sent from a node travels along the backbone until it reaches its destination. ☐
10. In a star network, a hub performs all types of filtering and routing of traffic. ☐

11. Make summary of parts 1, 2 and 3 of the text.

12. Read the text and put the verbs in brackets into the correct tense-aspect form. Be careful with non-finite forms.

a) Give synonyms to the words in bold type.

b) Single out the main points of this text and sum up its content.

The Network Switch

A network switch (to be) a small hardware **device** that (to join) multiple computers together within one local area network (LAN). Technically, network switches (to operate) at layer two (Data Link Layer) of the OSI model.

Network switches appear nearly identical to network hubs, but a switch generally (to contain) more intelligence and a slightly higher price tag than a hub. Unlike hubs, network switches **are capable of** (to inspect) data packets as they (to be received), (to determine) the source and destination device of each packet, and forwarding them **appropriately**. By (to deliver) messages only to the connected device intended, a network switch (to conserve) network bandwidth and (to offer) generally better performance than a hub.

As with hubs, Ethernet implementations of network switches (to be) the most common. Mainstream Ethernet network switches (to support) either 10 / 100 Mbps Fast Ethernet or Gigabit Ethernet (10 / 100 / 1000) standards.

Different models of network switches (to support) differing numbers of connected devices. Most consumer-grade network switches (to provide) either four or eight connections for Ethernet devices. Switches can (to connect) to each other, a so-called daisy chaining method (to add) **progressively** larger number of devices to a LAN.

(By Bradley Mitchell)

13. In the box below you can see three topologies of a network. Give main advantages and main disadvantages of each of them.

1. Star topology **2. Bus topology** **3. Star bus topology**	
Main Advantages	**Main Disadvantages**
a) It's easy to connect a computer or device.	a) The entire network depends on a central hub and a failure of the central hub can cripple the whole network.
b) One malfunctioning node doesn't affect the rest of the network.	b) The entire network shuts down if there is a break in the main wire and it can be difficult to identify the problem if the network shuts down.
c) It is a good choice for large computer networks as this topology «divides» the whole network into parts that are more easily manageable.	c) If the central computer fails, the entire network becomes unusable.

14. Render the following text in English.

Характеристики, влияющие на производительность коммутаторов

Производительность коммутатора — то свойство, которое сетевые интеграторы и администраторы ждут от этого устройства в первую очередь.

Основными показателями коммутатора, характеризующими его производительность, являются:

- скорость фильтрации кадров;
- скорость продвижения кадров;
- пропускная способность;
- задержка передачи кадра.

Кроме того, существует несколько характеристик коммутатора, которые в наибольшей степени влияют на указанные характеристики производительности. К ним относятся:

- тип коммутации — «на лету» или с полной буферизацией;
- размер буфера (буферов) кадров;
- производительность внутренней шины;
- производительность процессора или процессоров;
- размер внутренней адресной таблицы.

(Олифер В. Г., Олифер Н. А. «Компьютерные сети. Принципы, технологии, протоколы»)

LANGUAGE FOCUS 15

FUNCTION OF AN ITEM

The function of an item can be described in a number of ways:

1. Using the Present Simple.

Repeaters *connect* multiple Ethernet segments.

2. Used to-infinitive. Used for + -ing form.

Repeaters *are used to connect* multiple Ethernet segments.

Repeaters *are used for connecting* multiple Ethernet segments.

3. Emphasizing the function.

The function of repeaters is to connect multiple Ethernet segments.

15. Match each item in Column A with its function in Column B. Then describe its function in two ways.

A) Item	B) Function
1. Switch	a) Establishes the rules for how information passes through the Internet.
2. Server	b) Controls the cursor.

3. RAM	c) Gives us the ability to access the Internet wirelessly at speeds compatible to broadband connection.
4. Packet radio network	d) Executes the processing operations called for by the instructions brought from main memory by the control unit.
5. Processor	e) Inputs data through keys like a typewriter.
6. Protocol	f) Divides a single network into two logically separate networks.
7. Mouse	g) Displays the output from a computer on a screen.
8. DNS	h) Coordinates all the activities of the various components of the computer.
9. Clock	i) Reads DVD-roms.
10. 3.5" floppy drive	j) Connects computers through radio transmitters and receivers.
11. Wimax	k) Reads and writes to removable magnetic disks.
12. Monitor	l) Stores the information we seek on the Internet.
13. Router	m) Holds instructions which are needed to start up the computer.
14. Keyboard	n) Allows different nodes of a network to communicate directly with one another.
15. CPU	o) Holds data read or written to it by the processor.
16. DVD-ROM drive	p) Provides extremely fast access for sections of a program and its data.
17. Scanner	q) Points the request in the right direction.
18. Cache	r) Controls the timing of signals in the computer.
19. ALU	s) Controls all the operations in a computer.
20. ROM	t) Provides a capability for direct data entry into the computer system.

UNIT 16

PART 4. THE PROBLEM: TRAFFIC

In the most basic type of network found today, nodes are simply connected together using hubs. As a network grows, there are some potential problems with this configuration:

- **Scalability** — In a hub network, limited shared bandwidth makes it difficult to accommodate significant growth without sacrificing performance. Applications today need more bandwidth than ever before. Quite often, the entire network must be redesigned periodically to accommodate growth.
- **Latency** — This is the amount of time that it takes a packet to get to its destination. Since each node in a hub-based network has to wait for an opportunity to transmit in order to avoid collisions, the latency can increase significantly as you add more nodes. Or, if someone is transmitting a large file across the network, then all of the other nodes have to wait for an opportunity to send their own packets. You have probably seen this before at work — you try to access a server or the Internet and suddenly everything slows down to a crawl.
- **Network failure** — In a typical network, one device on a hub can cause problems for other devices attached to the hub due to incorrect speed settings (100 Mbps on a 10 Mbps hub) or excessive broadcasts. Switches can be configured to limit broadcast levels.
- **Collisions** — Ethernet uses a process called CSMA/CD (Carrier Sense Multiple Access with Collision Detection) to communicate across the network. Under CSMA/CD, a node will not send out a packet unless the network is clear of traffic. If

two nodes send out packets at the same time, a collision occurs and the packets are lost. Then both nodes wait a random amount of time and retransmit the packets. Any part of the network where there is a possibility that packets from two or more nodes will interfere with each other is considered to be part of the same collision domain. A network with a large number of nodes on the same segment will often have a lot of collisions and therefore a large collision domain.

While hubs provide an easy way to scale up and shorten the distance that the packets must travel to get from one node to another, they do not break up the actual network into discrete segments. That is where switches come in. In the next part, you'll find out how switches assist in directing network traffic.

PART 5. THE SOLUTION: ADDING SWITCHES

Think of a hub as a four-way intersection where everyone has to stop. If more than one car reaches the intersection at the same time, they have to wait for their turn to proceed (Fig. 11).

Now imagine what this would be like with a dozen or even a hundred roads intersecting at a single point. The amount of waiting and the potential for a collision increases significantly. But wouldn't it be amazing if you could take an exit ramp from any one of those roads to the road of your choosing? That is exactly what a switch does for network traffic. A switch is like a cloverleaf intersection — each car can take an exit ramp to get to its destination without having to stop and wait for other traffic to go by.

A vital difference between a hub and a switch is that all the nodes connected to a hub share the bandwidth among themselves, while a device connected to a switch port has the full bandwidth

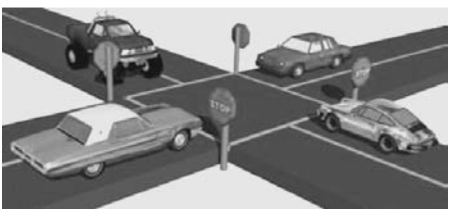


Fig. 11
Imagine that each vehicle is a packet of data waiting for an opportunity to continue on its trip

all to itself. For example, if 10 nodes are communicating using a hub on a 10-Mbps network, then each node may only get a portion of the 10 Mbps if other nodes on the hub want to communicate as well. But with a switch, each node could possibly communicate at the full 10 Mbps. Think about our road analogy. If all of the traffic is coming to a common intersection, then each car it has to share that intersection with every other car. But a cloverleaf allows all of the traffic to continue at full speed from one road to the next.

PART 6. FULLY SWITCHED NETWORKS

In a fully switched network, switches replace all the hubs of an Ethernet network with a dedicated segment for every node (Fig. 12). These segments connect to a switch, which supports multiple dedicated segments (sometimes in the hundreds). Since the only devices on each segment are the switch and the node, the switch picks up every transmission before it reaches another node. The switch then forwards the frame over the appropriate segment. Since any segment contains only a single node, the frame only reaches the intended recipient. This allows many conversations to occur simultaneously on a switched network.

Switching allows a network to maintain full-duplex Ethernet. Before switching, Ethernet was half-duplex, which means that data could be transmitted in only one direction at a time. In a

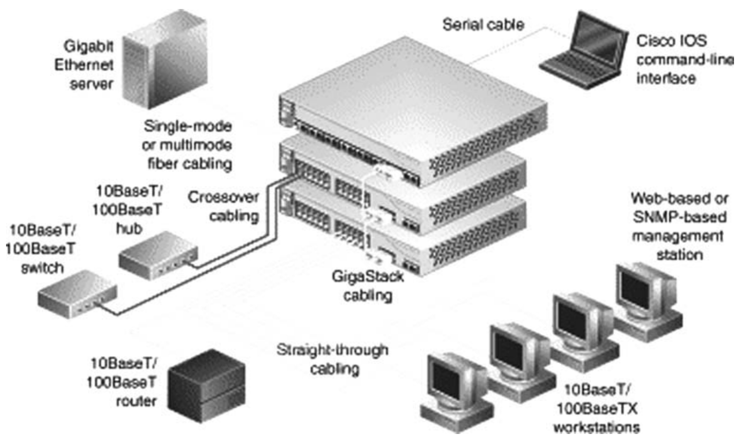


Fig. 12
An example of a network using a switch

fully switched network, each node communicates only with the switch, not directly with other nodes. Information can travel from node to switch and from switch to node simultaneously.

Fully switched networks employ either twisted-pair or fiber-optic cabling, both of which use separate conductors for sending and receiving data. In this type of environment, Ethernet nodes can forgo the collision detection process and transmit at will, since they are the only potential devices that can access the medium. In other words, traffic flowing in each direction has a lane to itself. This allows nodes to transmit to the switch as the switch transmits to them — it's a collision-free environment. Transmitting in both directions can effectively double the apparent speed of the network when two nodes are exchanging information. If the speed of the network is 10 Mbps, then each node can transmit simultaneously at 10 Mbps.

Essential vocabulary (4), (5), (6)

Words

accommodate *v*
appropriate *adj*
attach (to) *v*
bandwidth *n*
collision *n*
conductor *n*
discrete *adj*
due to *prep*
employ *v*
excessive *adj*
failure *n*
forward *v*
incorrect *adj*
interfere *v*
intersection *n*
latency *n*
opportunity *n*
performance *n*
proceed *v*
ramp *n*
redesign *v*
retransmit *v*
sacrifice *v*
scalability *n*
scale up *v*
simultaneously *adv*
slow down *v*
solution *n*
vital *adj*

Word Combinations

significant growth
without sacrificing performance
entire network
to access a server
hub-based network
to slow down to a crawl
network failure
to cause problems
incorrect speed settings
excessive broadcasts
clear of traffic
to break up into discrete segments
four-way cloverleaf intersection
to take an exit ramp from smth.
full bandwidth
fully switched network
to replace smth. with smth.
to reach the intended recipient
to maintain full-duplex Ethernet
collision detection process
to double the apparent speed
to shorten the distance

EXERCISES

1. Find in parts 4, 5 and 6 of the text English equivalents for the following words and phrases:

возможные проблемы; расширяемость; ограниченная, совместно используемая ширина полосы пропускания; обеспечивать значительный рост без потери производительности; довольно часто; переконструировать целую сеть; время ожидания; для того, чтобы избежать конфликтов; неисправность сети; причинять проблемы другим устройствам, подключённым к концентратору; из-за неточных настроек скорости; чрезмерная широковещательная рассылка; ограничивать степень широковещательной рассылки; пока не; ждать неопределённое время; сталкиваться друг с другом; предоставлять лёгкий способ сократить расстояние; разделять сеть на отдельные сегменты; помогать регулировать сетевой трафик; ждать своей очереди для продолжения движения; пересекаться в одной точке; вероятность конфликта; пересечение автодорог на разных уровнях типа «клеверный лист»; съезд с автомагистрали; существенная разница; полная ширина полосы пропускания; получить часть чего-л.; на полной скорости; полностью коммутируемая сеть; выделенный сегмент для каждого узла; поддерживать; пересылать блок данных; происходить одновременно; обеспечивать дуплексный Ethernet; использовать или витую пару, или оптико-волоконный кабель; использовать отдельные кабели для отправки и получения данных; процесс обнаружения конфликтов; иными словами; эффективно удваивать кажущуюся скорость сети; одновременно передавать со скоростью 10 Мбит/с.

2. Transcribe and learn to read the following words:

scalability, redesigned, failure, collision, appropriate, maintain, half-duplex, potential.

3. Write the Past Indefinite and the Past Participle of the verbs:

find, grow, sacrifice, take, avoid, try, occur, break up, stop, replace, mean, flow, accomodate, need, lose, interfere, think, proceed, share, support, travel, forgo, access.

4. Find in parts 4, 5 and 6 of the text antonyms to the following words and word combinations:

to make it easy, decrease (n), to face, to be full of smth., to find, to lengthen, continuous, sender, half-duplex.

5. Give all possible derivatives of the following words. Use dictionary if necessary.

To configure, significant, to accommodate, limit, correct, possible, effective.

6. Write the expansions of the following abbreviations and learn them:

CSMA/CD, Mbps.

7. Below you can see definitions with one word missing in each of them. Use the words from the box to fill in the gaps. One word will remain unused.

insulated, outcome, performance, simultaneous, optically, reliably, effectively, node, capacity, time, dedicated

1. *Scalability* — a measure of how well a computer, service, or application can grow to meet increasing … demands.
2. *Latency* — the … required for a signal to travel from one point on a network to another.
3. *Failure* … the inability of a computer system or related device to operate … or to operate at all.
4. *Collision* — the result of two devices or network workstations trying to transmit signals at the exact same time on the same channel. The typical … is a garbled transmission.
5. *Bandwidth* — the data transfer … , or speed of transmission, of a digital communications system as measured in bits per second (bps).
6. *Switched Ethernet* — an Ethernet network run through a high-speed switch instead of an Ethernet hub. A switched Ethernet involves … bandwidth of 10 Mbps between stations rather than a shared medium.
7. *Full-duplex* — … communications, in both directions, between the sender and receiver.

8. *Collision detection* — the process by which a ... on a local area network monitors the communications line to determine when a collision has occurred.

9. *Fiber-optic cable* — a form of cable used in networks that transmits signals ... , rather than electrically as do coaxial and twisted-pair cable.

10. *Twisted-pair cable* — a cable made of two separately ... strands of wire twisted together.

8. Translate the passages in writing.

A) Since each node in a hub-based network has to wait for an opportunity to transmit in order to avoid collisions, the latency can increase significantly as you add more nodes.

B) If two nodes send out packets at the same time, a collision occurs and the packets are lost. Then both nodes wait a random amount of time and retransmit the packets. Any part of the network where there is a possibility that packets from two or more nodes will interfere with each other is considered to be part of the same collision domain.

C) Fully switched networks employ either twisted-pair or fiber-optic cabling, both of which use separate conductors for sending and receiving data. In this type of environment, Ethernet nodes can forgo the collision detection process and transmit at will, since they are the only potential devices that can access the medium.

9. Use the information from parts 4, 5 and 6 of the text to complete the dialogue in your own words.

A : What kind of problems does a network face when it grows?

B : ...

A : What is «scalability» in your understanding?

B : ...

A : What does latency depend on?

B : ...

A : What is a collision? And what is a collision domain?

B : ...

A : What is a vital difference between a hub and a switch?

B : ...

A : What happens in a fully switched network?

B : ...

A : What is the difference between full-duplex and half-duplex Ethernet?

B : …

A : What type of cabling do fully switched networks employ?

B : …

A : What is the main idea of a collision-free environment?

B : …

A : What is the advantage of transmitting in both directions?

B : … .

10. Look through parts 4, 5 and 6 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. In a hub network, unlimited shared bandwidth makes it easy to accommodate significant growth without sacrificing performance. ☐
2. Each node in a hub-based network has to wait for an opportunity to transmit in order to avoid collisions. ☐
3. Hubs provide an easy way to scale up and shorten the distance that the packets must travel to get from one node to another, and they also break up the actual network into discrete segments. ☐
4. A vital difference between a hub and a switch is that all the nodes connected to a switch share the bandwidth among themselves, while a device connected to a hub has the full bandwidth all to itself. ☐
5. In a fully switched network, switches replace all the hubs of an Ethernet network with a dedicated segment for every node. ☐
6. Switching still doesn’t allow a network to maintain full-duplex Ethernet. ☐
7. In a fully switched network, each node communicates not only with the switch, but also with other nodes. ☐
8. Fully switched networks employ only fiber-optic cabling. ☐
9. A collision-free environment means that the nodes can transmit to the switch as the switch transmits to them. ☐
10. Transmitting in both directions can effectively quadruple the apparent speed of the network when two nodes are exchanging information. ☐

11. Make summary of parts 4, 5 and 6 of the text.

12. Read the text and supply prepositions or adverbs where necessary.

a) Give antonyms to the words in bold type.

b) Find the passages in the text where the following ideas are expressed:

a) Functions of hubs. ☐
b) Description of intelligent hubs. ☐
c) Today's popularity of hubs. ☐
d) Description of passive and active hubs. ☐
e) Prices of hubs. ☐
f) A number of ports in a hub. ☐
g) General characteristics of a hub. ☐

Key Features of Hubs

1. A special type of network device called the hub can be found ... many home and small business networks. Though they've existed ... many years, the popularity of hubs has exploded **recently**, especially ... people relatively new to networking.

2. A hub is a small rectangular box, often made ... plastic, that receives its power from an ordinary wall outlet. A hub joins ... multiple computers (or other network devices) together to form a single network segment. On this network segment, all computers can communicate **directly** ... each other. Ethernet hubs are by far the most common type, but hubs ... other types of networks such as USB also exist.

3. A hub includes ... a series of ports that each accepts a network cable. Small hubs network four computers. They contain four or sometimes five ports, the fifth port being reserved ... «**uplink**» connections to another hub or similar device. Larger hubs contain eight, 12, 16, and even 24 ports.

4. Hubs classify as Layer 1 devices in the OSI model. ... the physical layer, hubs can support little in the way of **sophisticated** networking. Hubs do not read any of the data passing ... them and are not aware ... their source or destination. Essentially, a hub simply receives incoming packets, possibly amplifies the electrical signal, and broadcasts these packets out ... all devices

on the network — including the one that originally sent the packet!

Technically speaking, three different types ... hubs exist:

- passive;
- active;
- intelligent.

5. Passive hubs do not amplify the electrical signal ... incoming packets before broadcasting them out to the network. Active hubs, ... the other hand, do perform this amplification, as does a different type of dedicated network device called a repeater. Some people use the terms concentrator when referring ... a passive hub and multiport repeater when referring ... an active hub.

6. Intelligent hubs add extra features to an active hub that are ... particular importance to businesses. An intelligent hub typically is stackable (built in such a way that multiple units can be placed one ... **top** of the other to conserve space). It also typically includes remote management ... capabilities via SNMP and virtual LAN (VLAN) support.

7. Hubs remain a very popular device ... small networks because of their low cost. A good five-port Ethernet hub can be purchased ... less than $30 USD. USB hubs cost only a bit more.

(By Bradley Mitchell)

13. Read the following text and choose the adjective or the adverb in brackets.

Make a short summary of the text, pointing out the difference between a hub and a switch.

What is the difference between a hub and a switch?

A switch is *(effectively / effective)* a higher-performance alternative to a hub. People tend to benefit from a switch over a hub if their home network has four or more computers, or if they want to use their home network for applications that generate *(significantly / significant)* amounts of network traffic, like multiplayer games or heavy music file sharing. In most other cases, home networkers will not notice an *(appreciable / appreciably)* difference between a hub and switch (hubs do cost slightly less).

(Technically / Technical) speaking, hubs operate using a broadcast model and switches operate using a virtual circuit model. When four computers are connected to a hub, for example, and two of those computers communicate with each other, hubs *(simple / simply)* pass through all network traffic to each of the four computers. Switches, on the other hand, are capable of determining the destination of each *(individually / individual)* traffic element (such as an Ethernet frame) and *(selectively / selective)* forwarding data to the one computer that *(actually / actual)* needs it. By generating less network traffic in delivering messages, a switch performs better than a hub on *(busily / busy)* networks.

(By Bradley Mitchell)

14. Translate the following text into English.

Приоритетная обработка кадров.

Построение сетей на основе коммутаторов позволяет использовать приоритезацию трафика, причем делать это независимо от технологии сети. Эта новая возможность (по сравнению с сетями, построенными целиком на концентраторах) является следствием того, что коммутаторы буферизуют кадры перед их отправкой на другой порт. Коммутатор обычно ведет для каждого входного и выходного порта не одну, а несколько очередей, причем каждая очередь имеет свой приоритет обработки. При этом коммутатор может быть сконфигурирован, например, так, чтобы передавать один низкоприоритетный пакет на каждые 10 высокоприоритетных пакетов.

Поддержка приоритетной обработки может особенно пригодиться для приложений, предъявляющих различные требования к допустимым задержкам кадров и к пропускной способности сети для потока кадров.

Приоритезация трафика коммутаторами сегодня является одним из основных механизмов обеспечения качества транспортного обслуживания в локальных сетях.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 16

THE GERUND

The **-ing** form of the verb is called the Gerund. It can be the subject, object, or predicative of a sentence.

Examples:

1. **Running out** of addresses is a big problem with a 32 bit address system. (*subject*)

2. The ISP intends **routing** the request to a server further up the chain on the Internet as soon as your electronic request is received. (*object*)

3. The function of a server is **looking for** a match for the domain name you've typed in and **directing** your request to the proper server's IP address if a match is found. (*predicative*)

The Gerund is often used after prepositions, such as **without**, **by**, **for**, **on**, etc. This includes **to** when it is a preposition and not part of the infinitive.

Examples:

4. Examples of ways to access the Internet *without* **using** HTTP include e-mail and instant messaging.

5. We can connect one computer to another *by* **using** a connecting medium.

6. We can thank network pioneers like Vinton Cerf and Robert Kahn *for* **creating** VoIP.

7. I insist *on* **mentioning** some of the fundamental parts of a network.

8. We look forward *to* **learning** what a LAN switch is and how transparent bridging works.

15. Rewrite each of these sentences like this:

An important function of the operating system is to manage the computer's resources. — *Managing the computer's resources is an important function of the operating system.*

1. One task of a computer is to replace people in dull, routine tasks.

2. The role of the operating system is to communicate directly with the hardware.

3. The role of these cables is to carry terabits of information every second.

4. One task of the supervisor program is to load into memory non-resident programs as required.

5. The role of headers and footers is to tell computers what's in the packet and how the information fits with other packets to create an entire file.

6. The task in most cases is to facilitate interaction between a single user and a PC.

7. The main task of wireless technologies is to open the doors for portable devices like smartphones, laptops and tablets.

8. The main reason for installing more memory is to allow the computer to process data faster.

9. The main function of the Internet Society is to oversee the formation of the policies and protocols that define how we interact with the Internet.

10. One of the most important functions of a computer is to process large amounts of data quickly.

11. One of the key functions of a router is to determine where to send information from one computer to another.

12. One of the key functions of the operating system is to establish a user interface.

13. An additional role is to provide services for applications software.

14. Part of the work of mainframe operating systems is to support multiple programs and users.

16. Complete these sentences with the correct form of the verb: infinitive or gerund.

1. A computer can make thousands of decisions without (become) tired. 2. A server responds by (send) the requested file in a series of packets. 3. He can't get used to (log on) with a password. 4. Because packets can travel multiple paths to (get) to their destination, it‘s possible for information to (route) around congested areas. 5. When you send an e-mail, it gets broken into packets before (zoom) across the Internet. 6. He tried to (hack into) the system without (know) the password. 7. No government can lay claim to (own) the Internet. 8. I look forward to (input) data by voice instead of (use) a keyboard. 9. A router is extremely useful in (deal) with two separate networks. 10. Don't switch off without (close down) your PC. 11. A router prevents the traffic on one network from unnecessarily (spill) over to the other. 12. I

want to (upgrade) my computer. 13. A trunk line combines multiple fiber optic cables together to (increase) the capacity. 14. He objected to (pay) expensive telephone calls for Internet access. 15. You can make connection by (provide) the IP address of a computer you want to establish a link with. 16. You needn't learn how to (program) in HTML before (design) Web pages. 17. A browser contacts a DNS server to (get) the IP address. 18. You can find information on the Internet by (use) a search engine. 19. A DNS server starts its search for an IP address by (contact) one of the root DNS servers. 20. Caching helps to (keep) things from (bog down). 21. It is important to know how switches assist in (direct) network traffic. 22. An active hub amplifies the electrical signal of incoming packets before (broadcast) them out to the network. 23. The algorithm that switches use to (decide) how to (forward) packets is different from the algorithms used by routers to (forward) packets. 24. Networking allows many different devices in multiple locations to (access) a shared repository of data.

UNIT 17

PART 7. MIXED NETWORKS

Most networks are not fully switched because of the costs incurred in replacing all of the hubs with switches.

Instead, a combination of switches and hubs is used to create an efficient yet cost-effective network (Fig. 13). For example, a company may have hubs connecting the computers in each department and then a switch connecting all of the department-level hubs.

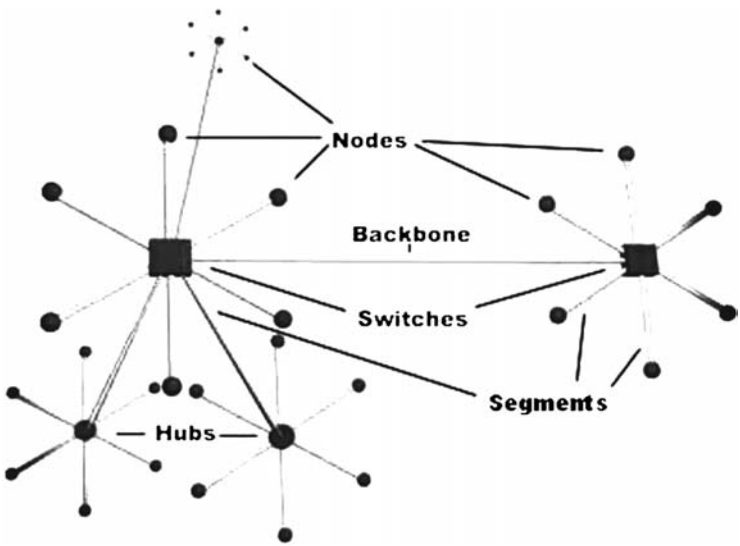


Fig. 13
A mixed network with two switches and three hubs

You can see that a switch has the potential to radically change the way nodes communicate with each other. But you may be wondering what makes it different from a router. Switches usually work at Layer 2 (Data or Datalink) of the OSI Reference Model, using MAC addresses, while routers work at Layer 3 (Network) with Layer 3 addresses (IP, IPX or Appletalk, depending on which Layer 3 protocols are being used, see figure 14). The algorithm that switches use to decide how to forward packets is different from the algorithms used by routers to forward packets.

One of these differences in the algorithms between switches and routers is how broadcasts are handled. On any network, the concept of a broadcast packet is vital to the operability of a network. Whenever a device needs to send out information but doesn't know who it should send it to, it sends out a broadcast. For example, every time a new computer or other device comes on to the network, it sends out a broadcast packet to announce its presence. The other nodes (such as a domain server) can add the computer to their browser list (kind of like an address directory) and communicate directly with that computer from that point on. Broadcasts are used any time a device needs to make an announcement to the rest of the network or is unsure of who the recipient of the information should be.

A hub or a switch will pass along any broadcast packets they receive to all the other segments in the broadcast domain, but a router will not. Think about our four-way intersection again: All of the traffic passed through the intersection no matter where it was going. Now imagine that this intersection is at an international border. To pass through the intersection, you must provide the border guard with the specific address that you are going to. If you don't have a specific destination, then the guard will not let you pass. A router works

Fig. 14
The OSI Reference Model consists of seven layers that build from the wire (Physical) to the software (Application)

like this. Without the specific address of another device, it will not let the data packet through. This is a good thing for keeping networks separate from each other, but not so good when you want to talk between different parts of the same network. This is where switches come in.

PART 9. PACKET-SWITCHING

LAN switches rely on packet-switching. The switch establishes a connection between two segments just long enough to send the current packet. Incoming packets (part of an Ethernet frame) are saved to a temporary memory area (buffer); the MAC address contained in the frame's header is read and then compared to a list of addresses maintained in the switch's look-up table. In an Ethernet-based LAN, an Ethernet frame contains a normal packet as the payload of the frame, with a special header that includes the MAC address information for the source and destination of the packet.

Packet-based switches use one of three methods for routing traffic:

- Cut-through;
- Store-and-forward;
- Fragment-free.

Cut-through switches read the MAC address as soon as a packet is detected by the switch. After storing the 6 bytes that make up the address information, they immediately begin sending the packet to the destination node, even as the rest of the packet is coming into the switch.

A switch using store-and-forward will save the entire packet to the buffer and check it for CRC errors or other problems before sending. If the packet has an error, it is discarded. Otherwise, the switch looks up the MAC address and sends the packet on to the destination node. Many switches combine the two methods, using cut-through until a certain error level is reached and then changing over to store-and-forward. Very few switches are strictly cut-through, since this provides no error correction.

A less common method is fragment-free. It works like cut-through except that it stores the first 64 bytes of the packet before sending it on. The reason for this is that most errors, and all collisions, occur during the initial 64 bytes of a packet.

Essential vocabulary (7), (8), (9)

Words

algorithm *n*
announcement *n*
AppleTalk *n*
cost-effective *adj*
CRC
datalink *n*
discard *v*
incur *v*
initial *adj*
IPX
layer *n*
look up *v*
operability *n*
OSI
pass through *v*
payload *n*
radically *adv*

Word Combinations

mixed network
cost-effective network
OSI Reference Model
to announce one's presence
browser list
specific destination
to keep smth. separate from smth.
packet-switching
current packet
lookup table
the payload of the frame
cut-through switch
store-and-forward switch
fragment-free switch
to check for CRC errors
error correction
error level

EXERCISES

1. Find in parts 7, 8 and 9 of the text English equivalents for the following words and phrases:

смешанная сеть; заменить все концентраторы коммутаторами; создавать эффективную и, при этом, рентабельную сеть; эталонная модель взаимодействия открытых систем; полностью изменить способ ... ; работать на втором уровне модели OSI; отличаться от алгоритмов, используемых маршрутизаторами; быть существенным для работоспособности сети; всякий раз, когда; осуществлять широковещательную рассылку; сообщить о чьём-л. присутствии; добавлять компьютер в список просмотра; сообщать остальной части сети; независимо от того, куда ... ; государственная граница; пограничник; пропускать пакет данных; основываться на пакетной коммутации; отправлять текущий пакет данных; сохранять в область временной памяти; сравнивать со списком адресов; сохранять в таблицу поиска коммутатора; содержать в себе полезную нагрузку кадра; источник и получатель пакета; три способа маршрутизации трафика; сквозная коммутация; коммутация с промежуточным хранением (буферизацией) пакетов; обнаруживать пакет; после сохранения 6 байтов … ; проверять на наличие CRC ошибок; сохранять в буфер целый пакет; иначе; достигать определённого уровня ошибок; не обеспечивать исправление ошибок; большинство ошибок и все конфликты происходят во время … .

2. Transcribe and learn to read the following words:

incurred, wonder, concept, announcement, rely, immediately, initial, algorithm.

3. Write the Past Indefinite and the Past Participle of the verbs:

cast, wonder, announce, add, let, pass, rely, send, read, begin, check, discard.

4. Find in parts 7, 8 and 9 of the text antonyms to the following words and word combinations:

unprofitable, to maintain, dispensable, absence, indirectly, to interrupt a connection, permanent memory, a portion of the packet, to discard, final.

5. Give all possible derivatives of the following words. Use dictionary if necessary.

To combine, to announce, specific, to separate, to operate, to depend, memory.

6. Write the expansions of the following abbreviations and learn them:

OSI Reference Model, IP, IPX.

7. Match the words on the left with their definitions on the right.

1. OSI reference model	a) A message-delivery technique in which small units of information (packets) are relayed through stations in a computer network along the best route available between the source and the destination.
2. Layer	b) A collection of stored results that can be accessed very rapidly by a program

	without the need to calculate each result whenever needed.
3. Packet switching	c) A method of delivering transmissions in which messages are held temporarily by an intermediary before being sent on to their destination.
4. Header	d) A layered architecture (plan) that standardizes levels of service and types of interaction for computers exchanging information through a communications network.
5. Look-up table	e) A network switch that routes packets immediately to the port associated with the packet's recipient.
6. Cut-through switch	f) A temporary storage area for data waiting to be processed.
7. Store-and-forward	g) The protocol or protocols operating at a particular level within a protocol suite, such as IP within the TCP/IP suite.
8. Buffer	h) The portion of a data packet that precedes the body (data). It contains data, such as source and destination addresses and control and timing information that is needed for successful transmission.

8. Translate the passages in writing:

A) Switches usually work at Layer 2 (Data or Datalink) of the OSI Reference Model, using MAC addresses, while routers work at Layer 3 (Network) with Layer 3 addresses (IP, IPX or Appletalk, depending on which Layer 3 protocols are being used). The algorithm that switches use to decide how to forward packets is different from the algorithms used by routers to forward packets.

B) Broadcasts are used any time a device needs to make an announcement to the rest of the network or is unsure of who the recipient of the information should be. A hub or a switch will pass along any broadcast packets they receive to all the other segments in the broadcast domain, but a router will not.

C) A switch using store-and-forward will save the entire packet to the buffer and check it for CRC errors or other problems before sending. If the packet has an error, it is discarded. Otherwise, the switch looks up the MAC address and sends the packet on to the destination node.

9. Answer the following questions using the information from parts 7, 8 and 9 of the text.

1. What kind of network is called a mixed network? 2. What layer of the OSI Reference Model do switches usually work at? 3. What is the difference in the algorithms between switches and routers? 4. When a new computer or other device comes on to the network, what does it do to announce its presence? 5. What example does the author give to describe the work of a router? 6. What technology do LAN switches rely on? 7. What does an Ethernet frame contain in an Ethernet based LAN? 8. What three methods do packet-based switches use for routing traffic? 9. What is the difference between cut-through and store-and-forward methods of routing traffic? 10. What's the main idea of fragment-free methods?

10. Look through parts 7, 8 and 9 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Most networks are not fully switched because it is rather expensive to replace all of the hubs with switches. ☐
2. Switches usually work at Layer 3 of the OSI Reference Model. ☐
3. On any network the concept of a broadcast packet is of no importance to the operability of a network. ☐
4. Whenever a device needs to send out information but doesn't know who it should send it to, it sends out a broadcast. ☐
5. A switch will never pass along any broadcast packets it receives to all the other segments in the broadcast domain. ☐
6. LAN switches rely on packet-switching. ☐
7. Incoming packets are saved to the switch's look-up table. ☐
8. Cut-through switches save the entire packet to the buffer and check it for CRC errors or other problems before sending. ☐
9. Many switches combine the two methods, using cut-through until a certain error level is reached and then changing over to store-and-forward. ☐
10. A switch using a fragment-free method stores the first 6 bytes of the packet before sending it on. ☐

11. Make summary of parts 7, 8 and 9 of the text.

12. Read the following text and fill in suitable words from the box.

standard, equipment, encryption, architecture, stack, pieces, functions, product, ratification, manufacturers, services, layers

The OSI Reference Model

The Open Systems Interconnection (OSI) reference model has been an **essential** element of computer network design since its ... in 1984. The OSI is an abstract model of how network protocols and ... should communicate and work together (interoperate).

The OSI model is a technology ... maintained by the International Standards Organization (ISO). Although today's technologies do not fully **conform** to the standard, it remains a useful introduction to the study of network ... .

The OSI model divides the complex task of computer-to-computer communications, traditionally called internetworking, into a series of stages known as ... . Layers in the OSI model are ordered from lowest level to highest. Together, these layers **comprise** the OSI ... . The stack contains seven layers in two groups:

Upper layers:

7. application;
6. presentation;
5. session.

OSI designates the application, presentation, and session stages of the stack as the upper layers. Generally speaking, software in these layers performs application-specific functions like data formatting, ... , and connection management.

Examples of upper layer technologies in the OSI model are HTTP, SSL and NFS.

Lower layers:

4. transport;
3. network;
2. data link;
1. physical.

The lower layers of the OSI model provide more primitive network-specific ... like routing, addressing, and flow control. Examples of lower layer technologies in the OSI model are TCP, IP and Ethernet.

By separating the network communications into logical smaller … , the OSI model simplifies how network protocols are designed. The OSI model was designed to ensure different types of equipment (such as network adapters, hubs, and routers) would all be **compatible** even if built by different … . A product from one network equipment **vendor** that implements OSI Layer 2 functionality, for example, will be much more likely to interoperate with another vendor's OSI Layer 3 … because both vendors are following the same model.

The OSI model also makes network designs more **extensible** as new protocols and other network … are generally easier to add to a layered architecture than to a monolithic one.

(By Bradley Mitchell)

a) Make your own sentences with the words in bold type.

b) Make short summary of the text.

13. Look at the table below. Match the OSI layers with the functions they are responsible for.

Layers in the ISO/OSI reference model

ISO/OSI layers	Focus
7. Application	a) Coding, addressing, and transmitting information.
6. Presentation	b) Accurate delivery, service quality.
5. Session	c) Transport routes, message handling and transfer.
4. Transport	d) Program-to-program transfer of information.
3. Network	e) Establishing, maintaining, and coordinating communication.
2. Data-link	f) Hardware connections.
1. Physical	g) Text formatting and display, code conversion.

14. Render the following text in English.

Модель OSI

Из того, что протокол является соглашением, принятым двумя взаимодействующими объектами, в данном случае двумя работающими в сети компьютерами, совсем не следует, что он обязательно является стандартным. Но на практике при реализации сетей стремятся использовать стандартные протоколы. Это могут быть фирменные, национальные или международные стандарты.

В начале 80-х годов ряд международных организаций по стандартизации — ISO, ITU-T и некоторые другие — разработали модель, которая сыграла значительную роль в развитии сетей. Эта модель называется моделью взаимодействия открытых систем или моделью OSI. Модель OSI определяет различные уровни взаимодействия систем, дает им стандартные имена и указывает, какие функции должен выполнять каждый уровень. Модель OSI была разработана на основе большого опыта, полученного при создании компьютерных сетей, в основном глобальных, в 70-е годы. Полное описание этой модели занимает более 1000 страниц текста.

В модели OSI средства взаимодействия делятся на семь уровней: прикладной, представительный, сеансовый, транспортный, сетевой, канальный и физический. Каждый уровень имеет дело с одним определенным аспектом взаимодействия сетевых устройств.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 17

VERBS + OBJECT + INFINITIVE; VERBS + OBJECT + TO-INFINITIVE

To describe new developments in computing and networking we often use such verbs as:

allow	let
enable	permit
help	

Study these examples:

1. HTTP **allows us to view** Web sites through a browser.
2. This equipment **enables your computer to send** information to another computer that can be on the other side of the world.
3. The TCP/IP protocols **permit a user to send** a message or retrieve information from another computer.

Allow, enable and **permit** are used with this structure:

verb + object + to-infinitive

Let is used with this structure:

verb + object + infinitive

Example:

4. Switches **let different nodes of a network communicate** directly with one another.

Help can be used with either structure.

Example:

5. A network switch **helps us (to) join** multiple computers together within one LAN.

15. Put the verbs in brackets into the correct form.

1. The Internet allows people all over the world ... (share) knowledge and opinions.
2. A network permits interconnected computers ... (exchange) information between them.
3. Windows allows you ... (display) two different folders at the same time.
4. Only token let the nodes ... (send) data.
5. The MouseKeys feature enables you ... (use) the numeric keypad to move the mouse pointer.
6. Switches help a network ... (limit) broadcast levels.
7. The StickyKeys feature helps disabled people ... (operate) two keys simultaneously.
8. Alt + Print Screen lets you ... (copy) an image of an active window to the Clipboard.
9. Switching enables a network ... (maintain) full-duplex Ethernet.
10. The Shift key allows you ... (type) in upper case.
11. This allows nodes ... (transmit) to the switch as the switch transmits to them — it's a collision-free environment.
12. Adding more memory lets your computer ... (work) faster.

13. Without the specific address of another device, a router will not let the data packet … (go through).

14. The Help facility enables users … (get) advice on most problems.

15. The public Internet permits businesses around the world … (share) information with each other and their customers.

16. Alt + Tab allows you … (switch) between programs.

17. Networking allows one computer … (send) information to and … (receive) information from another.

18. Computer terminals in public libraries help patrons … (search) for books far more quickly.

19. Fiber optic cables have enabled LAN technologies … (connect) devices tens of kilometers apart.

20. This figure will help us … (illustrate) the operation of Ethernet.

UNIT 18

PART 10. SWITCH CONFIGURATIONS

LAN switches vary in their physical design. Currently, there are three popular configurations in use.

- **Shared memory** — This type of switch stores all incoming packets in a common memory buffer shared by all the switch ports (input/output connections), then sends them out via the correct port for the destination node.
- **Matrix** — This type of switch has an internal grid with the input ports and the output ports crossing each other. When a packet is detected on an input port, the MAC address is compared to the lookup table to find the appropriate output port. The switch then makes a connection on the grid where these two ports intersect.
- **Bus architecture** — Instead of a grid, an internal transmission path (common bus) is shared by all of the ports using TDMA. A switch based on this configuration has a dedicated memory buffer for each port, as well as an ASIC to control the internal bus access.

PART 11. TRANSPARENT BRIDGING

Most Ethernet LAN switches use a very cool system called transparent bridging to create their address lookup tables. Transparent bridging is a technology that allows a switch to learn everything it needs to know about the location of nodes on the network without the network administrator having to do anything. Transparent bridging has five parts:

- Learning;
- Flooding;

- Filtering;
- Forwarding;
- Aging.

Here's a step-by-step description of transparent bridging.

- The switch is added to the network, and the various segments are plugged into the switch's ports.
- A computer (Node A) on the first segment (Segment A) sends data to a computer (Node B) on another segment (Segment C).
- The switch gets the first packet of data from Node A. It reads the MAC address and saves it to the look-up table for Segment A. The switch now knows where to find Node A anytime a packet is addressed to it. This process is called learning.
- Since the switch does not know where Node B is, it sends the packet to all of the segments except the one that it arrived on (Segment A). When a switch sends a packet out to all segments to find a specific node, it is called flooding.
- Node B gets the packet and sends a packet back to Node A in acknowledgement.
- The packet from Node B arrives at the switch. Now the switch can add the MAC address of Node B to the look-up table for Segment C. Since the switch already knows the address of Node A, it sends the packet directly to it. Because Node A is on a different segment than Node B, the switch must connect the two segments to send the packet. This is known as forwarding.
- The next packet from Node A to Node B arrives at the switch. The switch now has the address of Node B, too, so it forwards the packet directly to Node B.
- Node C sends information to the switch for Node A. The switch looks at the MAC address for Node C and adds it to the look-up table for Segment A. The switch already has the address for Node A and determines that both nodes are on the same segment, so it does not need to connect Segment A to another segment for the data to travel from Node C to Node A. Therefore, the switch will ignore packets traveling between nodes on the same segment. This is filtering.
- Learning and flooding continue as the switch adds nodes to the look-up tables. Most switches have plenty of memory in a switch for maintaining the lookup tables; but to optimize the use of this memory, they still remove older information so

that the switch doesn't waste time searching through stale addresses. To do this, switches use a technique called aging. Basically, when an entry is added to the look-up table for a node, it is given a timestamp. Each time a packet is received from a node, the timestamp is updated. The switch has a user-configurable timer that erases the entry after a certain amount of time with no activity from that node. This frees up valuable memory resources for other entries. As you can see, transparent bridging is a great and essentially maintenance-free way to add and manage all the information a switch needs to do its job!

In our example, two nodes share segment A, while the switch creates independent segments for Node B and Node D. In an ideal LAN-switched network, every node would have its own segment. This would eliminate the possibility of collisions and also the need for filtering.

PART 12. REDUNDANCY

When we talked about bus and ring networks earlier, one issue was the possibility of a single point of failure. In a star or star-bus network, the point with the most potential for bringing all or part of the network down is the switch or hub. Look at the example below.

In this example (Fig. 15), if either switch A or C fails, then the nodes connected to that particular switch are affected, but nodes at the other two switches can still communicate.

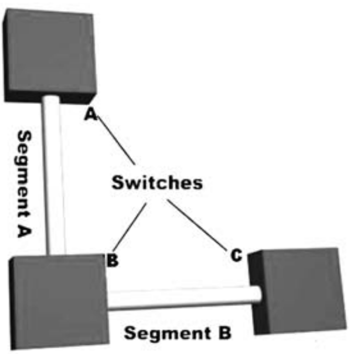


Fig. 15
Failure of Switch B brings the entire network down

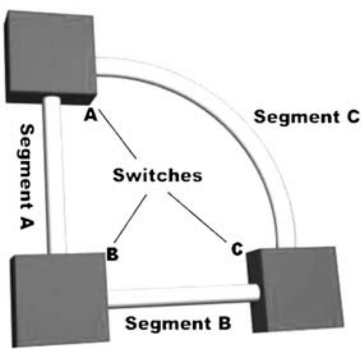


Fig. 16
Segment C provides redundancy

However, if switch B fails, then the entire network is brought down. What if we add another segment to our network connecting switches A and C (Fig. 16)?

In this case, even if one of the switches fails, the network will continue. This provides redundancy, effectively eliminating the single point of failure.

But now we have a new problem.

Essential vocabulary (10), (11), (12)

Words

acknowledgement *n*
affect *v*
aging *n*
arrive (at) *v*
ASIC
bring down *v*
currently *adv*
eliminate *v*
erase *v*
except *prep*
fail *v*
filtering *n*
flooding *n*
forwarding *n*
ignore *v*
intersect *v*
learning *n*
matrix *n*
plug (into) *v*
redundancy *n*
send back *v*
TDMA
technique *n*
timer *n*
timestamp *n*
valuable *adj*
various *adj*
waste *v*

Word Combinations

shared memory
physical design
internal grid
bus architecture
transmission path
common bus
dedicated memory buffer
internal bus access
transparent bridging
network administrator
step-by-step description
to be on the same segment
to have plenty of smth.
stale address
to give a timestamp
a user-configurable timer
memory resources
maintenance-free
separate / independent segment
single-point failure
to provide redundancy

EXERCISES

1. Find in parts 10, 11 and 12 of the text English equivalents for the following words and phrases:

отличаться на физическом уровне; совместно используемая память; сохранять все поступающие пакеты; буфер памяти, совместно используемый всеми портами коммутатора;

матричный коммутатор; внутренняя сетка с пересекающимися портами ввода-вывода; сравнивать с таблицами поиска; находить соответствующий порт вывода; шинная архитектура; совместно использовать внутренний канал передачи; использовать множественный доступ с временным разделением каналов; специализированный буфер памяти для каждого порта; так же, как специализированная интегральная схема; управлять доступом к внутренней шине; прозрачная маршрутизация; создавать таблицы поиска адресов; знать о местоположении узлов в сети; без каких-либо действий администратора сети; волновое распределение пакетов; пошаговое описание; рассылать пакет всем сегментам, чтобы найти нужный узел; в качестве подтверждения приёма; достигать коммутатора; добавлять в таблицу поиска; определять, что оба узла находятся в одном и том же сегменте; фильтрация; чтобы оптимизировать использование памяти ... ; бесполезно тратить время; устаревшие адреса; присваивать временную метку; каждый раз обновлять временную метку; конфигурируемый пользователем таймер; стирать запись; освобождать ценные ресурсы памяти; не требующий обслуживания способ управлять информацией; в идеальной коммутируемой ЛВС; устранять вероятность конфликтов; вероятность отказа системы вследствие выхода из строя одного элемента; привести часть сети к отказу; выйти из строя; затрагивать узлы, подключенные к конкретному коммутатору; обеспечивать дублирование; эффективно устранять.

2. Transcribe and learn to read the following words:
currently, architecture, flooding, bridging, arrive, optimize, aging, eliminate, redundancy, technique.

3. Write the Past Indefinite and the Past Participle of the verbs:
vary, store, detect, intersect, know, send, arrive, ignore, give, free, fail, bring down.

4. Find in parts 10, 11 and 12 of the text antonyms to the following words and word combinations:
unpopular, individual, input, improper, unsuitable, turbid, to leave, to pay attention (to), to stop, worthless.

5. Give all possible derivatives of the following words. Use dictionary if necessary.

To compare, to determine, to optimize, to remove, active, description, to vary.

6. Write the expansions of the following abbreviations and learn them:

TDMA, ASIC.

7. Below you can see definitions with one word missing in each of them. Use the words from the box to fill in the gaps.

providing, interconnected, removing, added, forwarding, transmitted, crossing, treated

1. *Flooding* — the networking technique of ... a frame onto all ports of a switch except the port on which it arrived.
2. *Configuration* — the entire ... set of hardware, or the way in which a network is laid out — the manner in which elements are connected.
3. *Timestamp* — a time signature that is ... by a program or system to files, e-mail messages, or Web pages.
4. *Entry* — a unit of information ... as a whole by a computer program.
5. *Redundancy* — the process of ... extra components in a system in case there is a breakdown.
6. *Acknowledgement* — sending a signal from a receiver to show that a ... message has been received.
7. *Aging* — the technique of ... older information so that the switch doesn't waste time searching through stale address.
8. *Matrix* — a type of switch that has an internal grid with the input ports and the output ports ... each other.

8. Translate the passages in writing.

A) Transparent bridging is a technology that allows a switch to learn everything it needs to know about the location of nodes on the network without the network administrator having to do anything.

B) Learning and flooding continue as the switch adds nodes to the lookup tables. Most switches have plenty of memory in a switch for maintaining the look-up tables; but to optimize the use of this memory, they still remove older information so that the switch doesn't waste time searching through stale addresses.

C) In this case, even if one of the switches fails, the network will continue. This provides redundancy, effectively eliminating the single point of failure.

9. Use the information from parts 10, 11 and 12 of the text to complete the dialogue in your own words.

A : What are three popular configurations of LAN switches in use today?

B : ...

A : Could you characterize each of them?

B : ...

A : What technology do most Ethernet LAN switches use to create their address look-up tables?

B : ...

A : What is transparent bridging?

B : ...

A : How many parts does transparent bridging have? What are they?

B : ...

A : What is learning and flooding?

B : ...

A : How do you understand the process of forwarding and filtering?

B : ...

A : Could you describe the process of aging?

B : ...

A : What can eliminate the possibility of collisions and also the need for filtering?

B : ...

A : What is the weakest point with the most potential for bringing network down in a star or star-bus network?

B : ...

A : How can we provide redundancy on the network?

B : ...

10. Look through parts 10, 11 and 12 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Currently, there are five popular configurations of LAN switches in use. ☐
2. Shared memory switch stores all incoming packets in a common memory buffer shared by all the switch ports. ☐
3. A switch based on bus architecture has a dedicated memory buffer for each port. ☐
4. Transparent bridging is a technology that allows a switch to filter packets on the network. ☐
5. When a switch sends a packet out to all segments to find a specific node, it is called learning. ☐
6. The process of connecting the two segments to send the packet is known as forwarding. ☐
7. To remove older information from the memory, switches use a technique called filtering. ☐
8. Each time a packet is received from a node, the timestamp remains the same. ☐
9. To free up valuable memory resources the entry is erased after a certain amount of time with no activity from the node. ☐
10. Redundancy provides effective elimination of a single-point failure. ☐

11. Make summary of parts 10, 11 and 12 of the text.

12. Read the text.

The LAN switch

1. A LAN switch is a local area networking device that prevents data packet collision, and maximizes transmission speed as well as bandwidth allocation. This is a good replacement to a network hub and solves problems associated with expanding networks.

2. LAN, as you know, is the geographically limited network; it is usually limited to a single office, home, department, or building. In some cases, though, a LAN can exist between neighboring buildings.

3. It is comprised of various nodes — these are usually desktop computers and computer servers — that are physically connected through LAN cables or through a wireless router and are able to communicate with each other and share common resources (e. g. office printers).

4. There are many ways of connecting the various nodes in a Local Area Network. Simple networks usually have nodes that are arranged in a bus (straight backbone with segments where nodes are attached) or ring topology (nodes are distributed on a circular backbone and only the node with the ring token can transmit or send data).

5. They can also be arranged in a star-like arrangement where all nodes have an individual segment connecting them to a hub. The hub is a passive network device; it is simply a place where data packets pass from one node to all the other nodes connected to it (except the port from which the data originally came from). Complex networks are usually a combination of the bus and star typology. Backbones connect multiple hubs.

6. All these networks have different physical properties (they vary in the way a node can send and receive data to another node), but all these suffer from inefficient bandwidth usage, extremely low speeds and data collision incidence.

7. In a network where a LAN switch is used, each node gets a direct connection to a switch. That is, a node gets a dedicated connection to the switch which only it (the node or the computer) and the switch use. This dedicated connection makes it possible for one node to maximize use of the bandwidth available to it. After all, no other node is competing with it for bandwidth. This means speedy data transmission.

8. Moreover, the connection between the node and the switch can be made using cabling which has a separate route for data that the node is sending out and a separate route for data that the switch is forwarding to the node. This eliminates problems of data collision.

9. The LAN switch is especially a vast improvement over the network hub since it has the ability to "read" the source and destination node of a data packet and forward the packet only to the destination node.

10. Whenever the node transmits data meant for another node in the local area network, the switch intercepts the data, determines the destination and forwards the transmission to its intended destination. Since a data packet does not get broadcasted to unnecessary segments, network congestion is minimized and network bandwidth is conserved.

(By Bradley Mitchell)

Each of the sentences below summarizes an individual paragraph of the text. Order the sentences so that they form a summary of the text.

a	A separate route for incoming and outgoing data eliminates problems of data collision.	☐
b	As a rule, simple networks have nodes that are arranged in a bus or ring topology.	☐
c	In a LAN switch network, a data packet does not get broadcasted to unnecessary segments, minimizing congestion and conserving bandwidth.	☐
d	All these network topologies suffer from inefficient bandwidth usage, low speeds and data collisions.	☐
e	A LAN switch is a good replacement to a network hub.	☐
f	There is also a star-like arrangement where all nodes are connected to a hub.	☐
g	The LAN switch can identify the source and destination node of a data packet and forward the packet only to the destination node.	☐
h	LAN is the geographically limited network.	☐
i	In a LAN switch network, each node gets a dedicated connection to the switch.	☐
j	LAN consists of various nodes that are able to communicate with each other.	☐

13. Read the text and fill in prepositions from the box.

> on, of, without, to, in, at, with, between, to, in, for, with, to, from

Transparent Bridges and Transparent Bridging

Transparent bridges are devices which connect more than one network segments ... other bridges to make all routing decisions. A transparent bridge is essentially used to learn the MAC addresses of all nodes and their associated port, to filter incoming frames whose destination MAC addresses are located on the same incoming port, and to forward incoming frames ... the destination MAC through their associated port.

There are two types ... Transparent Bridge Modes:

1. Store-and-Forward: Stores the entire frame and verifies the CRC before forwarding the frame. If a CRC error is detected, the frame is discarded.

2. Cut–Through: Forwards the frame just after it reads the destination MAC address ... performing a CRC check.

Transparent bridging is a method to connect two similar network segments ... each other ... the data link layer. It is done in a way that is transparent to end-stations, hence end-stations do not participate ... the bridging algorithm.

Transparent bridges are sometimes called learning bridges. When they are turned on and receive data packets ... a network segment they:

1) learn the relation ... MAC address and segment / port, and

2) forward the packet ... all other segments / ports.

The first step ... this process is essential to the «learning» aspect of the bridge. After some time the bridge has learned that a particular MAC address, say MAC A, is ... a particular segment / port, say PORT1. When it receives a packet destined ... the MAC address MAC A (from any port not being PORT1) it will no longer forward the packet to all ports (step 2). It knows that MAC A is associated ... PORT1 and will only forward the packet to PORT1.

(By Bradley Mitchell)

Single out the main points of this text and sum up its content.

14. Render the following text in English.

Коммутация «на лету» и с буферизацией.

На производительности коммутатора сказывается способ передачи пакетов — «на лету» или с буферизацией. Коммутаторы, передающие пакеты «на лету», вносят меньшие задержки передачи кадров на каждом промежуточном коммутаторе, поэтому общее уменьшение задержки доставки данных может быть значительным, что важно для мультимедийного трафика. Кроме того, выбранный способ коммутации оказывает влияние на возможности реализации некоторых полезных дополнительных функций, например трансляцию протоколов канального уровня.

Средняя величина задержки коммутаторов, работающих «на лету», при высокой нагрузке объясняется тем, что в этом случае выходной порт часто бывает занят приемом другого пакета, поэтому вновь поступивший пакет для данного порта все равно приходится буферизовать.

Коммутатор, работающий «на лету», может выполнять проверку некорректности передаваемых кадров, но не может изъять плохой кадр из сети, так как часть его байт (и, как правило, большая часть) уже переданы в сеть.

Так как каждый способ имеет свои достоинства и недостатки, в тех моделях коммутаторов, которым не нужно транслировать протоколы, иногда применяется механизм адаптивной смены режима работы коммутатора. Основной режим такого коммутатора — коммутация «на лету», но коммутатор постоянно контролирует трафик и при превышении некоторого порога интенсивности появления плохих кадров переходит на режим полной буферизации. Затем коммутатор может вернуться к коммутации «на лету».

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 18

-ING CLAUSES

Study this sentence.

Delivering messages only to the intended device, a network switch conserves network bandwidth.

It contains two clauses. An *-ing* clause:

Delivering messages only to the intended device

and a main clause:

a network switch conserves network bandwidth.

We use *-ing* clause:

1. to explain how something happens. In this case, the *-ing* clause explanation can be placed before, or after the main clause.

Example:

Using hubs, nodes are simply connected together.

Nodes are simply connected together (by) using hubs.

2. to link a cause and effect.

Example:

In a ring topology the end of the network comes back around to the first node, (cause) creating a complete circuit. (effect)

15. Match cause and effect. Then link them with an *-ing* clause.

Cause	Effect
1. A switch has a timer that erases the entry.	a) This provides a good replacement to a network hub.
2. In a LAN-switched networks, every node has its own segment.	b) This makes configuration and troubleshooting easier.
3. A phone line simply uses existing phone wiring found in most homes.	c) This minimizes network congestion and conserves network bandwidth.
4. A LAN switch prevents data packet collision and maximizes transmission speed.	d) This significantly increases the network diameter.
5. A data packet does not get broadcasted to unnecessary segments.	e) This increases the network diameter and also helps regulate traffic.
6. Ethernet devices can have only a few hundred meters of cable between them.	f) This creates multiple collision domains.
7. Repeaters join multiple cables.	g) This allows many conversations to occur simultaneously.
8. One way to reduce congestion is to split a single segment into multiple segments.	h) This eliminates the possibility of collisions and also the need for filtering.
9. Bridges connect two or more network segments.	i) This replaces the shared medium of legacy Ethernet with a dedicated segment for each station.
10. A frame only reaches the intended recipient.	j) This provides fast services as DSL.
11. Contemporary Ethernet networks make use of switched Ethernet.	k) This frees up valuable memory resources for other entries.
12. The Ethernet standard is well known and well understood.	l) This makes it impractical to connect geographically dispersed location.

UNIT 19

PART 13. BROADCAST STORMS

In the last part, you discovered how switches learn where the nodes are located. With all of the switches now connected in a loop, a packet from a node could quite possibly come to a switch from two different segments. For example, imagine that Node B is connected to Switch A, and needs to communicate with Node A on Segment B. Switch A does not know who Node A is, so it floods the packet (Fig. 17).

The packet travels via Segment A or Segment C to the other two switches (B and C). Switch B will add Node B to the lookup table it maintains for Segment A, while Switch C will add it to the lookup table for Segment C. If neither switch has learned the address for Node A yet, they will flood Segment B looking for Node A. Each switch will take the packet sent by the other switch

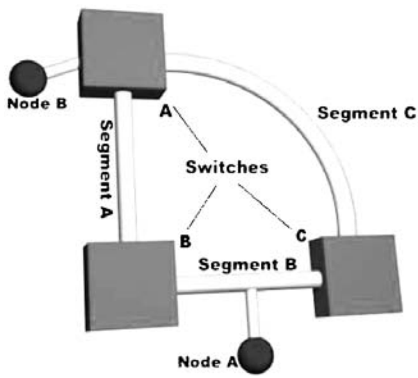


Fig. 17
Broadcast storm results in severe network congestion

and flood it back out again immediately, since they still don't know who Node A is. Switch A will receive the packet from each segment and flood it back out on the other segment. This causes a broadcast storm as the packets are broadcast, received and rebroadcast by each switch, resulting in potentially severe network congestion.

Which brings us to spanning trees...

PART 14. SPANNING TREES

To prevent broadcast storms and other unwanted side effects of looping, Digital Equipment Corporation created the spanning-tree protocol (STP), which has been standardized as the 802.1d specification by the Institute of Electrical and Electronic Engineers (IEEE). Essentially, a spanning tree uses the spanning-tree algorithm (STA), which senses that the switch has more than one way to communicate with a node, determines which way is best and blocks out the other path (s). The cool thing is that it keeps track of the other path(s), just in case the primary path is unavailable.

Here's how STP works:

- Each switch is assigned a group of IDs, one for the switch itself and one for each port on the switch. The switch's identifier, called the bridge ID (BID), is 8 bytes long and contains a bridge priority (2 bytes) along with one of the switch's MAC addresses (6 bytes). Each port ID is 16 bits long with two parts: a 6-bit priority setting and a 10-bit port number.
- A path cost value is given to each port. The cost is typically based on a guideline established as part of 802.1d. According to the original specification, cost is 1,000 Mbps (1 gigabit per second) divided by the bandwidth of the segment connected to the port. Therefore, a 10 Mbps connection would have a cost of (1,000 / 10) 100.

To compensate for the speed of networks increasing beyond the gigabit range, the standard cost has been slightly modified. The new cost values are:

Bandwidth	STP Cost Value	Bandwidth	STP Cost Value
4 Mbps	250	155 Mbps	14
10 Mbps	100	622 Mbps	6
16 Mbps	62	1 Gbps	4
45 Mbps	39	2 Gbps	3
100 Mbps	19	10 Gbps	2

You should also note that the path cost can be an arbitrary value assigned by the network administrator, instead of one of the standard cost values.

- Each switch begins a discovery process to choose which network paths it should use for each segment. This information is shared between all the switches by way of special network frames called bridge protocol data units (BPDU). The parts of a BPDU are:
- **Root BID** — This is the BID of the current root bridge.
- **Path cost to root bridge** — This determines how far away the root bridge is. For example, if the data has to travel over three 100-Mbps segments to reach the root bridge, then the cost is (19 + 19 + 0) 38. The segment attached to the root bridge will normally have a path cost of zero.
- **Sender BID** — This is the BID of the switch that sends the BPDU.
- **Port ID** — This is the actual port on the switch that the BPDU was sent from.

All of the switches are constantly sending BPDUs to each other, trying to determine the best path between various segments. When a switch receives a BPDU (from another switch) that is better than the one it is broadcasting for the same segment, it will stop broadcasting its BPDU out that segment. Instead, it will store the other switch's BPDU for reference and for broadcasting out to inferior segments, such as those that are farther away from the root bridge.

A root bridge is chosen based on the results of the BPDU process between the switches. Initially, every switch considers itself the root bridge. When a switch first powers up on the network, it sends out a BPDU with its own BID as the root BID. When the other switches receive the BPDU, they compare the BID to the one they already have stored as the root BID. If the new root BID has a lower value, they replace the saved one. But if the saved root BID is lower, a BPDU is sent to the new switch with this BID as the root BID. When the new switch receives the BPDU, it realizes that it is not the root bridge and replaces the root BID in its table with the one it just received. The result is that the switch that has the lowest BID is elected by the other switches as the root bridge.

Based on the location of the root bridge, the other switches determine which of their ports has the lowest path cost to the root bridge. These ports are called root ports, and each switch (other than the current root bridge) must have one.

The switches determine who will have designated ports. A designated port is the connection used to send and receive packets on a specific segment. By having only one designated port per segment, all looping issues are resolved!

Designated ports are selected based on the lowest path cost to the root bridge for a segment. Since the root bridge will have a path cost of «0», any ports on it that are connected to segments will become designated ports. For the other switches, the path cost is compared for a given segment. If one port is determined to have a lower path cost, it becomes the designated port for that segment. If two or more ports have the same path cost, then the switch with the lowest BID is chosen.

Once the designated port for a network segment has been chosen, any other ports that connect to that segment become non-designated ports. They block network traffic from taking that path so it can only access that segment through the designated port.

Each switch has a table of BPDUs that it continually updates. The network is now configured as a single spanning tree, with the root bridge as the trunk and all the other switches as branches. Each switch communicates with the root bridge through the root ports, and with each segment through the designated ports, thereby maintaining a loop-free network. In the event that the root bridge begins to fail or have network problems, STP allows the other switches to immediately reconfigure the network with another switch acting as root bridge. This amazing process gives a company the ability to have a complex network that is fault-tolerant and yet fairly easy to maintain.

Essential vocabulary (13), (14)

Words

assign *v*	loop *n*	sense *v*
BPDU	looping *n*	severe *adj*
continually *adv*	modify *v*	specification *n*
elect *v*	range *n*	STA
essentially *adv*	rebroadcast *v*	STP
fault-tolerant *adj*	reconfigure *v*	thereby *adv*
flood *v*	reference *n*	therefore *senconnector*

guideline *n*	resolve *v*	unavailable *adj*
identifier *n*	result in *v*	value *n*

Word Combinations

broadcast storm	arbitrary value
severe network congestion	root bridge
spanning tree	inferior segment
spanning tree algorithm / protocol	root BID
unwanted side effect	root port
to keep track of smth.	designated / non-designated port
primary path	to block smth. from doing smth.
bridge / port ID	a loop-free network
path cost	in the event

EXERCISES

1. Find in parts 13 and 14 of the text English equivalents for the following words and phrases:

быть соединенным в контур; лавинно распространять пакет; вызывать «широковещательный шторм»; приводить к сильной перегрузке сети; предотвращать нежелательные побочные эффекты; чтобы предотвратить всплеск широковещательных пакетов; создать протокол покрывающего дерева; стандартизировать в качестве спецификации 802.1d; Институт инженеров по электротехнике и электронике; использовать алгоритм покрывающего дерева; отслеживать другие маршруты; на тот случай, если основной маршрут недоступен; присваивать группу идентификаторов; 10-битовый номер порта; значение цены маршрута; согласно первоначальной спецификации ... ; вырасти за пределы гигабитного диапазона; немного изменять; пропускная способность; произвольное значение, присвоенное сетевым администратором; протокольные блоки данных моста; определять наилучший маршрут между различными сегментами; передавать нижележащим сегментам; выбирать, основываясь на результатах обработки; в начале; считать себя; выбирать в качестве основного моста; основываясь на месторасположении основного моста; определять, какой из портов имеет наименьшую цену маршрута; назначенные порты; разрешать проблему образования контуров; становиться необозначенным портом; блокировать сетевой трафик; непрерывно обновлять; иметь сложную, отказоустойчивую сеть; довольно легко обслуживать.

2. Transcribe and learn to read the following words:

standardize, specification, primary, assigned, priority, guideline, slightly, determine, designated, fault-tolerant.

3. Write the Past Indefinite and the Past Participle of the verbs:

locate, discover, flood, cause, prevent, block, modify, note, choose, broadcast, store, become.

4. Find in parts 13 and 14 of the text antonyms to the following words and word combinations:

to conceal, unlikely, with delay, slight, to facilitate, necessary, to let through, accessible, to decrease, to maintain, to detach, superior, with a loop, error-prone.

5. Give all possible derivatives of the following words. Use dictionary if necessary.

To prevent, to communicate, original, to divide, to modify, initial, to designate, tolerant.

6. Write the expansions of the following abbreviations and learn them:

DEC, STP, IEEE, STA, ID, BID, BPDU.

7. Match the words on the left with their definitions on the right.

1. Broadcast storm	a) A switch that has the lowest BID.
2. Congestion	b) A detailed description of something.
3. Spanning tree	c) A network broadcast that causes multiple hosts to respond simultaneously, overloading the network.
4. Specification	d) The connection used to send and receive packets on a specific segment.
5. Inferior segment	e) The connection that has the lowest path cost to the root bridge.
6. Root bridge	f) The condition of a network when the current load approaches or exceeds the available

	resources and bandwidth designed to handle that load at a particular location in the network.
7. Root port	g) A part of a network that is farther away from the root bridge.
8. Designated port	h) A method of creating a network topology that does not contain any loops and provides redundancy in case of a network fault or problem.

8. Translate the passages in writing.

A) Each switch will take the packet sent by the other switch and flood it back out again immediately, since they still don't know who Node A is. Switch A will receive the packet from each segment and flood it back out on the other segment. This causes a broadcast storm as the packets are broadcast, received and re-broadcast by each switch, resulting in potentially severe network congestion.

B) Essentially, a spanning tree uses the spanning-tree algorithm (STA), which senses that the switch has more than one way to communicate with a node, determines which way is best and blocks out the other path (s). The cool thing is that it keeps track of the other path(s), just in case the primary path is unavailable.

C) A path cost value is given to each port. The cost is typically based on a guideline established as part of 802.1d. According to the original specification, cost is 1,000 Mbps (1 gigabit per second) divided by the bandwidth of the segment connected to the port.

D) The network is now configured as a single spanning tree, with the root bridge as the trunk and all the other switches as branches. Each switch communicates with the root bridge through the root ports, and with each segment through the designated ports, thereby maintaining a loop-free network.

9. Answer the following questions using the information from parts 13 and 14 of the text.

1. What causes a broadcast storm? 2. What did DEC create to prevent broadcast storms and other unwanted side effects of looping? 3. What is the function of the spanning-tree algorithm? 4. How long is the bridge ID and what does it contain? 5. What is given to each port? 6. How is the path cost value calculated

according to the original specification? 7. What does each switch begin a discovery process for? 8. How do we call special network frames by way of which information is shared between all the switches? 9. What are the parts of a BPDU? 10. What does path cost to root bridge determine? 11. How is a root bridge chosen? 12. What ports are called root ports? 13. What is the difference between designated ports and non-designated ones? 14. What does STP do in case the root bridge begins to fail or have network problems?

10. Look through parts 13 and 14 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. With all of the switches connected in a loop, a packet from a node could quite possibly come to a switch from two different segments. ☐
2. Receiving the packet from each segment and flooding it back out on the other segment eliminates a broadcast storm. ☐
3. To prevent broadcast storms and other unwanted side effects of looping, Microsoft Corporation created the spanning-tree protocol. ☐
4. A spanning tree uses the error-correction algorithm, which senses that the switch has more than one way to communicate with a node. ☐
5. The bridge ID is 10 bytes long and contains only the switch's MAC address. ☐
6. According to the original specification, path cost is 1,000 Mbps divided by the bandwidth of the segment connected to the path. ☐
7. The path cost is always one of the standard cost values and cannot be an arbitrary value assigned by the network administrator. ☐
8. All of the switches are constantly sending BPDUs to each other, trying to determine the best path between various segments. ☐
9. The switch that has the highest BID is elected by the other switches as the root bridge. ☐
10. Each switch communicates with the root bridge through the root ports, and with each segment through the non-designated ports. ☐

11. Make summary of parts 13 and 14 of the text.

12. Read the text and insert articles where necessary. Give definitions to the word combinations in bold type.

Spanning Trees

Spanning trees are ... standard technique used in local area network (LAN) switching. ... Spanning tree algorithms were developed to prevent redundant transmission of data along intermediate hops between ... source and destination host on ... **mesh network topology**. Without spanning trees, ... mesh network can be flooded and rendered unusable by ... messages circulating in ... **infinite loop** between hosts.

... primary Spanning Tree Protocol (STP) is IEEE standard 802,1D, an algorithm commonly used on ... Ethernet networks. This algorithm works by limiting the paths messages can travel at any given time to ... fully connected tree rather than ... mesh. As hosts join and leave ... network, this protocol dynamically updates the tree accordingly.

... variant of STP called Rapid Spanning Tree Protocol (RSTP) is also now part of ... IEEE standard and is the recommended version for use today. RSTP improves ... performance of spanning tree updates when the network configuration changes.

(By Bradley Mitchell)

13. Read the following text and fill in words from the box. Each word can be used once only.

directs	difference	interface
assigns	signals	transmits
half-duplex	antenna	mode
firewall	eavesdropping	device
software	trick	broadcasts
accommodates	increase	cost
arrive		

A Networking Switch

1. A networking switch is the central ... in a wired or wireless LAN (local area network). It receives ... from each computer on the network via Ethernet cables in a wired network or radio waves in a wireless LAN. In both cases, the networking switch ... traffic across the LAN, enabling the computers to talk to each other and share resources.

2. All computers included in the LAN must contain a network … card (NIC). The card … a unique address to the machine in which it is installed. This address is called a MAC (Medium Access Control). A wired NIC … an Ethernet cable, which runs to a port on the back of the networking switch. If the NIC is wireless, the card will feature a small … instead of an Ethernet port. The antenna … signals to the wireless networking switch, which also bears an antenna rather than ports. Whether wireless or wired, the networking switch acts as a relay, reading traffic packets as they … from the various machines and directing the packets to the proper MAC address.

3. A networking switch runs in full-duplex … , meaning a machine on the LAN can receive and transmit data simultaneously. This is much faster than a networking hub, an alternate device that serves the same purpose as a switch but operates in … mode, allowing each machine or node either to send or receive at any given time. Another key … between a networking switch and a hub is that the switch sends traffic discriminately, using addresses to direct traffic packets exactly where they are supposed to go. Conversely, a networking hub … all traffic on the network to all nodes, relying on filters within each machine to discard packets not addressed to it. This makes networks that use a hub particularly vulnerable to «packet sniffers» or … .

4. For the above reasons, a networking switch is considered superior to a networking hub. However, a networking switch is also not foolproof. It can be «tricked» into accommodating packet sniffers, but the methods used to … the switch will leave telltale traffic signatures, unlike the passive methods that can be used on a hub. Anti-sniffing … can be installed on a switched network to detect packet sniffers.

5. Network switches are inexpensive devices that … in price with the number of ports featured. A basic Ethernet networking switch might come with five ports at a … of about US$30. For those with cable modem or DSL service, a broadband router with a built-in switch and … can be used in lieu of a stand-alone networking switch.

(By Bradley Mitchell)

Skip through the text above and match each paragraph with the appropriate summary.

a) A network switch allows each machine to send and receive data at the same time. ☐
b) A networking switch is a rather cheap device and can be purchased for about US$30. ☐
c) A networking switch directs traffic across a LAN. ☐
d) NIC and MAC address are essential elements of any computers included in a LAN. ☐
e) A networking switch is also not foolproof and can be tricked. ☐

14. Render the following text in English.

Поддержка алгоритма Spanning Tree.

Алгоритм покрывающего дерева позволяет коммутаторам автоматически определять древовидную конфигурацию связей в сети при произвольном соединении портов между собой. Как уже отмечалось, для нормальной работы коммутатора требуется отсутствие замкнутых маршрутов в сети. Эти маршруты могут создаваться администратором специально для образования резервных связей или же возникать случайным образом, что вполне возможно, если сеть имеет многочисленные связи, а кабельная система плохо структурирована или документирована.

Поддерживающие алгоритм STA коммутаторы автоматически создают активную древовидную конфигурацию связей (т. е. связную конфигурацию без петель) на множестве всех связей сети. Такая конфигурация называется покрывающим деревом (иногда ее называют основным деревом), и ее название дало имя всему алгоритму. Алгоритм покрывающего дерева описан в стандарте IEEE 802.1d, том же стандарте, который определяет принципы работы прозрачных мостов.

Коммутаторы находят покрывающее дерево адаптивно, с помощью обмена служебными пакетами. Реализация в коммутаторе алгоритма STA очень важна для работы в больших сетях — если коммутатор не поддерживает этот алгоритм, то администратор должен самостоятельно определить, какие порты нужно перевести в заблокированное состояние, чтобы исключить петли. К тому же при отказе какого-либо кабеля, порта или коммутатора администратор должен, во-первых, обнаружить факт отказа, а во-вторых, ликвидировать последствия отказа, переведя резервную связь в рабочий режим путем активизации некоторых портов. При поддержке коммутаторами сети протокола покрывающего дерева отказы обнаруживаются автоматически, за счет постоянного тестирования связности сети служебными пакетами. После обнаружения потери связности, протокол строит новое покрывающее дерево, если это возможно, и сеть автоматически восстанавливает работоспособность.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 19

RELATIVE CLAUSES WITH A PARTICIPLE

We can use relative clauses with a participle to provide a lot of information about a noun using as few words as possible.

Study these examples.

1. A network is a group of computers *connected* together ... .
2. The MAC address *made up* of two equal parts is 6 bytes long.
3. Information *sent* from a node travels along the backbone ... .
4. A switch *speeding* things *up* is another fundamental part ... .
5. We'll focus on Ethernet networks *using* LAN switches.

1. We can use the passive participle as in examples 1, 2 and 3.

1. A network is a group of computers **connected** together ... (= computers *which are connected* together ...).

2. The MAC address *made up* of two equal parts is 6 bytes long. (= The MAC address *which is made up* ...).

3. Information *sent* from a node travels along the backbone ... (= Information *which is sent* from ...).

2. We can use the active participle as in examples 4 and 5.

4. A switch *speeding* things *up* is another fundamental part ... (= A switch *which speeds* things *up* ...).

5. We'll focus on Ethernet networks *using* LAN switches. (= ... Ethernet networks *which use* LAN switches).

15. Complete these definitions with the correct participle of the verb given in brackets.

1. A *LAN switch* is a switch (provide) a separate connection for each node.

2. A *bridge* is a hardware and software combination (use) to connect the same type of networks.

3. A *node* is a computer (connect) to the network.

4. A *router* is a special computer (direct) messages when several networks are linked.

5. A *segment* is any portion of a network (separate) by a switch, bridge or router.

6. A *LAN* is a network (connect) computers over a small distance such as within a company.

7. A *unicast* is a transmission (address) specifically to another node.

8. A *client* is a network computer (use) for accessing a service on a server.

9. A *broadcast* is a packet (intend) for transmission to all other nodes on the network.

10. A *hub* is an electronic device (connect) all the data cabling in a network.

11. A *gateway* is an interface (enable) dissimilar networks to communicate.

12. *Token ring* is a networks technology (develop) by IBM.

13. A *backbone* is a network transmission path (handle) major data traffic.

14. *FDDI* is a token-passing technology (operate) over a pair of fiber optic rings.

15. A *network* is a number of computers and peripherals (link) together.

16. *ATM* is a network technology (be) able to attach many different devices with high reliability and at high speeds.

17. A *server* is a powerful computer (store) many programs (share) by all the clients in the network.

18. A *thin client* is a simple computer (comprise) a processor and memory, display, keyboard, mouse and hard drives only.

16. Link these statements using a relative clause with a participle.

1. a) You only need one network printer.
   b) It is connected to the server.
2. a) The technology is here today.
   b) It is needed to set up a home network.

3. a) She created the site using a program called Netscape Composer.
b) It is contained in Netscape Communicator.
4. a) There is a line receiver in the living room.
b) It delivers home entertainment audio to speakers.
5. a) Eve has designed a site.
b) It is dedicated to dance.
6. a) She has built in links.
b) They connect her site to other dance sites.
7. a) Her house has a network.
b) It allows basic file-sharing and multi-player gaming.
8. a) At the centre of France Telecom's home of tomorrow is a network.
b) It is accessed through a Palm Pilot-style control pad.
9. a) The network can simulate the owner's presence.
b) This makes sure vital tasks are carried out in her absence.
10. a) The house has an electronic door-keeper.
b) It is programmed to recognize you.
c) This gives access to family only.

UNIT 20

PART 15. ROUTERS AND LAYER 3 SWITCHING

While most switches operate at the Data layer (Layer 2) of the OSI Reference Model, some incorporate features of a router and operate at the Network layer (Layer 3) as well. In fact, a Layer 3 switch is incredibly similar to a router.

When a router receives a packet, it looks at the Layer 3 source and destination addresses to determine the path the packet should take. A standard switch relies on the MAC addresses to determine the source and destination of a packet, which is Layer 2 (Data) networking.

The fundamental difference between a router and a Layer 3 switch is that Layer 3 switches have optimized hardware to pass data as fast as Layer 2 switches, yet they make decisions on how to transmit traffic at Layer 3, just like a router. Within the LAN environment, a Layer 3 switch is usually faster than a router because it is built on switching hardware. In fact, many of Cisco's Layer 3 switches are actually routers that operate faster because they are built on «switching» hardware with customized chips inside the box.

The pattern matching and caching on Layer 3 switches is similar to the pattern matching and caching on a router. Both use a routing protocol and routing table to determine the best path. However, a Layer 3 switch has the ability to reprogram the hardware dynamically with the current Layer 3 routing information. This is what allows for faster packet processing.

On current Layer 3 switches, the information received from the routing protocols is used to update the hardware caching tables.

As networks have grown in size and complexity, many companies have turned to virtual local area networks (VLANs) to provide some way of structuring this growth logically. Basically, a VLAN is a collection of nodes that are grouped together in a single broadcast domain that is based on something other than physical location.

You learned about broadcasts earlier, and how a router does not pass along broadcasts. A broadcast domain is a network (or portion of a network) that will receive a broadcast packet from any node located within that network. In a typical network, everything on the same side of the router is all part of the same broadcast domain. A switch that you have implemented VLANs on has multiple broadcast domains, similar to a router. But you still need a router (or Layer 3 routing engine) to route from one VLAN to another — the switch can't do this by itself.

Here are some common reasons why a company might have VLANs.

- **Security** — Separating systems that have sensitive data from the rest of the network decreases the chances that people will gain access to information they are not authorized to see.
- **Projects / Special applications** — Managing a project or working with a specialized application can be simplified by the use of a VLAN that brings all of the required nodes together.
- **Performance / Bandwidth** — Careful monitoring of network use allows the network administrator to create VLANs that reduce the number of router hops and increase the apparent bandwidth for network users.
- **Broadcasts / Traffic flow** — Since a principle element of a VLAN is the fact that it does not pass broadcast traffic to nodes that are not part of the VLAN, it automatically reduces broadcasts. Access lists provide the network administrator with a way to control who sees what network traffic. An access list is a table the network administrator creates that lists which addresses have access to that network.
- **Departments / Specific job types** — Companies may want VLANs set up for departments that are heavy network users (such as multimedia or engineering), or a VLAN across departments that is dedicated to specific types of employees (such as managers or sales people).

You can create a VLAN using most switches simply by logging into the switch via Telnet and entering the parameters for the VLAN (name, domain and port assignments). After you have created the VLAN, any network segments connected to the assigned ports will become part of that VLAN.

While you can have more than one VLAN on a switch, they cannot communicate directly with one another on that switch. If they could, it would defeat the purpose of having a VLAN, which is to isolate a part of the network. Communication between VLANs requires the use of a router.

VLANs can span multiple switches, and you can have more than one VLAN on each switch. For multiple VLANs on multiple switches to be able to communicate via a single link between the switches, you must use a process called trunking — trunking is the technology that allows information from multiple VLANs to be carried over a single link between switches.

In the next part, you'll learn about trunking.

PART 17. VLAN TRUNKING PROTOCOL

The VLAN trunking protocol (VTP) is the protocol that switches use to communicate among themselves about VLAN configuration.

In figure 18, each switch has two VLANs. On the first switch, VLAN A and VLAN B are sent through a single port (trunked) to the router and through another port to the second switch. VLAN C and VLAN D are trunked from the second switch to the first switch, and through the first switch to the router. This trunk can carry traffic from all four VLANs. The trunk link from the first switch to the router can also carry all four VLANs. In fact, this one connection to the router allows the router to appear on

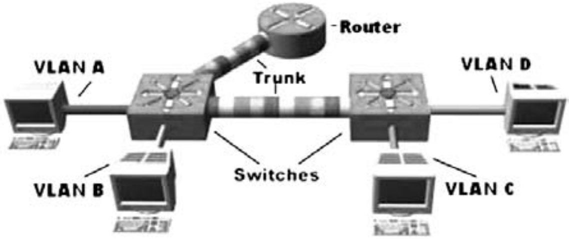


Fig. 18
Trunk line connects four VLANs

all four VLANs, as if it had four different physical ports connected to the switch.

The VLANs can communicate with each other via the trunking connection between the two switches using the router. For example, data from a computer on VLAN A that needs to get to a computer on VLAN B (or VLAN C or VLAN D) must travel from the switch to the router and back again to the switch. Because of the transparent bridging algorithm and trunking, both PCs and the router think that they are on the same physical segment!

As you can see, LAN switches are an amazing technology that can really make a difference in the speed and quality of a network.

(By Jeff Tyson)

Essential vocabulary (15), (16), (17)

Words

assignment *n*
basically *adv*
defeat *v*
hop *n*
incorporate *v*
incredibly *adv*
isolate *v*
pattern *n*
reprogram *v*
separate (from) *v*
span *v*
Telnet
trunk *n*
trunking *n*
turn to *v*
VLAN
VTP

Word Combinations

Layer 3 switch / switching
to make decisions on smth.
customized chip
pattern matching
routing protocol / table / engine
broadcast domain
physical location
sensitive data
to be authorized to do smth.
to gain access
careful monitoring
traffic flow
access list
heavy network user
VLAN trunking protocol
trunking connection
trunk link

EXERCISES

1. Find in parts 15, 16 and 17 of the text English equivalents for the following words and phrases:

коммутация третьего уровня; включать в себя функции маршрутизатора; быть чрезвычайно похожим на что-л.; определять маршрут; основное отличие между маршрутизатором и коммутатором третьего уровня заключается в том, что ... ; принимать решения на счет чего-л.; основываться на чем-л.; использовать таблицу маршрутизации; определять наилучший маршрут; иметь возможность динамично перепрограммировать оборудование; более быстрая обработка пакетов; увеличиваться в размерах; обращаться к виртуальным локальным сетям; совокупность узлов; один домен широковещательной рассылки; основываться на фактическом месторасположении; передавать; обладать незащищенными данными; уменьшать вероятность; получить доступ; работать со специализированным приложением; сводить вместе; производительность; тщательный мониторинг использования сети; уменьшать количество транзитов; поток трафика; создавать списки доступа; предоставлять сетевому администратору возможность контролировать трафик; крупные пользователи сети; предназначенный для определенных сотрудников; вводить параметры; изолировать часть сети; магистральный протокол виртуальной локальной сети; транковое соединение; благодаря алгоритму прозрачной маршрутизации; качество сети.

2. Transcribe and learn to read the following words:

feature, source, decision, dynamically, virtual, authorized, decrease (v), require, employee, assignment, isolate, trunking, quality.

3. Write the Past Indefinite and the Past Participle of the verbs:

incorporate, build, receive, route, gain, simplify, reduce, see, create, defeat, appear, get.

4. Find in parts 15, 16 and 17 of the text antonyms to the following words and word combinations:

to exclude, ordinarily, diverse, destination address, to destroy, the worst, incapacity, statically, simplicity, real, unsafety, heedless, to combine, to vanish.

5. Give all possible derivatives of the following words. Use dictionary if necessary.

To transmit, complex, to authorize, to simplify, to employ, to appear, access.

6. Write the expansions of the following abbreviations and learn them:

VLAN, Telnet, VTP.

7. Below you can see definitions with one word missing in each of them. Use these words to fill in the gaps.

a) network	d) signal	g) segments
b) permission	e) value	h) sequence
c) link	f) usage	

1. *Source* — a point where a transmitted ... enters a network.
2. *VLAN* — a local area network consisting of groups of hosts that are on physically different ... but that communicate as though they were on the same wire.
3. *Broadcast domain* — a ... (or part of a network) that receives a broadcast packet from any node located within the network.
4. *Monitoring software* — a program or set of programs used to oversee networks for the purpose of tracking ... or identifying, reporting on, and solving problems at the earliest possible stage.
5. *Access list* — a table that contains information about which users or groups have ... to access the network.
6. *Trunking* — a technique for combining two or more Ethernet connections into one logical ... , or trunk, between two devices. It is used to increase the bandwidth capacity of connections and to make these connections more resilient.
7. *Algorithm* — a finite ... of steps for solving a logical or mathematical problem or performing a task.
8. *Assignment* — the process of setting a variable equal to a ... or string or character.

8. Translate the passages in writing.

A) The fundamental difference between a router and a Layer 3 switch is that Layer 3 switches have optimized hardware to pass data as fast as Layer 2 switches, yet they make decisions on how to transmit traffic at Layer 3, just like a router. Within the LAN environment, a Layer 3 switch is usually faster than a router because it is built on switching hardware.

B) As networks have grown in size and complexity, many companies have turned to virtual local area networks (VLANs) to provide some way of structuring this growth logically. Basically, a VLAN is a collection of nodes that are grouped together in a single broadcast domain that is based on something other than physical location.

C) While you can have more than one VLAN on a switch, they cannot communicate directly with one another on that switch. If they could, it would defeat the purpose of having a VLAN, which is to isolate a part of the network. Communication between VLANs requires the use of a router.

9. Use the information from parts 15, 16 and 17 of the text to complete the dialogue in your own words.

A : What does a standard switch rely on to determine the source and destination of a packet?

B : …

A : What is the fundamental difference between a router and a Layer 3 switch?

B : …

A : What allows a Layer 3 switch to process packets faster?

B : …

A : As networks grow in size and complexity, what do many companies turn to and why?

B : …

A : What is VLAN?

B : …

A : Could you mention some common reasons why a company might have VLANs?

B : …

A : What is a principle element of a VLAN?

B : …

A : What do we have to use if we require communication between VLANs?

B : …

A : What is trunking? And what is VLAN trunking protocol?

B : …

10. Look through parts 15, 16 and 17 of the text and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Some switches incorporate features of a router and operate at the Network layer as well. ☐
2. A standard switch relies on the MAC address to determine the source and destination of a packet. ☐
3. Layer 3 switches make decisions on how to transmit traffic at Layer 3, just like a router, but they are not as fast as Layer 2 switches. ☐
4. Within the LAN environment, a Layer 3 switch is usually slower than a router because it is built on switching hardware. ☐
5. As networks grow in size and complexity many companies turn to virtual private networks (VPNs) to provide some way of structuring this growth logically. ☐
6. A broadcast domain is a network (or part of a network) that receives a broadcast packet from any node located within that network. ☐
7. A switch can easily route from one VLAN to another and you don't need a router to do so. ☐
8. Separating systems decreases the chances that people will gain access to information they are not authorized to see. ☐
9. For multiple VLANs on multiple switches to be able to communicate via a single link between the switches, you must use a process called forwarding. ☐
10. The VLAN trunking protocol is the protocol that switches use to communicate among themselves about VLAN configuration. ☐

11. Make summary of parts 15, 16 and 17 of the text.

12. Read the text and put the verbs in brackets into the correct tense-aspect form. Be careful with the Passive Voice.

Tell some words about Cell-based VLANs and Frame-based VLANs. Describe three modes of VLAN configuration.

VLANs

The acronym VLAN (to expand) to Virtual Local Area Network. A VLAN (to be) a logical local area network that (to extend) beyond a single traditional LAN to a group of LAN segments, given specific configurations. Because a VLAN (to be) a logical entity, its creation and configuration (to do) completely in software.

Since a VLAN is a software concept, identifiers and configurations for a VLAN must properly (to prepare) for it to function as expected. Frame coloring (to be) the process used to ensure that VLAN members or groups properly (to identify) and (to handle). With frame coloring, packets (to give) the proper VLAN ID at their origin so that they may properly (to process) as they (to pass) through the network. The VLAN ID then (to use) to enable switching and routing engines to make the appropriate decisions as defined in the VLAN configuration.

There (to be) only two types of VLAN possible today, cell-based VLANs and frame-based VLANs.

1. Cell-based VLANs (to use) in ATM switched networks with LAN Emulation (or LANE). LANE (to use) to allow hosts on legacy LAN segments to communicate using ATM networks without having to use special hardware or software modification.

2. Frame-based VLANs (to use) in Ethernet networks with frame tagging. The two primary types of frame tagging (to be) IEEE 802.10 and ISL (Inter Switch Link is a Cisco proprietary frame-tagging). Keep in mind that the 802.10 standard (to make) it possible to deploy VLANs with 802.3 (Ethernet), 802.5 (Token-Ring), and FDDI, but Ethernet (to be) most common.

There (to be) three different modes in which a VLAN can (to configure). These modes (to cover) below:

1. VLAN Switching Mode — The VLAN (to form) a switching bridge in which frames (to forward) unmodified.

2. VLAN Translation Mode — VLAN translation mode (to use) when the frame tagging method (to change) in the network path, or if the frame (to traverse) from a VLAN group to a legacy or native interface which (not to configure) in a VLAN. When the packet is to pass into a native interface, the VLAN tag (to remove) so that the packet can properly enter the native interface.

3. VLAN Routing Mode — When a packet (to route) from one VLAN to a different VLAN, you (to use) VLAN routing mode. The packet (to modify), usually by a router, which (to place) its own MAC address as the source, and then (to change) the VLAN ID of the packet.

(By Bradley Mitchell)

13. Read the text and choose the correct word for each number. Think of a suitable title for the text.

* * *

A switch is something that is used to turn on or off (1) … electronic devices. However, in computer networking, a switch is used to connect (2) … computers with each other. Since it is an external device it becomes part of the hardware peripherals used in the (3) … of a computer system. This connection is done within an existing Local Area Network (LAN) only and is (4) … to an Ethernet hub in terms of appearance except with more intelligence. These switches not only receive data packets, but also have the ability to inspect them before passing them on to the next computer. That is, they can figure out the source, the contents of the data, and (5) … the destination as well. Because of this (6) … , it sends the data to the relevant connected system only, thereby using less bandwidth at high performance rates.

The wires in a crossover cable are «crossed» so that output signals from the (7) … device are properly sent as input signals to the receiving end. An Ethernet switch can be thought of as a device that makes (8) … crossover cable connections between computers that want to communicate. Just like crossover cables, switches do not (9) … from the problem of collisions. However, it should be noted that the (10) … cables used are «straight through». The crossover function is done inside of the switch.

Since (11) … wires are used for sending and receiving, switches support operation in full duplex mode. This mode allows devices to send and receive data at the same time.

As mentioned above, switches are (12) … devices that can read the data packets that pass through them. By storing the MAC address of each host and its (13) … port in a table, switches ensure that bandwidth is not wasted by intelligently directing traffic. Hubs are dumb devices that do not do any (14) … .

Unlike hubs, switches are modern, fast, and support full-duplex operation. In short, they are (15) … better.

(By Bradley Mitchell)

(1) a) variously; b) various; c) variable.
(2) a) multiple; b) multiply; c) multiplication.
(3) a) operability; b) operate; c) operation.

(4) a) identically; b) identical; c) identification.
(5) a) identity; b) identifier; c) identify.
(6) a) uniqueness; b) unique; c) uniquely.
(7) a) transmitting; b) transmitted; c) transmission.
(8) a) temporarily; b) temporariness; c) temporary.
(9) a) suffered; b) suffer; c) suffering.
(10) a) actually; b) actuality; c) actual.
(11) a) separately; b) separator; c) separate.
(12) a) intelligent; b) intelligence; c) intelligently.
(13) a) correspondence; b) correspondent; c) corresponding.
(14) a) processing; b) process; c) procession.
(15) a) most; b) more; c) much.

14. Render the following text in English.

Виртуальные локальные сети

Кроме своего основного назначения — повышения пропускной способности связей в сети — коммутатор позволяет локализовать потоки информации в сети, а также контролировать эти потоки и управлять ими, опираясь на механизм пользовательских фильтров. Однако пользовательский фильтр может запретить передачи кадров только по конкретным адресам, а широковещательный трафик он передаёт всем сегментам сети. Так требует алгоритм работы моста, который реализован в коммутаторе, поэтому сети, созданные на основе мостов и коммутаторов, иногда называют плоскими — из-за отсутствия барьеров на пути широковещательного трафика.

Технология виртуальных локальных сетей, которая появилась несколько лет тому назад в коммутаторах, позволяет преодолеть указанное ограничение. Виртуальной сетью называется группа узлов сети, трафик которой, в том числе и широковещательный, на канальном уровне полностью изолирован от других узлов сети. Это означает, что передача кадров между разными виртуальными сетями на основании адреса канального уровня невозможна, независимо от типа адреса – уникального, группового или широковещательного. В то же время внутри виртуальной сети кадры передаются по технологии коммутации, то есть только на тот порт, который связан с адресом назначения кадра. Виртуальные сети могут пересекаться, если один или несколько компьютеров входят в состав более чем одной виртуальной сети.

Назначение технологии виртуальных сетей состоит в облегчении процесса создания изолированных сетей, которые затем должны связываться с помощью маршрутизаторов, реализующих какой-либо протокол сетевого уровня, например IP. Такое построение сети создает гораздо более мощные барьеры на пути ошибочного трафика из одной сети в другую. Сегодня считается, что любая крупная сеть должна включать маршрутизаторы, иначе потоки ошибочных кадров, например широковещательных, будут периодически затапливать всю сеть через прозрачные для них коммутаторы, приводя ее в неработоспособное состояние.

(Олифер В. Г., Олифер Н. А.
«Компьютерные сети.
Принципы, технологии, протоколы»)

LANGUAGE FOCUS 20

WARNINGS

Warnings are used to ensure safety, to prevent damage to equipment and breaches of security, and to ensure the law is not broken.

1. The simplest warnings are basic instructions NOT to do something:

Don't do X.	Avoid Xing.
No Xing.	Never do X.

2. Sometimes the warning is twinned with matching good practice:

Always do Y; never do X.
Do Y rather than doing X.

3. Warnings may be made stronger by using *must* / *must not* and in some cases *should* / *should not*. For example:

The wire linking a static earthing band to earth *must* contain a resistor of at least 1 megohm.

4. If there is any reason to fear the warning may not be understood, a reason for the warning may be added. For example:

Never remove ICs with a screwdriver. *The pins are very fragile.*

15. Rewrite each of these warnings according to the prompt. Add a reason to the warning where you think it appropriate.

1. Never give out your home address or phone number.

Always …

2. You must not use your own floppies on these machines.

Never …

3. This appliance must be earthed.

Never …

4. Avoid giving financial information in a chat room.

Don't …

5. Never give out your password.

Always …

6. Avoid turning off main power while computer is running.

Don't …

7. Never use a computer that has been standing for a long time in a cold environment without waiting until it has reached normal room temperature.

Always …

8. No Coffee in this lab.

… must not …

9. No smoking, eating or drinking at the computer.

Never …

10. Always ensure the power is switched off when working on a computer.

… must not …

11. Don't give open access to PCs.

Avoid …

12. It is an offence to make unauthorized access to computer material.

... must not …

13. Cards must not be removed from their anti-static packing until required.

Never …

14. Don't use out-of-date anti-virus software.

Use …

15. A machine which has been exposed to a moist atmosphere should be given time to dry out before being put into use.

Always …

16. Use an IC extraction tool; don't use a screwdriver.

… rather than …

SECTION FOUR

WIRELESS NETWORKS

Wireless network is a network that uses microwaves or radio waves to provide communication channels between computers.
(Webster's New World ^{TM} Hacker Dictionary)

QUIZ 4

If your phone talks through a wireless earpiece and your computer sends songs to speakers across the room, Bluetooth is probably behind it. But what's behind Bluetooth?

1. Bluetooth is:
a) a physical standard for radio signals
b) a standard communications protocol
c) both A and B
2. Bluetooth is named for:
a) Ivan Bluetooth, lead developer Bluetooth technology
b) Harald Bluetooth Gormson, king of Denmark
c) The color and shape of the first Bluetooth receivers
3. Bluetooth operates in the 2,45 gigahertz range of the radio frequency spectrum. ... also use this part of the spectrum.
a) baby monitors and garage door openers
b) AM and FM radios
c) shortwave radios
4. Bluetooth devices communicate using:
a) radio waves
b) infrared light
c) neither A nor B
5. Bluetooth devices have a range of about:
a) 1 meter
b) 10 meters
c) 100 meters

6. Bluetooth can support up to eight simultaneous connections in a 10-meter radius. The devices don't interfere with each other because of:

a) spread-spectrum frequency hopping

b) radio shielding in each device

c) dedicated frequencies for each stream of data

7. A ... is a network established by Bluetooth devices.

a) piconet

b) bluetronet

c) community

8. With your Bluetooth devices in ... mode, other Bluetooth devices can find and make contact with you.

a) connection

b) discoverable

c) locatable

9. Bluetooth devices change frequencies:

a) 5 times per second

b) 100 times per second

c) 1,600 times per second

10. Bluebugging is:

a) twitter via Bluetooth

b) taking over another person's Bluetooth to make calls or send messages

c) eavesdropping using a Bluetooth device

(To find correct answers, see pages 333–334)

UNIT 21

TEXT 1

BLUETOOTH

PART 1. INTRODUCTION TO BLUETOOTH

When you use computers, entertainment systems or telephones, the various pieces and parts of the systems make up a community of electronic devices. These devices communicate with each other using a variety of wires, cables, radio signals and infrared light beams, and an even greater variety of connectors, plugs and protocols.

There are lots of different ways that electronic devices can connect to one another. For example:

- Component cables;
- Electrical wires;
- Ethernet cables;
- WiFi;
- Infrared signals.

The art of connecting things is becoming more and more complex every day. In this article, we will look at a method of connecting devices, called Bluetooth, that can streamline the process. A Bluetooth connection is wireless and automatic, and it has a number of interesting features that can simplify our daily lives.

When any two devices need to talk to each other, they have to agree on a number of points before the conversation can begin. The first point of agreement is physical: Will they talk over wires, or through some form of wireless signals? If they use wires, how many are required — 1, 2, 8, 25? Once the physical attributes are decided, several more questions arise.

- How much data will be sent at a time? For instance, serial ports send data 1 bit at a time, while parallel ports send several bits at once.

- How will they speak to each other? All of the parties in an electronic discussion need to know what the bits mean and whether the message they receive is the same message that was sent. This means developing a set of commands and responses known as a protocol.

Bluetooth offers a solution to the problem.

PART 2. CREATING A CONNECTION

Bluetooth takes small-area networking to the next level by removing the need for user intervention and keeping transmission power extremely low to save battery power. Picture this: You're on your Bluetooth-enabled cell phone, standing outside the door to your house. You tell the person on the other end of the line to call you back in five minutes so you can get in the house and put your stuff away. As soon as you walk in the house, the map you received on your cell phone from your car's Bluetooth-enabled GPS system is automatically sent to your Bluetooth-enabled computer, because your cell phone picked up a Bluetooth signal from your PC and automatically sent the data you designated for transfer. Five minutes later, when your friend calls you back, your Bluetooth-enabled home phone rings instead of your cell phone. The person called the same number, but your home phone picked up the Bluetooth signal from your cell phone and automatically re-routed the call because it realized you were home. And each transmission signal to and from your cell phone consumes just 1 milliwatt of power, so your cell phone charge is virtually unaffected by all of this activity.

Bluetooth is essentially a networking standard that works at two levels:

- It provides agreement at the physical level — Bluetooth is a radio-frequency standard.
- It provides agreement at the protocol level, where products have to agree on when bits are sent, how many will be sent at a time, and how the parties in a conversation can be sure that the message received is the same as the message sent.

The big draws of Bluetooth are that it is wireless, inexpensive and automatic. There are other ways to get around using wires, including infrared communication. Infrared (IR) refers to light waves of a lower frequency than human eyes can receive and interpret. Infrared is used in most television remote control systems.

Infrared communications are fairly reliable and don't cost very much to build into a device, but there are a couple of drawbacks. First, infrared is a «line of sight» technology. For example, you have to point the remote control at the television or DVD player to make things happen. The second drawback is that infrared is almost always a «one-to-one» technology. You can send data between your desktop computer and your laptop computer, but not your laptop computer and your PDA at the same time.

These two qualities of infrared are actually advantageous in some regards. Because infrared transmitters and receivers have to be lined up with each other, interference between devices is uncommon. The one-to-one nature of infrared communications is useful in that you can make sure a message goes only to the intended recipient, even in a room full of infrared receivers.

Bluetooth is intended to get around the problems that come with infrared systems. The older Bluetooth 1.0 standard has a maximum transfer speed of 1 megabit per second (Mbps), while Bluetooth 2.0 can manage up to 3 Mbps. Bluetooth 2.0 is backward-compatible with 1.0 devices.

Let's find out how Bluetooth networking works.

PART 3. BLUETOOTH OPERATION

Bluetooth networking transmits data via low-power radio waves. It communicates on a frequency of 2.45 gigahertz (actually between 2.402 GHz and 2.480 GHz, to be exact). This frequency band has been set aside by international agreement for the use of industrial, scientific and medical devices (ISM).

A number of devices that you may already use take advantage of this same radio-frequency band. Baby monitors, garage-door openers and the newest generation of cordless phones all make use of frequencies in the ISM band. Making sure that Bluetooth and these other devices don't interfere with one another has been a crucial part of the design process.

One of the ways Bluetooth devices avoid interfering with other systems is by sending out very weak signals of about 1 milliwatt. By comparison, the most powerful cell phones can transmit a signal of 3 watts. The low power limits the range of a Bluetooth device to about 10 meters (32 feet), cutting the chances of interference between your computer system and your portable telephone or television. Even with the low power, Bluetooth doesn't require line of sight between communicating devices. The walls in your house won't stop a Bluetooth signal, making the standard useful for controlling several devices in different rooms.

Bluetooth can connect up to eight devices simultaneously. With all of those devices in the same 10-meter (32-foot) radius, you might think they'd interfere with one another, but it's unlikely. Bluetooth uses a technique called spread-spectrum frequency hopping that makes it rare for more than one device to be transmitting on the same frequency at the same time. In this technique, a device will use 79 individual, randomly chosen frequencies within a designated range, changing from one to another on a regular basis. In the case of Bluetooth, the transmitters change frequencies 1,600 times every second, meaning that more devices can make full use of a limited slice of the radio spectrum. Since every Bluetooth transmitter uses spread-spectrum transmitting automatically, it's unlikely that two transmitters will be on the same frequency at the same time. This same technique minimizes the risk that portable phones or baby monitors will disrupt Bluetooth devices, since any interference on a particular frequency will last only a tiny fraction of a second.

When Bluetooth-capable devices come within range of one another, an electronic conversation takes place to determine whether they have data to share or whether one needs to control the other. The user doesn't have to press a button or give a command — the electronic conversation happens automatically. Once the conversation has occurred, the devices — whether they're part of a computer system or a stereo — form a network. Bluetooth systems create a personal-area network (PAN), or piconet, that may fill a room or may encompass no more distance than that between the cell phone on a belt-clip and the headset on your head. Once a piconet is established, the members randomly hop frequencies in unison so they stay in touch with one another and avoid other piconets that may be operating in the same room. Let's check out an example of a Bluetooth-connected system.

Essential vocabulary (1), (2), (3)

Words

advantageous *adj*	get around *v*	range *n*
agree (on) *v*	hop *v*	reliable *adj*

arise *v*
attribute *n*
belt-clip *n*
Bluetooth *n*
connector *n*
consume *v*
crucial *adj*
disrupt *v*
draw *n*
drawback *n*
frequency *n*
inexpensive *adj*
interfere *v*
interference *n*
intervention *n*
milliwatt *n*
minimize *v*
piconet *n*
plug *n, v*
point (at) *v*
quality *n*
randomly *adv*
response *n*
set aside (for) *v*
simultaneously *adv*
streamline *v*
stuff *n*
technique *n*
unison *n*
virtually *adv*
wireless *adj*
ISM
PAN

Word Combinations

to make up a community	a remote control (system)
an infrared light beam	to build into a device
infrared signals / communication	«line of sight» technology
a physical attribute	«one to one» technology
a serial / parallel port	to be advantageous in some regards
to develop a set of commands	to be backward-compatible with smth.
to offer a solution to the problem	low-power radio waves
small-area networking	to communicate on a frequency of ...
to save battery power	frequency band
to keep smth. extremely low	to take advantage of smth.
Bluetooth-enabled cell phone / GPS system / computer	to avoid interfering with smth.
to be on cell phone	to limit the range of smth. to smth.
to pick up a Bluetooth signal	to cut the chances of smth.
to designate for transfer	to require line of sight between smth.
cell phone charge	spread-spectrum frequency hopping
to stay in touch with smth.	a limited slice of the radio spectrum
to be on the same frequency at the same time	to provide agreement at the physical / protocol level
	to create a personal-area network

EXERCISES

1. Find in parts 1, 2 and 3 of text 1 English equivalents for the following words and phrases:

инфракрасные световые лучи; модернизировать процесс; упрощать нашу повседневную жизнь; договариваться по некоторым вопросам; возникают несколько вопросов; передавать 1 бит данных за один раз; разработка набора команд; предлагать решение проблемы; вмешательство пользователя; экономить заряд аккумулятора; сотовый телефон с включённым Bluetooth; перезвонить через пять минут; ловить Bluetooth-сигнал от персонального компьютера; указывать данные для передачи; автоматически перенаправить звонок; потреблять всего лишь 1 милливатт электроэнергии; обеспечивать согласование на физическом уровне; довольно надёжный; несколько недостатков; технология «прямой видимости»; направлять пульт дистанционного управления на телевизор; технология «один на один»; быть выгодным в некоторых отношениях; находится на одной линии друг с другом; максимальная скорость передачи; обратно совместимый с устройствами версии 1.0; передавать данные с помощью маломощных радиоволн; выделять частотный диапазон для использования промышленными, научными и медицинскими устройствами; использовать частоты диапазона ISM; интерферировать друг с другом; избегать интерференции с другими системами; ограничивать зону охвата Bluetooth-устройства; требовать прямую видимость между взаимодействующими устройствами; соединять до восьми устройств одновременно; десятиметровый радиус; использовать метод широкодиапазонной скачкообразной перестройки частоты; передавать на той же самой частоте в то же самое время; отдельные, произвольно выбираемые частоты в пределах установленного диапазона; на постоянной основе; полностью использовать ограниченную часть спектра радиочастот; радионяня; длиться малую долю секунды; происходить автоматически; создавать персональную сеть; охватывать расстояние не большее чем то, что между сотовым телефоном и наушниками; согласованно менять частоты.

2. Transcribe and learn to read the following words:

variety, infrared, component, streamline, simplify, require, discussion, virtually, product, advantageous, gigahertz, interference, simultaneously, command.

3. Write the Past Indefinite and the Past Participle of the verbs:

become, streamline, simplify, begin, arise, offer, take, stand, ring, interpret, avoid, choose, fill, hop.

4. Find in parts 1, 2 and 3 of text 1 synonyms to the following words:

intricate (adj), characteristic, everyday, to need, answer, to propose, interference, disadvantage, profitable, to intersect, to happen.

5. Find in parts 1, 2 and 3 of text 1 antonyms to the following words:

hand-operated, to complicate, passivity, dissension, futile, to confront.

6. Write the expansions of the following abbreviations and learn them:

GPS, IR, PDA, GHz, ISM, PAN.

7. Match the definitions on the left with the words they denote on the right.

1. The movement of data from one location to another.	a) Infrared light
2. The measure of how often a periodic event occurs, such as a signal going through a complete cycle.	b) Plug
3. Noise or other external signals that affect the performance of a communications channel.	c) Bluetooth
4. A connector, especially a male connector, one that fits into a socket.	d) Transfer
5. The light that has a frequency in the electromagnetic spectrum in the range just below that of red light.	e) Interference
6. A contiguous range of frequencies used for a particular purpose, such as radio or television broadcasts.	f) Frequency
7. Technology protocol developed to wirelessly connect electronic devices such as wireless phones, personal digital assistants (PDAs), and computers.	g) Band

8. Translate the passages in writing.

A) When any two devices need to talk to each other, they have to agree on a number of points before the conversation can begin.

The first point of agreement is physical: Will they talk over wires, or through some form of wireless signals? If they use wires, how many are required — 1, 2, 8, 25? Once the physical attributes are decided, several more questions arise.

B) The big draws of Bluetooth are that it is wireless, inexpensive and automatic. There are other ways to get around using wires, including infrared communication. Infrared (IR) refers to light waves of a lower frequency than human eyes can receive and interpret. Infrared is used in most television remote control systems. Infrared communications are fairly reliable and don't cost very much to build into a device, but there are a couple of drawbacks. First, infrared is a «line of sight» technology. For example, you have to point the remote control at the television or DVD player to make things happen. The second drawback is that infrared is almost always a «one to one» technology. You can send data between your desktop computer and your laptop computer, but not your laptop computer and your PDA at the same time.

C) Bluetooth uses a technique called spread-spectrum frequency hopping that makes it rare for more than one device to be transmitting on the same frequency at the same time. In this technique, a device will use 79 individual, randomly chosen frequencies within a designated range, changing from one to another on a regular basis. In the case of Bluetooth, the transmitters change frequencies 1,600 times every second, meaning that more devices can make full use of a limited slice of the radio spectrum.

9. Use the information from parts 1, 2 and 3 of text 1 to complete the dialogue in your own words.

A : How do electronic devices communicate with each other?

B : ...

A : What are the ways that electronic devices can connect to one another?

B : ...

A : What is Bluetooth?

B : ...

A : What are the points of agreement between any two devices when they need to talk to each other?

B : ...

A : What does Bluetooth do with small-area networking?

B : ...

A : How many levels does Bluetooth work at? What are they?

B : ...

A : What are the big draws of Bluetooth?

B : ...

A : What is infrared communication?

B : ...

A : What are the drawbacks of infrared communication?

B : ...

A : What is the maximum transfer speed of Bluetooth?

B : ...

A : What frequency does Bluetooth communicate on?

B : ...

A : What other devices make use of frequencies in the ISM band?

B : ...

A : How do Bluetooth devices avoid interfering with other systems?

B : ...

A : How many devices can Bluetooth connect simultaneously?

B : ...

A : What kind of technique does Bluetooth use to minimize interference between devices?

B : ...

A : What is a piconet?

B : ...

10. Look through parts 1, 2 and 3 of text 1 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. There is only one way that electronic devices can connect to one another. ☐
2. A Bluetooth connection has a number of interesting features that make our daily lives easier. ☐
3. Once the physical attributes are decided, there are no more questions to be solved. ☐
4. Bluetooth is a networking standard that works at three levels. ☐
5. The big drawbacks of Bluetooth are that it is wireless, inexpensive and automatic. ☐
6. Infrared refers to light waves of a higher frequency than human eyes can receive and interpret. ☐

7. Infrared is a «line of sight» and almost always a “one to one” technology. ☐
8. Bluetooth 2.0 has a maximum transfer speed of 5 Mbps and is not backward-compatible with 1.0 devices. ☐
9. Bluetooth networking transmits data via low-power radio waves on a frequency of 2.45 gigahertz. ☐
10. Bluetooth requires line of sight between communicating devices. ☐
11. Bluetooth uses a technique called spread-spectrum frequency hopping that makes it almost impossible for more than one device to be transmitting on the same frequency at the same time. ☐
12. Bluetooth transmitters change frequencies 800 times every second. ☐

11. Make summary of parts 1, 2 and 3 of text 1.

12. Read the text and fill in prepositions or adverbs in paragraphs 1, 4 and 8.

Skip through the text and find the passages where the following ideas are expressed:

a) Operation of a Bluetooth surveillance network. ☐
b) Once Bluetooth devices are traceable, security is an important issue with this technology. ☐
c) Using a Bluetooth surveillance system in a shopping mall. ☐
d) The tip of how to locate Bluetooth users in a 10-meter radius around you. ☐
e) The point of installing the Bluetooth surveillance system in the Aalborg Zoo. ☐
f) Bluetooth popularity in mobile phones. ☐
g) Making your device non-discoverable is the best defense against tracking you down via Bluetooth. ☐
h) Bluetooth technology makes life easier by getting rid of frustrating wires and expensive adapters. ☐
i) The example of locating you in front of a shoe store. ☐

Bluetooth Surveillance

1. If you were to randomly pick up a piece of electronic equipment ... your house, there’s a reasonable chance that it has Bluetooth capabilities, especially if the gadget ... question is fairly new. Whether it’s a cell phone, smartphone, laptop, printer

or keyboard, Bluetooth wireless technology has made life easier ... those of us with too many electronics ... our hands. Bluetooth devices get rid ... frustrating wires and expensive adapters ... using short-range radio signals to connect devices to each other and send information back and forth.

2. Bluetooth is especially common in mobile phones, which make up more than 60 percent of the Bluetooth market. Bluetooth headsets, for example, transmit calls from your phone to the headset in your ear — this allows you to keep your phone in your pocket, backpack or handbag while walking around. It's also helpful to drivers wanting to cruise around hands-free.

3. Imagine, though, taking a walk through a crowded area — perhaps the shopping district of a big city. Maybe you're just doing some casual window shopping, and you've kept your phone with you and left Bluetooth on «discoverable» mode. This allows other Bluetooth phones to locate you. As you linger in front of a shoe store and consider a new pair, your phone beeps: Someone's sent you a text message. It reads: «We know where you are. Having fun shopping?». Sounds like something out of a movie, right?

4. Such a thing is possible, and it's happened before. In fact, it's the very nature ... Bluetooth — a technology that can search ... and locate other devices that also have Bluetooth — which has some people concerned. Security has long been an issue ... this technology — bluejacking, for instance, although simply a harmless prank, allows Bluetooth users to send out unsolicited messages ... nearby devices. Because Bluetooth devices are to some degree traceable, the concept of Bluetooth surveillance has been introduced ... the tech world.

5. Locating several Bluetooth users with a typical mobile phone is relatively simple: You just turn on your phone and search for every discoverable device. But you could only monitor the people moving in and out of your Bluetooth's range, which is most likely a 10-meter (33-foot) circle around you. If you wanted to track a specific address, you'd have to visually locate that person's physical device and follow it around all day, which would easily blow your cover.

6. Creating a Bluetooth surveillance network solves this problem. If several Bluetooth-enabled receivers are strategically placed to cover a large area, they can track the positions of any discoverable device, recording and sending any data back to a single ad-

dress. Each Bluetooth receiver acts like any regular Bluetooth device: It searches for every device within range. If a person walked down a 100-meter-long (328-foot-long) street and each Bluetooth receiver had a range of 10 meters, five receivers with a radius of 20 meters (66 feet) would be needed to track that person's movement. As he walked toward the street, the first receiver would track him for the length of the first 20 meters, the second for the next 20 meters, and so on for the length of the street.

7. So how have people used this system to track people? One of the earliest uses of Bluetooth positioning and tracking technology is the Aalborg Zoo, the largest zoological garden in Denmark. The point of installing the system was not to put the zoo's patrons under surveillance or to see which exhibitions people went to more often. Instead, special «Bluetags» were made available to prevent parents from losing valuable belongings that tend to wander off — their children. A parent could attach a «Bluetag» onto a child, and Bluetooth receivers around the zoo would track the child's movement.

8. Some people worry ... others using this sort ... technology illegally and maliciously. A shopping mall, ... example, could install a Bluetooth surveillance system ... its entire area to monitor the movements ... Bluetooth owners. Although it wouldn't present a perfectly accurate description ... a person's movement, the system could create a general map of his path and even compare how long someone stays ... a certain area. ... this knowledge, store owners could analyze shopper's behavior and change advertisement positions accordingly ... anyone ever knowing.

9. It's difficult for someone to use Bluetooth to identify you in particular, unless you've chosen to include your name or some other personally identifiable information in the name of your phone, smart phone or PDA. Still, if you're concerned that someone might be able to track you down via Bluetooth, the best defense is to make your device non-discoverable to others when not using it.

(By John Fuller)

13. Fill in suitable words from the box.

data, developed, devices, enabled, telecommunications, wireless, signals

Bluetooth®

Bluetooth® technology enables **(1)** ... communication between **(2)** ... such as laptop computers, mobile phones and PDAs. Bluetooth® **(3)** ... devices use short-range radio **(4)** ... to exchange **(5)** ... quickly and easily. The technology was **(6)** ... by a group of computer and **(7)** ... companies including IBM, Intel, Nokia and Ericsson.

14. Render the following text in English.

Технология Bluetooth™

Bluetooth — быстро развивающаяся технология передачи данных по радио, разработка которой была инициирована лидерами рынка в передаче данных и компьютерной отрасли.

Название Bluetooth — Синий Зуб — было дано в честь датского короля X в. Гаральда Блатана.

В X в. датский король Гаральд II Блатан (Блатан по-датски «Синий Зуб», Blue Tooth по-английски) прославился своей способностью находить общий язык с князьями-вассалами. Через 1000 лет технологии беспроводной связи разнородных устройств выбрали название — Bluetooth. Инициатором проекта Bluetooth была шведская компания Ericsson, которая и порекомендовала такое название.

Эта передовая технология позволяет устройствам, включая ноутбуки, PDA и сотовые телефоны, а также многочисленным настольным и другим устройствам связываться по радио автоматически с близко расположенными устройствами для обмена информацией, командами и т. п. Одно устройство может общаться с несколькими (до 7 одновременно) устройствами Bluetooth, остальные будут в режиме ожидания. Используются сверхвысокие радиочастоты 2,4 ГГц — диапазон, свободный от лицензирования. В этом же диапазоне работают локальные радиосети по стандарту WLAN (IEEE 802.11) и другие устройства и приборы. Bluetooth обеспечивает скорость передачи данных до 721 Кбит/с в радиусе до 10–20 метров в зависимости от чипсета и мощности.

(«Мир беспроводных технологий», www.asusrouter.ru)

LANGUAGE FOCUS 21

TIME CLAUSES

We can show how actions are linked in time by using time clauses introduced by different conjunctions. For example:

1. If we want to show that one action happens immediately after another action, we use a time clause with the conjunction **when**.

Example:

When Bluetooth-capable devices come within range of one another, an electronic conversation takes place.

To emphasize the completion of the first action we use **once** in place of **when**. It often occurs with the Present Perfect.

Example:

Once the conversation has occurred, the devices form a network.

2. To link an action and the limit of that action we use a time clause with the conjunction **until**.

Example:

Information sent from a node travels along the backbone **until** it reaches its destination node.

3. To show that one action precedes another we use a time clause with the conjunction **before**.

Example:

A switch picks up every transmission **before** it reaches another node.

If the subjects are the same in both actions, we can use a gerund.

Example:

Passive hubs don't amplify the electrical signal of incoming packets **before** broadcasting them out to the network.

4. To link two connected actions happening at the same time we use a time clause with the conjunction **as**.

Example:

As a new computer comes on to the network, it sends out a broadcast packet to announce its presence.

15. Link each pair of actions using a time clause.

1. a) The second node passes the token to the third node and so on.
   b) It comes back around to the first node again.
2. a) Cut-through switches read the MAC address.
   b) A packet is detected by the switch.

3. a) You have clicked on a hyperlink.
b) You have to wait for the webpage to be copied to your computer.
4. a) You click on a URL.
b) Your browser sends it to a DNS server.
5. a) The graphics can be displayed gradually.
b) The webpage is downloaded.
6. a) Many switches use a cut-through method.
b) A certain error level is reached.
7. a) You click on a hyperlink.
b) The browser checks to see if the linked webpage is stored in the cache.
8. a) The packets are passed from router to router.
b) They reach the Web server.
9. a) You type in a Web address.
b) You should press the Enter key.
10. a) The MAC address is compared to the look-up table.
b) A packet is detected on an input port.
11. a) You use a search engine.
b) It provides a set of links related to your search.
12. a) The packets may travel by different routes.
b) They reach the Web server.
13. a) With POP3, email is stored on the server.
b) You check your email account.
14. a) A timestamp is given to the entry.
b) It is added to the look-up table for a node.
15. a) You listen to the first part of a streamed audio file.
b) The next part is downloading.
16. a) The individual packets reach the Web server.
b) They are put back together again.
17. a) You receive an email message.
b) You can forward it to another address.
18. a) A store-and-forward mode stores the frame and verifies the CRC.
b) It forwards the frame.
19. a) You can bookmark a webpage to make it easier to find in the future.
b) You find a webpage you like.
20. a) You click on the Home button.
b) The browser displays your starting webpage.

UNIT 22

PART 4. BLUETOOTH PICONETS

Let's say you have a typical modern living room with typical modern stuff inside. There's an entertainment system with a stereo, a DVD player, a satellite TV receiver and a television; there's also a cordless telephone and a personal computer. Each of these systems uses Bluetooth, and each forms its own piconet to talk between the main unit and peripheral.

The cordless telephone has one Bluetooth transmitter in the base and another in the handset. The manufacturer has programmed each unit with an address that falls into a range of addresses it has established for a particular type of device. When the base is first turned on, it sends radio signals asking for a response from any units with an address in a particular range. Since the handset has an address in the range, it responds, and a tiny network is formed. Now, even if one of these devices should receive a signal from another system, it will ignore it since it's not from within the network. The computer and entertainment system go through similar routines, establishing networks among addresses in ranges established by manufacturers. Once the networks are established, the systems begin talking among themselves. Each piconet hops randomly through the available frequencies, so all of the piconets are completely separated from one another.

Now the living room has three separate networks established, each one made up of devices that know the address of transmitters it should listen to and the address of receivers it should talk to. Since each network is changing the frequency of its operation thousands of times a second, it's unlikely that any two networks will be on the same frequency at the same time. If it turns out that they are, then the resulting confusion will only cover a tiny fraction of a second, and software designed to correct for such errors weeds out the confusing information and gets on with the network's business.

PART 5. BLUETOOTH SECURITY

In any wireless networking setup, security is a concern. Devices can easily grab radio waves out of the air, so people who send sensitive information over a wireless connection need to take precautions to make sure those signals aren't intercepted. Bluetooth technology is no different — it's wireless and therefore susceptible to spying and remote access, just like WiFi is susceptible if the network isn't secure. With Bluetooth, though, the automatic nature of the connection, which is a huge benefit in terms of time and effort, is also a benefit to people looking to send you data without your permission.

Bluetooth offers several security modes, and device manufacturers determine which mode to include in a Bluetooth-enabled gadget. In almost all cases, Bluetooth users can establish «trusted devices» that can exchange data without asking permission. When any other device tries to establish a connection to the user's gadget, the user has to decide to allow it. Service-level security and device-level security work together to protect Bluetooth devices from unauthorized data transmission. Security methods include authorization and identification procedures that limit the use of Bluetooth services to the registered user and require that users make a conscious decision to open a file or accept a data transfer. As long as these measures are enabled on the user's phone or other device, unauthorized access is unlikely. A user can also simply switch his Bluetooth mode to «non-discoverable» and avoid connecting with other Bluetooth devices entirely. If a user makes use of the Bluetooth network primarily for synching devices at home, this might be a good way to avoid any chance of a security breach while in public.

Still, early cell-phone virus writers have taken advantage of Bluetooth's automated connection process to send out infected files. However, since most cell phones use a secure Bluetooth connection that requires authorization and authentication before accepting data from an unknown device, the infected file typically doesn't get very far. When the virus arrives in the user's cell phone, the user has to agree to open it and then agree to install it. This has, so far, stopped most cell-phone viruses from doing much damage.

Other problems like «bluejacking», «bluebugging» and «Car Whisperer» have turned up as Bluetooth-specific security issues. Bluejacking involves Bluetooth users sending a business card (just a text message, really) to other Bluetooth users within a 10-meter (32-foot) radius. If the user doesn't realize what the message is, he might allow the contact to be added to his address book, and the contact can send him messages that might be automatically opened because they're coming from a known contact. Bluebugging is more of a problem, because it allows hackers to remotely access a user's phone and use its features, including placing calls and sending text messages, and the user doesn't realize it's happening. The Car Whisperer is a piece of software that allows hackers to send audio to and receive audio from a Bluetooth-enabled car stereo. Like a computer security hole, these vulnerabilities are an inevitable result of technological innovation, and device manufacturers are releasing firmware upgrades that address new problems as they arise.

(By Curt Franklin and Julia Layton)

Essential vocabulary (4), (5)

Words

address *v, n*
authentication *n*
authorization *n*
base *n*
benefit *n*
bluebugging *n*
bluejacking *n*
concern *n*
confusion *n*
cordless *adj*
correct (for) *v*
conscious *adj*
damage *n*
gadget *n*
get on (with) *v*
grab *v*
handset *n*
identification *n*
inevitable *adj*
intercept *v*
manufacturer *n*
measure *n*
non-discoverable *adj*
permission *n*
precaution *n*
permit *v*
remotely *adv*
respond *v*
satellite *n*
secure *adj*
setup *n*
spy *v*
susceptible *adj*
synch *v, n*
unauthorized *adj*
vulnerability *n*
weed out *v*

Word Combinations

to form one's own piconet
to fall into a range of smth.
to weed out the confusing information
to go through similar routines
available frequencies
to ask for a response

sensitive information
to take precautions against smth.
to be susceptible to doing smth.
to be a huge benefit in terms of time and effort
remote access
to establish «trusted devices»
service-level security
technological innovation

device-level security
unauthorized data transmission
to include authorization and identification procedures
to make a conscious decision
to accept a data transfer
to switch to «non-discoverable» mode
security breach
to take advantage of smth.
to send out infected files
to require authorization and authentication
car whisperer
Bluetooth-specific security issue
to place a call
to address new problems

EXERCISES

1. Find in parts 4 and 5 of text 1 English equivalents for the following words and phrases:

приемник спутникового телевидения; беспроводной телефон; попадать в диапазон адресов; запрашивать ответ; образовывать крошечную сеть; игнорировать сигнал; производитель; произвольно менять доступные частоты; быть полностью отделённым друг от друга; тысячи раз в секунду; если окажется, что … ; продолжаться малую долю секунды; программное обеспечение, предназначенное для исправления таких ошибок; настройка беспроводной сети; посылать секретную информацию; принимать меры предосторожности; перехватывать сигналы; подверженный шпионажу; безопасная сеть; огромная польза в отношении времени и усилий; посылать данные без разрешения; устанавливать «надежные устройства»; обмениваться данными; безопасность на уровне физических устройств; защищать от несанкционированной передачи данных; процедуры авторизации и идентификации; принимать осознанное решение; несанкционированный доступ; переключить режим Bluetooth на «невидимый»; использовать, в основном, для синхронизации устройств; избегать малейшей бреши в системе защиты; создатели вирусов для первых сотовых телефонов; рассылать зараженный файл; использовать безопасное Bluetooth-подключение, которое требует авторизацию и аутентификацию; удерживать вирусы от причинения большого ущерба; несанкционированное, злоумышленное управление Bluetooth-устройством; совершать звонок; неизбежный результат технологических инноваций; реагировать на новые проблемы по мере их появления; выпускать обновлённое программно-аппаратное обеспечение.

2. Transcribe and learn to read the following words:

manufacturer, available, particular, precautions, susceptible, unauthorized, identification, procedure, conscious, virus, vulnerability, inevitable.

3. Write the Past Indefinite and the Past Participle of the verbs:

fall, send, respond, go, weed out, grab, spy, decide, exchange, require, get, arrive, involve, happen, allow.

4. Find in parts 4 and 5 of text 1 synonyms to the following words and word combinations:

normal, producer, accessible, very small, to remove, mistake, compliant, leave (n), device, incompetent, aware, unavoidable.

5. Find in parts 4 and 5 of text 1 antonyms to the following words:

old-world (adj), to notice, inaccessible, joint, to reject, disadvantage.

6. Write the expansions of the following abbreviations and learn them:

DVD, TV,WiFi.

7. Below you can see definitions with one word missing in each of them. Use the words from the list to fill in the gaps.

a) made	d) resistant
b) used	e) specified
c) intrusive	f) verified

1. *Security* — the technologies used to make a service ... to unauthorized access to the data that it holds or for which it is responsible.

2. *Authorization* — the right granted an individual to use the system and the data stored on it. Authorization is typically set up by a system administrator and ... by the computer based on some form of user identification, such as a code number or password.

3. *Identification* — a procedure ... to establish the identity and nature of a computer or user.

4. *Authentication* — the process by which the system validates a user's logon information. A user's name and password are compared against an authorized list, and if the system detects a match, access is granted to the extent ... in the permission list for that user.

5. *Synchronization* — the process of updating or backing up the data on a handheld computer to the linked software applications on a desktop computer. Data changes ... on the desktop computer may also be copied to the handheld during synchronization.

6. *Virus* — an ... program that infects computer files by inserting in those files copies of itself.

8. Translate the passages in writing.

A) The cordless telephone has one Bluetooth transmitter in the base and another in the handset. The manufacturer has programmed each unit with an address that falls into a range of addresses it has established for a particular type of device. When the base is first turned on, it sends radio signals asking for a response from any units with an address in a particular range. Since the handset has an address in the range, it responds, and a tiny network is formed.

B) In any wireless networking setup, security is a concern. Devices can easily grab radio waves out of the air, so people who send sensitive information over a wireless connection need to take precautions to make sure those signals aren't intercepted. Bluetooth technology is no different — it's wireless and therefore susceptible to spying and remote access, just like WiFi is susceptible if the network isn't secure.

9. Answer the following questions using the information from parts 4 and 5 of text 1.

1. What does each system in a typical modern living room form to talk between the main unit and peripheral? 2. What does the manufacturer program each unit with? 3. What does the base do when it is first turned on? 4. What will happen if one of the devices receives a signal from another system? 5. How many times does each network change the frequency of its operation? 6. What should people do to make sure their sensitive information isn't intercepted? 7. What is the most popular security mode included in Bluetooth-enabled gadgets? 8. What are two security levels that work together to protect Bluetooth devices from unauthorized data transmission? 9. What procedures do security methods include? 10. What have early cell-phone virus writers taken advantage of to send out infected files? 11. What are Bluetooth-specific security issues? 12. What is «bluejacking»? 13. What can you say about «bluebugging»? 14. What is «Car Whisperer»? 15. What do device manufacturers do to solve these security problems?

10. Look through parts 4 and 5 of text 1 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Each of the systems that uses Bluetooth forms its own nanonet to talk between the main unit and peripheral. ☐
2. Each piconet uses only particular frequencies, so all of the piconets can easily interfere with one another. ☐
3. If it turns out that any two networks are on the same frequency at the same time, the resulting confusion will only cover a tiny fraction of a second. ☐
4. In any wireless networking setup, security is not a problem at all. ☐
5. People who send sensitive information over a wireless connection need to take precautions. ☐
6. Bluetooth technology is susceptible to spying and remote access. ☐
7. Bluetooth offers only one security mode, and the user himself decides whether or not he should use it in a Bluetooth-enabled gadgets. ☐
8. Security methods include authorization and identification procedures that limit the use of Bluetooth services to the registered user. ☐

9. When the virus arrives in the user's cell phone, it is automatically opened and installed. ☐

10. Bluejacking is more of a problem than bluebugging, because it allows hackers to remotely access a user's phone and use its features, including placing calls and sending text messages. ☐

11. Make summary of parts 4 and 5 of text 1.

12. Read the text and in paragraphs 4 and 6 put the verbs in brackets into the correct tense-aspect form.

Each of the sentences below summarizes an individual paragraph of the text. Order the sentences so that they form a summary of the text.

a) A bluejacker finds his victims in places with a potentially high percentage of people with Bluetooth-enabled devices. ☐

b) A bluejacker's crowning moment comes when the victim receives the message and expresses a mild mix of confusion. ☐

c) To send information to another party, the user creates a personal contact name in the phone's address book. ☐

d) Sometimes the bluejacker may have a hard time messaging his target on the first try. ☐

e) The joy of doorbell ditching is reveling in the homeowner's confusion and rolling with laughter under the security of his bushes. ☐

f) Bluetooth devices in the same area share the same ISM band and can locate and communicate with each other. ☐

g) According to the bluejacking code of ethics bluejackers should refrain from sending insulting or threatening messages to others. ☐

h) Bluejacking is the digital version of doorbell ditching and prank phone calls. ☐

i) The bluejacker's message takes the place of the name instead of creating a legitimate name in the address book. ☐

What is bluejacking?

1. Have you ever been doorbell ditching before? The point of the prank is simple: Sneak up to someone's front door, knock loudly or ring the doorbell, and, instead of greeting whoever answers the door, run away and hide somewhere nearby. The joy of doorbell ditching is, of course, reveling in the homeowner's con-

fusion and rolling with laughter under the security of his nicely trimmed bushes. Although the game might get you in a bit of trouble if you happen to incite the ire of a cranky neighbor, it's mostly a harmless joke on par with a prank phone call.

2. For more technically inclined pranksters with access to Bluetooth technology, however, there's the digital version of doorbell ditching and prank phone calls: Bluejacking. A kind of practical joke played out between Bluetooth-enabled devices, bluejacking takes advantage of a loophole in the technology's messaging options that allows a user to send unsolicited messages to other nearby Bluetooth owners.

3. The only difference between doorbell ditching and bluejacking is that bluejacking usually isn't done on your neighbor's lawn. Instead, a bluejacker will most likely camp out in crowded areas like shopping malls, airports and subway systems to find victims — places with a potentially high percentage of people with Bluetooth-enabled devices. The trend has even fostered fan Web sites, where Bluetooth users inform newcomers how to bluejack, trade tips and post amusing bluejacking stories that include every keystroke and puzzled look.

4. Bluetooth technology (to operate) by using low-power radio waves, communicating on a frequency of 2.45 gigahertz. This special frequency also (to know) as the ISM band, an open, unlicensed band set aside for industrial, scientific and medical devices. When a number of Bluetooth devices (to switch) on in the same area, they all (to share) the same ISM band and can locate and communicate with each other, much like a pair of walkie-talkies tuned to the same frequency are able to link up.

5. Bluetooth technology users take advantage of this ability to network with other phones and can send text messages or electronic business cards to each other. To send information to another party, the user creates a personal contact name in his or her phone's address book — the name can be anything from the sender's actual name to a clever nickname.

6. Bluejackers (to devise) a simple technique to surprise their victims: Instead of creating a legitimate name in the address book, the bluejacker's message (to take) the place of the name. The prank essentially (to erase) the «from» part of the equation, allowing a user to send any sort of comment he (to wish) without identifying himself.

7. For instance, if you're sitting in a coffee shop and notice a fellow Bluetooth user sitting down to enjoy a cup of iced coffee, you could set up a contact under the name «Is your coffee cold enough?» After choosing to send the text via Bluetooth, the phone will search for other enabled Bluetooth devices; selecting one will send the unsolicited message to that device. A bluejacker's crowning moment comes, of course, when the victim receives the message and expresses a mild mix of confusion and fear that he's under surveillance.

8. Bluejacking is imprecise, however. Searching for other Bluetooth-enabled hardware might turn up a list of devices labeled with a series of numbers and letters. Unless the bluejacker's target has chosen to publicly identify his or her phone, or it's the only Bluetooth phone in the area, the bluejacker may have a hard time messaging his or her target on the first try.

9. After bluejacking turned into a small tech subculture in 2003, several Web sites emerged, offering how-to's and forums for trading stories. But there's even a bluejacking code of ethics, according to bluejackQ.com. Bluejackers should refrain, for example, from sending insulting or threatening messages to others, and if no interest is shown in communication after two messages, the bluejacker should cease activity in order to avoid annoying anyone. The point of bluejacking, according to its proponents, is to have fun, not cause complete anarchy.

(By John Fuller)

13. Fill in suitable words from the box.

Bluetooth, secure, issues, eavesdrop, security, networks, manufacturers, produce

Bluetooth Security

Because Bluetooth devices can connect to (1) … so easily, it's important to be aware of security (2) … . If your (3) … network isn't secure, then it might be possible for someone else to (4) … on you using another Bluetooth device. Most of the burden of Bluetooth (5) … falls on the shoulders of electronics (6) … , who can choose to (7) … devices that are (8) … or unsecured.

14. Render the following text in English.

Как работает технология Bluetooth?

Bluetooth является высокоскоростным видом связи, основанным на радиоволнах. Технология разработана для установления связи между мобильными телефонами, ноутбуками и другими портативными устройствами. В отличие от устройств, основанных на технологии инфракрасного излучения, Bluetooth не требует нахождения соединяемых устройств на линии прохождения луча. Технология Bluetooth, в каком-то смысле, является модифицированной разновидностью существующей технологии локальных сетей. С другой стороны, Bluetooth удобнее в силу небольших размеров и невысокой стоимости.

В настоящее время чип Bluetooth представляет собой микросхему размером в 0,9 квадратных сантиметров. Чипы Bluetooth сейчас встраиваются во многие устройства. Недорогие миниатюрные передатчики размещены в цифровых устройствах. Устройства, использующие технологию Bluetooth, работают на частоте 2,45 ГГц.

Технология Bluetooth поддерживает скорость передачи данных до 721 Кб / с и 3 голосовых канала. Чип Bluetooth либо непосредственно встраивается в устройство, либо используется в качестве адаптера. Соединение можно устанавливать как с одним устройством, так и с несколькими устройствами одновременно. Стандартный диапазон работы Bluetooth не превышает 10 метров, но если увеличить мощность, диапазон работы может увеличиться до 100 метров.

Устройства Bluetooth надёжно защищены от внешнего вмешательства в силу того, что их частота меняется до 1600 раз в секунду. Немаловажной характеристикой технологии Bluetooth является то, что она позволяет мгновенно создавать сеть между устройствами, находящимися на некотором расстоянии друг от друга.

(«Мир беспроводных технологий»,
www.asusrouter.ru)

LANGUAGE FOCUS 22

PREDICTIONS 1 : CERTAINTY EXPRESSIONS

To express certainty we use different expressions. Study this list showing different means:

LESS ⟶ MORE				
Verbs	could may might			will will not
Adverbs	possibly	probably	likely unlikely	certainly
Adjectives	possible	probable	expected	certain

15. Rank these predictions according to how certain the speakers are. Put the most certain at the top of your list and the least certain at the bottom. Some predictions can have equal ranking.

a) The wireless connection will soon be cheaper than the wired alternative.

b) The wireless connection may soon be cheaper than the wired alternative.

c) It's likely the wireless connection will soon be cheaper than the wired alternative.

d) It's unlikely the wireless connection will soon be cheaper than the wired alternative.

e) It's expected the wireless connection will soon be cheaper than the wired alternative.

f) It's probable the wireless connection will soon be cheaper than the wired alternative.

g) It's possible the wireless connection will soon be cheaper than the wired alternative.

h) The wireless connection will certainly be cheaper than the wired alternative.

16. Make statements about these predictions for the next five years. Use the certainty expressions above.

Example:

All school children in my country will have mobile phones.

I think it's unlikely that all school children will have mobile phones but it's probable that many of the older pupils will have them.

1. The term Local Area Network (LAN) will be replaced by Metropolitan Area Network (MAN).

2. Bluetooth technology will replace all the wires in our equipment, except for the power cord.

3. Taxis will be robot-controlled.

4. Wireless technology will become commonplace.

5. There will be more robots than people in developed countries.

6. Most computers will be voice-controlled.

7. High-end smartphones and ultrabooks will have Bluetooth v 4.0.

8. TV journalists will be able to transmit what they see by using sensors in their optic nerves.

9. Email will be replaced by a voice-based system.

10. Computers will become more powerful.

11. ATM machines will use iris recognition rather than PIN numbers. You will get access to your account by looking at the machine.

12. People will vote in elections online.

13. Mobile phones will replace computers as the commonest way to access the Internet.

14. English will no longer be the commonest language for websites.

QUIZ 5

Wireless networks are easy to set up and inexpensive. They're also unobtrusive — unless you're on the lookout for a place to use your laptop, you may not even notice when you're in a hotspot. What do you know about wireless networks?

1. Wireless networking, or Wi-Fi, can be used to connect computers in a home, and many cities are using the technology to offer free or low-cost Internet access to residents. What's another name for Wi-Fi?

a) 801.12 networking
b) 801.22 networking
c) 802.11 networking

2. A wireless network uses ... waves to transmit signals.

a) mechanical
b) radio
c) sound

3. What device includes an adapter that decodes data sent in radio signals?

a) modem
b) digital translator
c) router

4. At what frequencies do Wi-Fi radios make transmissions?

a) 3 GHz or 8 GHz
b) 2.4 GHz or 5 GHz
c) 2 GHz or 7,3 GHz

5. Of the following networking standards, which is not used in Wi-Fi data transmissions?

a) 802.11g
b) 802.11c
c) 802.11b

6. Which networking standard is the slowest and least expensive?

a) 802.11a
b) 802.11b
c) 802.11n

7. Which networking standard was the first to use orthogonal frequency-division multiplexing (OFDM) as a coding technique?

a) 802.11g
b) 802.11a
c) 802.11n

8. Which short-range wireless standard is used for Wireless Personal Area Networks (WPANs)?

a) 802.16
b) 802.15
c) 802.13

9. If your laptop doesn't have a built-in wireless transmitter, you can buy a wireless adapter that plugs into all of the following except:

a) headphone jack
b) USB port
c) PC card slot

10. You can change the settings on your wireless router through a Web interface. One option you can change is channel. What channel do routers use by default?

a) 2
b) 7
c) 6

(To find correct answers, see pages 334–335)

UNIT 23

TEXT 2

WIFI

PART 1. INTRODUCTION TO WIFI

If you've been in an airport, coffee shop, library or hotel recently, chances are you've been right in the middle of a wireless network. Many people also use wireless networking, also called WiFi or 802.11 networking, to connect their computers at home, and some cities are trying to use the technology to provide free or low-cost Internet access to residents. In the near future, wireless networking may become so widespread that you can access the Internet just about anywhere at any time, without using wires.

WiFi has a lot of advantages. Wireless networks are easy to set up and inexpensive. They're also unobtrusive — unless you're on the lookout for a place to use your laptop, you may not even notice when you're in a hotspot. In this article, we'll look at the technology that allows information to travel over the air. We'll also review what it takes to create a wireless network in your home.

First, let's go over a few WiFi basics.

PART 2. WHAT IS WIFI?

A wireless network uses radio waves, just like cell phones, televisions and radios do. In fact, communication across a wireless network is a lot like two-way radio communication. Here's what happens:

A computer's wireless adapter translates data into a radio signal and transmits it using an antenna.

A wireless router receives the signal and decodes it. The router sends the information to the Internet using a physical, wired Ethernet connection.

The process also works in reverse, with the router receiving information from the Internet, translating it into a radio signal and sending it to the computer's wireless adapter.

The radios used for WiFi communication are very similar to the radios used for walkie-talkies, cell phones and other devices. They can transmit and receive radio waves, and they can convert 1s and 0s into radio waves and convert the radio waves back into 1s and 0s. But WiFi radios have a few notable differences from other radios:

They transmit at frequencies of 2.4 GHz or 5 GHz. This frequency is considerably higher than the frequencies used for cell phones, walkie-talkies and televisions. The higher frequency allows the signal to carry more data.

They use 802.11 networking standards, which come in several flavors:

802.11a transmits at 5 GHz and can move up to 54 megabits of data per second. It also uses orthogonal frequency-division multiplexing (OFDM), a more efficient coding technique that splits that radio signal into several sub-signals before they reach a receiver. This greatly reduces interference.

802.11b is the slowest and least expensive standard. For a while, its cost made it popular, but now it's becoming less common as faster standards become less expensive. 802.11b transmits in the 2.4 GHz frequency band of the radio spectrum. It can handle up to 11 megabits of data per second, and it uses complementary code keying (CCK) modulation to improve speeds.

802.11g transmits at 2.4 GHz like 802.11b, but it's a lot faster — it can handle up to 54 megabits of data per second. 802.11g is faster because it uses the same OFDM coding as 802.11a.

802.11n is the newest standard that is widely available. This standard significantly improves speed and range. For instance, although 802.11g theoretically moves 54 megabits of data per second, it only achieves real-world speeds of about 24 megabits of data per second because of network congestion. 802.11n, however, reportedly can achieve speeds as high as 140 megabits per second. The standard is currently in draft form — the Institute of Electrical and Electronics Engineers (IEEE) plans to formally ratify 802.11n by the end of 2009.

Other 802.11 standards focus on specific applications of wireless networks, like wide area networks (WANs) inside vehicles or technology that lets you move from one wireless network to another seamlessly.

WiFi radios can transmit on any of three frequency bands. Or, they can «frequency hop» rapidly between the different bands. Frequency hopping helps reduce interference and lets multiple devices use the same wireless connection simultaneously.

As long as they all have wireless adapters, several devices can use one router to connect to the Internet. This connection is convenient, virtually invisible and fairly reliable; however, if the router fails or if too many people try to use high-bandwidth applications at the same time, users can experience interference or lose their connections.

Next, we'll look at how to connect to the Internet from a WiFi hotspot.

Essential vocabulary (1), (2)

Words

achieve *v*
antenna *n*
congestion *n*
convenient *adj*
convert *v*
decode *v*
draft *n*
experience *n*
flavor *n*
go over *v*
handle *v*
high-bandwidth *adj*
hotspot *n*
improve *v*
lookout *n*
modulation *n*
notable *adj*
ratify *v*
real-world *adj*
reduce *v*
reportedly *adv*
resident *n*
reverse *n, v*
seamlessly *adv*
theoretically *adv*
two-way *adj*
unobtrusive *adj*
vehicle *n*
walkie-talkie *n*
widespread *adj*
CCK
OFDM

Word Combinations

to provide free / low-cost Internet access to smb.
to become widespread
to be on the lookout for smth.
to be in a hotspot
to create a wireless network
over the air
wireless adapter
to transmit at frequency of ...
to come in several flavors
orthogonal frequency-division multiplexing
to split a radio signal into several sub-signals
efficient coding technique
to reduce interference
to make smth. popular
complementary code keying
to achieve real-world speed of ...
to be in draft form
frequency band
to lose one's connection

EXERCISES

1. Find in parts 1 and 2 of text 2 English equivalents for the following words and phrases:

в центре беспроводной сети; предоставлять жителям бесплатный доступ к Интернету; дешёвый доступ к Интернету; в ближайшем будущем; везде, в любое время; иметь множество преимуществ; быть в поисках места; находится в точке доступа; создать дома беспроводную сеть; двусторонняя радиосвязь; декодировать сигнал; передавать информацию, используя физическое соединение; работать в обратную сторону; преобразовывать единицы и нули в радиоволны; обладать несколькими заметными отличиями; значительно выше, чем частоты, используемые для сотовых телефонов; передавать со скоростью до 54 Мбит / с; использовать мультиплексирование с ортогональным частотным разделением сигналов; более эффективный метод кодирования; разделять радиосигнал на несколько подсигналов; значительно уменьшать интерференцию; становиться менее дорогим; частотный диапазон радиоспектра; использовать модуляцию ССК; дополнительная кодовая манипуляция; увеличивать скорость; значительно увеличивать скорость и расстояние; достигать реальной скорости; быть в черновом варианте; плавно перемещаться из одной беспроводной сети в другую; перестройка частоты; одновременно использовать одно и то же беспроводное соединение; практически невидимый; приложение, требующее высокую пропускную способность; терять соединение.

2. Transcribe and learn to read the following words:

widespread, unobtrusive, physical, convert, orthogonal, technique, theoretically, vehicle, convenient, experience.

3. Write the Past Indefinite and the Past Participle of the verbs:

try, notice, do, convert, come, split, improve, ratify, reduce, have, lose, achieve, carry, decode.

4. Find in parts 1 and 2 of text 2 synonyms to the following words:

lately, cheap, unnoticeable, to change, noteworthy, substantially, effective, to reach, to validate, trustworthy.

5. Find in parts 1 and 2 of text 2 antonyms to the following words:

paid (adj), expensive, to encipher, similarity, to enlarge, awkward.

6. Write the expansions of the following abbreviations and learn them:

OFDM, CCK, IEEE, WAN.

7. Match the words on the left with their definitions on the right.

1. Wireless network	a) The part of a radio or television system having any of various shapes by means of which radio waves are transmitted or received.
2. Hotspot	b) The range of frequencies of a particular type of radiation.
3. Antenna	c) A technique used in communications and input / output operations for transmitting a number of separate signals simultaneously over a single channel or line.
4. Walkie-talkie	d) A place where wireless broadband services are provided to users through a wireless local area network, such as in an airport, railway station, or library.
5. Multiplexing	e) A small combined radio transmitter and receiver, usually operating on shortwave, that can be carried around by one person.
6. Spectrum	f) A network that sends and receives data via radio, infrared optical signaling, or some other technology that does not require a physical connection between individual nodes and the hub.

8. Translate the passages in writing.

A) In the near future, wireless networking may become so widespread that you can access the Internet just about anywhere at any time, without using wires. WiFi has a lot of advantages. Wireless networks are easy to set up and inexpensive. They're also unobtrusive — unless you're on the lookout for a place to use your laptop, you may not even notice when you're in a hotspot.

B) 802.11n is the newest standard that is widely available. This standard significantly improves speed and range. For instance, although 802.11g theoretically moves 54 megabits of data per second, it only achieves real-world speeds of about 24 megabits of data per second because of network congestion. 802.11n, however, reportedly can achieve speeds as high as 140 megabits per second. The standard is currently in draft form — the Institute of Electrical and Electronics Engineers plans to formally ratify 802.11n by the end of 2009.

9. Use the information from parts 1 and 2 of text 2 to complete the dialogue in your own words.

A : What do many people use WiFi for?

B : ...

A : What are some cities trying to use this technology for?

B : ...

A : What are the advantages of WiFi?

B : ...

A : How does communication across a wireless network happen?

B : ...

A : What are the differences between WiFi radios and radios used for walkie-talkies, cell phones and other devices?

B : ...

A : What are the flavors of 802.11 network standards?

B : ...

A : What is OFDM?

B : ...

A : What does 802.11b use to improve speeds?

B : ...

A : What is the newest standard? What speeds can it reportedly achieve?

B : ...

A : What helps reduce interference and lets multiple devices use the same wireless connection simultaneously?

B : ...

A : When can users experience interference or lose their connections?

B : ...

10. Look through parts 1 and 2 of text 2 and mark the statements as true (T) or false F). If you think a statement is false, change it to make it true.

1. Some cities are trying to use WiFi technology to provide free or low-cost Internet access to residents. ☐
2. WiFi has only one advantage. ☐
3. WiFi networks are very difficult to set up, they are expensive and obtrusive. ☐
4. A wireless network uses radio waves, just like cell phones and radios do. ☐
5. WiFi radios transmit at frequencies of 2.4 GHz or 10 GHz. ☐
6. The higher frequency allows the signal to carry less data. ☐
7. 802.11 networking standards come in several flavors. ☐
8. 802.11a is the slowest and least expensive standard. ☐
9. 802.11n is the newest standard that is widely available and significantly improves speed and range. ☐
10. Frequency hopping can't reduce interference and doesn't let multiple devices use the same wireless connection simultaneously. ☐

11. Make summary of parts 1 and 2 of text 2.

12. Read the following text and write one-sentence summary of each paragraph. When you do this, you'll have fifteen sentences forming the summary of the whole text.

Municipal WiFi

1. Most WiFi hot spots in coffee shops and other locations have a hub and spoke configuration. One radio (the hub) sends and receives data for several users (the spokes). The wireless router has a physical connection to the Internet — a wire — and it transmits data from multiple users through that wire.

2. Adding a wireless router to an existing wired connection is an easy, convenient way to provide wireless access on a small scale. Wireless routers are relatively inexpensive. Most allow people to choose from various sign-on and encryption options, providing a layer of security.

3. But if a wireless router goes down, there's not always another router nearby to pick up the slack. And on a large scale, like a whole city, using a physical wire to connect every wireless router to the Internet is expensive.

4. That's why most municipal wireless networks use a mesh rather than a hub and spoke. A mesh is a series of radio transmitters. Each transmitter is able to communicate with at least two others. They create a cloud of radio signals through the city. Signals travel from router to router through this cloud.

5. In some networks, signals hop from one receiver to another until they reach a node that has a wired connection to the Internet. Other networks use backhaul nodes. These nodes do exactly what their name implies — they gather up all the data from many transmitters and haul it back to the Internet by sending it to a router with a wired connection. Backhaul nodes are usually point-to-point or point-to-multipoint nodes. They can either connect one point to exactly one other, or they can connect one point to several points.

6. If you use your laptop to connect to the Internet in a mesh network, here's what happens:

1. Your computer detects the nearby network, and you sign on.

2. The protocol that controls the mesh determines the best path for your data to follow. It plans the route that will make the fewest hops before reaching a wired connection or a backhaul node.

3. Your data follows the path that the protocol sets. When your data reaches a node that has a wired connection, it travels over the Internet until it reaches its final destination.

7. If you're out and about in a city with public access, you can probably do this with no extra equipment. But if you're trying to access the network from home, you may need a stronger radio and possibly a directional antenna. Although signals from the city network are strong enough to make it into your home, the signal from your computer may not be strong enough to make it out again. Most service providers take this into account and provide the necessary equipment for free or for a fee, much like they do with DSL or cable modems.

8. This system has several advantages over the hubs and spokes of ordinary hot spots. First, since there are fewer wires, it's less expensive. If a few nodes fail, others in the mesh can compensate for it. In addition to being far less expensive than running high-speed cable to every location in a city, it's a lot faster to build.

9. When a city decides to built a wireless network, it generally issues a request for proposal (RFP). An RFP is simply a

request for information from companies that are interested in building the network. While a city could theoretically build its own network, most choose to delegate that part of the process to a company that has experience in Internet and network technology.

10. Interested businesses respond to the RFP with a proposal that describes a plan for building and maintaining the network. The proposal includes everything from the number and type of radios to the final cost. The physical structure of the network has to take the size and layout of the city, tree cover, landscape and other factors into consideration. The proposal also includes who will end up owning, running and maintaining the network — the city or the business.

11. In some of the earliest proposed networks, the cities themselves owned and controlled the networks. Businesses like ISPs and telecommunications companies objected to these plans. Their argument was that competition between municipalities and the private sector was unfair or even illegal.

12. Today, many existing and proposed networks follow one of the following four models:

- The city owns the network, which is for city use only.
- The city owns the network, which is for city or public use.
- The city owns the network, and ISPs lease access to it, passing that access on to the public.
- A service provider owns and operates the network, providing access to the city, the public and even other service providers.

13. The city reviews all of the RFPs, then decides which proposal to accept. EarthLink, for example, has been selected to build networks in Anaheim, California and Philadelphia, Pennsylvania and is a finalist in several other cities. EarthLink is also teaming up with Google to build a wireless network in San Francisco.

14. Exactly what the network ends up looking like depends on a few factors. The first is exactly what a city hopes to do with the network. A city-wide blanket of coverage that's open to everyone can look very different from a public safety network that will be open only to police officers and firefighters. Different businesses' proposals can also vary widely depending on the hardware and protocols they use. EarthLink's projects combine mesh and point-to-multipoint networks. Most of its proposals incorporate radio transmitters on light poles throughout the city, which create the cloud of wireless signals. Radio antennas on tall build-

ings or towers also communicate to smaller antennas placed throughout the cloud. These point-to-multipoint antennas provide the backhaul, carrying the data from the cloud to the wired Internet.

15. Almost always, once a city has made a choice about who will build, run and maintain the network, the final step is a pilot program. A pilot program is like a preview or a test run of a smaller version of the network. It's generally a fraction of the size of the final project, and it lets the city to make sure the network is right for them.

(By Tracy V. Wilson)

13. Fill in suitable words from the box.

inexpensive, low-cost, investment, equipment, automated, reports, real-time, easier

Wireless Network Applications

Free or (1) ... Internet access is great, but it's only a fraction of what a municipal network can do. In rural areas, wireless networks can give farmers (2) ... access to security cameras and controls for irrigation and other systems. Networks can make (3) ... Voice over IP (VoIP) phone calls more practical, which can save money for people, businesses and the government. Networks can also make city workers' jobs substantially (4) ... with applications like (5) ... meter reading. Building, fire and restaurant inspectors can file (6) ... without returning to the office, cutting down on their travel time. This is another way that cities can see a return on their (7) ... in the network — they save money on travel, (8) ... and fees paid for existing communications networks.

(By Tracy V. Wilson)

14. Render the following text in English.

Что такое WiFi технология?

WiFi — (аббревиатура от «Wireless Fidelity») — это набирающий обороты формат передачи цифровых данных по радиоканалам. Технология WiFi постоянно совершенствуется, что позволяет передавать больший поток данных, обеспечивает более надежную связь и защиту. Последнее время WiFi технологиями снабжаются ноутбуки, сотовые телефоны, КПК, игровые приставки и даже компьютерные мыши.

Применения WiFi достаточно универсальны, она может быть использована там, где нежелательно или нет возможности сделать проводную сеть. WiFi можно использовать для общего доступа в Интернет, например в небольшом офисе.

Технологию WiFi можно использовать и на достаточно больших расстояниях. Это осуществляется за счет антенн. Антенны бывают направленные и секторные. Направленные антенны используется для соединения двух точек доступа. Они могут передавать сигнал на очень большие расстояния, причем даже не обязательна прямая видимость, но сигнал может очень сильно портиться.

Секторные антенны служат для передачи данных на какую-то область. Есть несколько модификаций антенн, способных отсылать сигнал до 360 градусов. Но они существенно уступают направленным антеннам в дистанции передачи сигнала и, зачастую, в его качестве.

Конечно, у WiFi технологии существуют и недостатки. Один из них — маленькая скорость передачи данных, особенно если этот WiFi-канал одновременно использует несколько человек. Ещё один существенный минус WiFi — он разрешен не во всех странах. А в некоторых странах любой WiFi-канал требует обязательной регистрации. За нелегальный канал вас могут оштрафовать и конфисковать оборудование.

(«Мир беспроводных технологий»,
www.asusrouter.ru)

LANGUAGE FOCUS 23

GIVING ADVICE

There are several ways to advise someone to do something.

1. Using an imperative.

Example:

Use WiFi to connect your computers at home.

Read other articles on networking.

2. Using the modal verb **should**.

Example:

You **should** use WiFi to connect your computers at home.

3. Using the verb **recommend**.

Example:

I **recommend** using WiFi to connect your computers at home.

4. You can also use:

I **recommend that** you use WiFi to connect your computers at home.

I **advise you to** use WiFi to connect your computers at home.

5. Or phrases such as:

The best thing to do is to use WiFi to connect your computers at home.

15. Study these steps to take before you phone for technical support. Rewrite each one using the clue given.

1. Reboot your PC to see if the problem recurs. (should)
2. Use your PC's on-board diagnostic and repair tools. (recommend)
3. Record the details of the problem so you can describe it accurately. (good idea)
4. Note your system's model name and serial number. (advise)
5. Keep a record of hardware and software you've installed along with any changes you've made to settings. (strongly recommend)
6. If you think hardware may be at fault, figure out how to open the case. (should)
7. Visit the vendor's website and check the FAQs. (best thing)
8. Avoid phoning in peak times. (never)
9. Have your system up and running and be near it when you call. (good idea)
10. When you reach a technician, tell him or her if you may have caused the problem. (advise)

UNIT 24

PART 3. WIFI HOTSPOTS

If you want to take advantage of public WiFi hotspots or start a wireless network in your home, the first thing you'll need to do is make sure your computer has the right gear. Most new laptops and many new desktop computers come with built-in wireless transmitters. If your laptop doesn't, you can buy a wireless adapter that plugs into the PC card slot or USB port. Desktop computers can use USB adapters, or you can buy an adapter that plugs into the PCI slot inside the computer's case. Many of these adapters can use more than one 802.11 standard.

Once you've installed your wireless adapter and the drivers that allow it to operate, your computer should be able to automatically discover existing networks. This means that when you turn your computer on in a WiFi hotspot, the computer will inform you that the network exists and ask whether you want to connect to it. If you have an older computer, you may need to use a software program to detect and connect to a wireless network.

Being able to connect to the Internet in public hotspots is extremely convenient. Wireless home networks are convenient as well. They allow you to easily connect multiple computers and to move them from place to place without disconnecting and reconnecting wires. In the next part, we'll look at how to create a wireless network in your home.

If you already have several computers networked in your home, you can create a wireless network with a wireless access point. If you have several computers that are not networked, or if you want to replace your Ethernet network, you'll need a wireless router. This is a single unit that contains:

- A port to connect to your cable or DSL modem;
- A router;
- An Ethernet hub;
- A firewall;
- A wireless access point.

A wireless router allows you to use wireless signals or Ethernet cables to connect your computers to one another, to a printer and to the Internet. Most routers provide coverage for about 100 feet (30.5 meters) in all directions, although walls and doors can block the signal. If your home is very large, you can buy inexpensive range extenders or repeaters to increase your router's range.

As with wireless adapters, many routers can use more than one 802.11 standard. 802.11b routers are slightly less expensive, but because the standard is older, they're slower than 802.11a, 802.11g and 802.11n routers. Most people select the 802.11g option for its speed and reliability.

Once you plug in your router, it should start working at its default settings. Most routers let you use a Web interface to change your settings. You can select:

The name of the network, known as its service set identifier (SSID) — The default setting is usually the manufacturer's name.

The channel that the router uses — Most routers use channel 6 by default. If you live in an apartment and your neighbors are also using channel 6, you may experience interference. Switching to a different channel should eliminate the problem.

Your router's security options — Many routers use a standard, publicly available sign-on, so it's a good idea to set your own username and password.

Security is an important part of a home wireless network, as well as public WiFi hotspots. If you set your router to create an open hotspot, anyone who has a wireless card will be able to use your signal. Most people would rather keep strangers out of their network, though. Doing so requires you to take a few security precautions.

It's also important to make sure your security precautions are current. The Wired Equivalency Privacy (WEP) security measure was once the standard for WAN security. The idea behind WEP was to create a wireless security platform that would make any wireless network as secure as a traditional wired network. But hackers discovered vulnerabilities in the WEP approach, and today it's easy to find applications and programs that can compromise a WAN running WEP security.

To keep your network private, you can use one of the following methods:

1. WiFi Protected Access (WPA) is a step up from WEP and is now part of the 802.11i wireless network security protocol. It uses temporal key integrity protocol (TKIP) encryption. As with WEP, WPA security involves signing on with a password. Most public hotspots are either open or use WPA or 128-bit WEP technology, though some still use the vulnerable WEP approach.

2. Media Access Control (MAC) address filtering is a little different from WEP or WPA. It doesn't use a password to authenticate users — it uses a computer's physical hardware. Each computer has its own unique MAC address. MAC address filtering allows only machines with specific MAC addresses to access the network. You must specify which addresses are allowed when you set up your router. This method is very secure, but if you buy a new computer or if visitors to your home want to use your network, you'll need to add the new machines' MAC addresses to the list of approved addresses. The system isn't foolproof. A clever hacker can spoof a MAC address — that is, copy a known MAC address to fool the network that the computer he or she is using belongs on the network.

Wireless networks are easy and inexpensive to set up, and most routers' Web interfaces are virtually self-explanatory.

(By Marshall Brain and Tracy V. Wilson)

Essential vocabulary (3), (4)

Words

approved *adj*	disconnect *v*	self-explanatory *adj*
authenticate *v*	discover *v*	sign-on *n*
built-in *adj*	foolproof *adj*	spoof *v*

channel *n*
compromise *v*
coverage *n*
current *adj*
default *n*
detect
gear *n*
keep out (of) *v*
option *n*
reconnect *v*
replace *v*
unit *n*
username *n*
TKIP
WEP
WPA

Word Combinations

to come with built-in wireless transmitter
to plug into the PC card / PCI slot
existing networks
to use smth. by default
public hotspot
wireless access point
to replace Ethernet network
to provide coverage for … feet
a range extender
to select option
to work at default settings
to use a Web interface
to detect and connect to a wireless network
to set one's own username and password
to switch to a different channel
to create an open hotspot
to take security precautions
the Wired Equivalency Privacy
to discover vulnerabilities
to keep smth. private
WiFi Protected Access
temporal key integrity protocol
a list of approved addresses
to spoof a MAC address
a self-explanatory interface

EXERCISES

1. Find in parts 3 and 4 of text 2 English equivalents for the following words and phrases:

воспользоваться общественными точками доступа WiFi; иметь нужное оборудование; поставляться со встроенным беспроводным передатчиком; купить беспроводной адаптер; автоматически обнаруживать существующие сети; обнаруживать и подключаться к беспроводной сети; переносить компьютер с места на место; без отсоединения и повторного подключения; создание беспроводной сети; брандмауер; обеспечивать зону покрытия во всех направлениях; блокировать сигнал; недорогой расширитель диапазона; работать с установками по умолчанию; менять настройки; использовать по умолчанию шестой канал; устранять проблему; использовать стандартный ввод пароля; открытая точка доступа; не позволять незнакомцам пользоваться сетью; современные меры предосторожности;

безопасность, аналогичная защите проводных сетей; такой же безопасный, как и … ; обнаруживать слабые места; чтобы сохранить вашу сеть частной; защищённый доступ WiFi; использовать шифрование на основе протокола сохранности временного ключа; фильтрация MAC-адресов; использовать пароль для аутентификации пользователя; иметь уникальный MAC-адрес; добавлять новые MAC-адреса в список разрешенных адресов; практически не требующий пояснений интерфейс.

2. Transcribe and learn to read the following words:

wireless, router, firewall, coverage, slightly, reliability, default, eliminate, equivalency, authenticate, explanatory, private.

3. Write the Past Indefinite and the Past Participle of the verbs:

want, make, buy, plug, operate, discover, detect, create, increase, select, set, keep, find, specify, spoof.

4. Find in parts 3 and 4 of text 2 synonyms to the following words and word combinations:

integrated, to detect, to set up, to make, to substitute, to stop, somewhat, to do away, present-day, confidential, to define, unfailing.

5. Find in parts 3 and 4 of text 2 antonyms to the following words:

to stay, to interdict, unreliability, to remain, non-interference, sanctioned (adj).

6. Write the expansions of the following abbreviations and learn them:

USB, PCI, DSL, SSID, WEP, WPA, TKIP, MAC address.

7. Below you can see definitions with one word missing in each of them. Use the words from the box to fill in the gaps.

unauthorized, external, graphical, electromagnetic, incompatible, high-speed

1. *DSL* — a recently developed (late 1990s) digital communications technology that can provide ... transmissions over standard copper telephone wiring.

2. *Firewall* — a security system intended to protect an organization's network against ... threats, such as hackers, coming from another network, such as the Internet.

3. *Channel* — a medium for transferring information. Depending on its type, a communications channel can carry information (data, sound, and / or video) in either analog or digital form. A communications channel can be a physical link, such as the cable connecting two stations in a network, or it can consist of some ... transmission on one or more frequencies within a bandwidth in the electromagnetic spectrum, as in radio and television, or in optical, microwave, or voice-grade communication.

4. *Encryption* — the process of encoding data to prevent ... access, especially during transmission.

5. *Interface* — software that enables a program to work with the user (the user interface, which can be a command-line interface, menu-driven interface, or a ... user interface), with another program such as the operating system, or with the computer's hardware.

6. *Adapter* — a device that allows two or more ... devices to be connected together.

8. Translate the passages in writing.

A) If you want to take advantage of public WiFi hotspots or start a wireless network in your home, the first thing you'll need to do is make sure your computer has the right gear. Most new laptops and many new desktop computers come with built-in wireless transmitters. If your laptop doesn't, you can buy a wireless adapter that plugs into the PC card slot or USB port.

B) It's also important to make sure your security precautions are current. The Wired Equivalency Privacy (WEP) security measure was once the standard for WAN security. The idea behind WEP was to create a wireless security platform that would make any wireless network as secure as a traditional wired network. But hackers discovered vulnerabilities in the WEP approach, and today it's easy to find applications and programs that can compromise a WAN running WEP security.

9. Answer the following questions using the information from parts 3 and 4 of text 2.

1. What should you do first if you want to take advantage of public WiFi hotspots or start a wireless network in your home? 2. What will computer do if you turn it on in a WiFi hotspot? 3. What do wireless home networks allow you to do? 4. What do you need if you have several computers that are not networked, or if you want to replace your Ethernet network? 5. What does a wireless router contain? 6. What coverage do most wireless routers provide? 7. What can you do to increase your router's range? 8. What settings can you change in most routers? 9. What is an important part of a home wireless network as well as public WiFi hotspots? 10. What measure was once the standard for WAN security? 11. What methods can you use to keep your network private? 12. How does MAC address filtering differ from WPA? 13. What does it mean «to spoof a MAC address»?

10. Look through parts 3 and 4 of text 2 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. Most new laptops and many new desktop computers never come with built-in wireless transmitters.	☐
2. Once the wireless adapter and the drivers that allow it to operate have been installed, the computer is able to automatically discover existing networks.	☐
3. Being able to connect to the Internet in public hotspots is absolutely inconvenient.	☐
4. Wireless home networks allow you to easily connect multiple computers and to move them from place to place without disconnecting and reconnecting wires.	☐
5. A wireless router is a single unit that contains a port to connect to your cable or DSL modem, a router and a firewall.	☐
6. Most wireless routers provide coverage for about 50 meters in all directions and walls and doors can't block the signal.	☐
7. You may change settings in most routers by using a Web interface.	☐
8. The Wired Equivalency Privacy security measure was once the standard for WAN security.	☐

9. WiFi Protected Access and MAC address filtering don't keep the network private. ☐

10. MAC address filtering also uses a password to authenticate users. ☐

11. Make summary of parts 3 and 4 of text 2.

12. Read the text and match each paragraph with the appropriate summary.

a ☐ WiMAX is the next generation of wireless technology that improves data transmission speeds.

b ☐ It's becoming a common thing to hop on a bus and connect to the Internet through a bus network.

c ☐ WiFi is becoming a more pervasive feature in everyday life, but not everyone has easy access to the Internet.

d ☐ On the bus data transmission rates are slow compared to a stationary wired connection.

e ☐ A company called United Villages sends a bus containing computers that link to the Web server to remote communities.

f ☐ This technology helps people living in remote villages stay in touch.

g ☐ The people living in some impoverished or remote regions aren't able to jump online any time they want.

h ☐ The next time the bus reaches the remote community, it updates the Web servers.

Can you make a WiFi network out of a bus?

1. Whether you believe technology is connecting human beings across the globe or turning us all into dependent tech junkies, it's impossible to deny that WiFi is becoming a more pervasive feature in everyday life. It's not unusual to find WiFi connections in airports, coffee shops, hotel rooms and even public parks. But not everyone in the world has easy access to the Internet.

2. Some impoverished or remote regions don't have the infrastructure to connect to the Internet. While companies try to build out infrastructure to these areas using physical cables, satellite

linkups and broadcast towers, the people living in these regions right now aren't able to jump online any time they want.

3. To help people in places like Costa Rica and Rwanda connect to the Internet, a company called United Villages has developed a simple approach. The company sells Web servers to remote communities. People in those communities can post messages, place orders and perform other online activities. But the catch is that the server isn't connected to the Internet. Instead, United Villages sends a vehicle — a bus — to the community. The bus contains computers that link to the Web server and pull data from it.

4. When the bus reaches a town with a connection to the Internet, the computers inside upload the stored information to the network. The computers also receive requested information. The next time the bus reaches the remote community, it updates the Web servers and the process begins again. Think of it as an Internet connection with serious lag issues.

5. Meanwhile, in other parts of the world, it's becoming more common to hop on a bus and connect to the Internet through a bus network. The Greyhound bus line launched WiFi service on some routes back in 2008. Even some schools in the United States have buses outfitted with wireless routers to provide WiFi service.

6. How do they do it? The routers connect to cellular modems that transmit data to cell phone towers. Data transmission rates are slow compared to a stationary wired connection — you wouldn't want to try to watch a streaming movie or play an online first-person shooter game on the bus. But for the techno geek on the go it's almost a necessity.

7. The next generation of wireless technology will improve connection speeds. Several cities already have WiMAX networks, LTE towers or both. These competing technologies boast faster data transmission speeds than cellular 3G networks. They're also capable of conducting handovers. That's the process of one WiMAX, LTE or cellular transmitter handing a connection over to a second transmitter. Without this capability, you'd be confined to the area covered by one transmitter's range of operation.

8. Does this technology help us stay in touch or is it actually closing us off to human contact? It's pretty a safe bet that people living in remote villages probably have a different opinion on the subject from the urban technologist with a smartphone in hand.

(By Jonathan Strickland)

13. Fill in suitable words from the box.

vulnerable, debatable, encryption, password-protected, open, wireless, secure, free

Detecting Wireless Piggybacking

The first and simplest thing you can do is check out your **(1)** ... network connection and see if it's **(2)** ... . When you install your router, you're given the option of setting a wireless **(3)** ... protocol (WEP) key. Basically this is a **(4)** ... method for you to log on to your own wireless network. If you don't have one, you're operating an **(5)** ... network. That means anyone within range can use your wireless for **(6)** ... . While it's not hacking, it is **(7)** ... as to whether this is actually stealing. In any case, if you don't have a WEP key, you're **(8)** ... to WiFi squatting and certainly not deterring squatters.

(By Josh Briggs)

14. Render the following text in English.

Сети WiFi. Стандарты и технологии

Первый стандарт беспроводных сетей 802.11 был одобрен Институтом инженеров по электротехнике и радиоэлектронике (IEEE) в 1997 году и поддерживал скорость передачи данных до 2-х Мбит / с. Используемые технологические схемы модуляции стандарта: псевдослучайная перестройка рабочей частоты (FHSS — Frequency Hopping Spread Spectrum) и широкополосная модуляция с прямым расширением спектра (DSSS — Direct Sequence Spread Spectrum).

Далее, в 1999 году, IEEE одобрил еще два стандарта беспроводных сетей WiFi: 802.11a и 802.11b. Стандарт 802.11a работает в частотном диапазоне 5 ГГц со скоростью передачи данных до 54 Мбит / с. Данный стандарт построен на основе технологии цифровой модуляции ортогонального мультиплексирования с разделением частот (OFDM — Orthogonal Frequency Division Multiplexing). Стандарт 802.11b использует диапазон частот 2.4 ГГц и достигает скоростей передачи данных до 11 Мбит / с. В отличие от стандарта 802.11a, схема стандарта 802.11b построена по принципу DSSS.

Поскольку реализовать схему DSSS легче, нежели чем OFDM, то и продукты, использующие стандарт 802.11b, начали появляться на рынке раньше (с 1999 года). С тех пор продукты, работающие по беспроводному протоколу радиодоступа и использующие стандарт 802.11b, широко использовались в корпорациях, офисах, дома, в загородных коттеджах, в общественных местах (хот-споты) и т. д. На всех продуктах, прошедших сертификацию альянса совместимости беспроводного оборудования Ethernet (WECA — Wireless Ethernet Compatibility Alliance), имеется соответствующая отметка с официально зарегистрированным логотипом WiFi. Альянс WECA (или Wi-Fi Alliance) включает в себя всех основных производителей беспроводных устройств на основе технологии WiFi. Альянс занимается тем, что сертифицирует, маркирует, а также тестирует на совместимость оборудование, применяющее технологии WiFi.

В начале 2001 года Федеральная Комиссия Связи Соединенных Штатов (FCC — Federal Communications Commission) ратифицировала новые правила, благодаря которым разрешается дополнительная модуляция в диапазоне 2.4 ГГц. Это позволило IEEE расширить стандарт 802.11b, что привело к поддержке более высоких скоростей для передачи данных. Таким образом, появился стандарт 802.11g, который работает со скоростью передачи данных до 54 Мбит / с и использует технологию ODFM.

(«Мир беспроводных технологий», www.asusrouter.ru)

LANGUAGE FOCUS 24

REQUIREMENTS :

NEED TO, HAVE TO, MUST, BE + ESSENTIAL, CRITICAL

We describe requirements for particular jobs using different ways:

1. NEED TO. It expresses necessity and corresponds to the Russian «нужно».

Example:

You **need to** be able to empathize with the person at the other end of the phone.

To express absence of necessity we use the negative form.

Example:

You **don't need to** have a degree in computing science.

We can also treat **need** as a modal verb and use the negative form **needn't**.

Example:

You **needn't** have a degree in computing science.

There is a slight difference in the usage of these forms. As an ordinary verb, **need** is used mainly when the following infinitive denotes habitual action. As a modal verb, it is more common when one particular occasion is referred to.

2. HAVE TO. It expresses obligation or necessity arising out of circumstances and corresponds to the Russian «приходится, вынужден».

Example:

IT managers **have to** take responsibility for budgets.

Have to is an ordinary verb. Its negative form is made in the usual way.

Example:

You **don't have to** be an expert in everything.

3. MUST. It expresses obligation or necessity and corresponds to the Russian «надо, нужно, должен».

Example:

You **must** work for at least two years in systems analysis.

The negative form **mustn't** has a quite different meaning. It means it is important not to do something. It is used for warnings, rules and strong advice.

Example:

You **mustn't** make unauthorized copies of software.

4. BE + ESSENTIAL / CRITICAL

Example:

Experience with mainframes **is essential / critical.**

15. Fill in the appropriate form of the verbs, *need to*, *have to* and *must,* to make sensible statements. More than one answer is possible in some examples.

1. If you want to start a wireless network, the first thing you ... to do is to make sure your computer has the right gear.

2. You ... become an expert in too narrow a field.

3. If you have an older computer, you ... to use a software program to detect and connect to a wireless network.

4. You … be an expert in hardware to become a programmer.

5. You will … to use a wireless router if you want to replace your Ethernet network.

6. You … be able to show leadership.

7. To be able to communicate via a single link between the switches you … use a process called trunking.

8. You … to have experience in JavaScript.

9. Data from a computer on VLAN A that … to get to a computer on VLAN B … travel from the switch to the router and back again to the switch.

10. These days you … study BASIC.

11. Identifiers and configurations for a VLAN … properly be prepared for it to function as expected.

12. Technical qualifications … to be renewed at intervals to ensure they do not go out of date.

13. When any two devices … to talk to each other, they … to agree on a number of points.

14. You … to have good communication skills to become an IT Manager.

15. All of the parties in an electronic discussion … to know what the bits mean.

16. You … have worked with IBM mainframes for at least two years.

17. The user … to press a button or give a command — the electronic conversation happens automatically.

18. You … have a degree but it … be in computing science.

19. People who send sensitive information over a wireless connection … to take precautions to make sure those signals aren't intercepted.

20. You … be able to use C++.

UNIT 25

TEXT 3

WIMAX

PART 1. INTRODUCTION TO WIMAX

Think about how you access the Internet today. There are basically three different options:

- **Broadband access** — In your home, you have either a DSL or cable modem. At the office, your company may be using a T1 or a T3 line.
- **WiFi access** — In your home, you may have set up a WiFi router that lets you surf the Web while you lounge with your laptop. On the road, you can find WiFi hotspots in restaurants, hotels, coffee shops and libraries.
- **Dial-up access** — If you are still using dial-up, chances are that either broadband access is not available, or you think that broadband access is too expensive.

The main problems with broadband access are that it is pretty expensive and it doesn't reach all areas. The main problem with WiFi access is that hotspots are very small, so coverage is sparse.

What if there were a new technology that solved all of these problems? This new technology would provide:

- The high speed of broadband service.
- Wireless rather than wired access, so it would be a lot less expensive than cable or DSL and much easier to extend to suburban and rural areas.
- Broad coverage like the cell phone network instead of small WiFi hotspots.

This system is actually coming into being right now, and it is called WiMAX. WiMAX is short for Worldwide Interoperability for Microwave Access, and it also goes by the IEEE name 802.16.

WiMAX has the potential to do to broadband Internet access what cell phones have done to phone access. In the same way that many people have given up their «land lines» in favor of cell phones, WiMAX could replace cable and DSL services, providing universal Internet access just about anywhere you go. WiMAX will also be as painless as WiFi — turning your computer on will automatically connect you to the closest available WiMAX antenna.

In this article, we'll find out how WiMAX works, what engineers are doing to make it better and what it could mean for the future of wireless Internet.

PART 2. WIMAX WIRELESS NETWORK

In practical terms, WiMAX would operate similar to WiFi but at higher speeds, over greater distances and for a greater number of users. WiMAX could potentially erase the suburban and rural blackout areas that currently have no broadband Internet access because phone and cable companies have not yet run the necessary wires to those remote locations.

A WiMAX system consists of two parts:

- A **WiMAX tower**, similar in concept to a cell-phone tower — A single WiMAX tower can provide coverage to a very large area — as big as 3,000 square miles (~8,000 square km).
- A **WiMAX receiver** — The receiver and antenna could be a small box or PCMCIA card, or they could be built into a laptop the way WiFi access is today.

A WiMAX tower station can connect directly to the Internet using a high-bandwidth, wired connection (for example, a T3 line). It can also connect to another WiMAX tower using a line-of-sight, microwave link. This connection to a second tower (often referred to as a backhaul), along with the ability of a single tower to cover up to 3,000 square miles, is what allows WiMAX to provide coverage to remote rural areas (Fig. 19).

What this points out is that WiMAX actually can provide two forms of wireless service:

1) There is the **non-line-of-sight**, WiFi sort of service, where a small antenna on your computer connects to the tower. In this mode, WiMAX uses a lower frequency range — 2 GHz to 11 GHz (similar to WiFi). Lower-wavelength transmissions are not as easily disrupted by physical obstructions — they are better able to diffract, or bend, around obstacles.

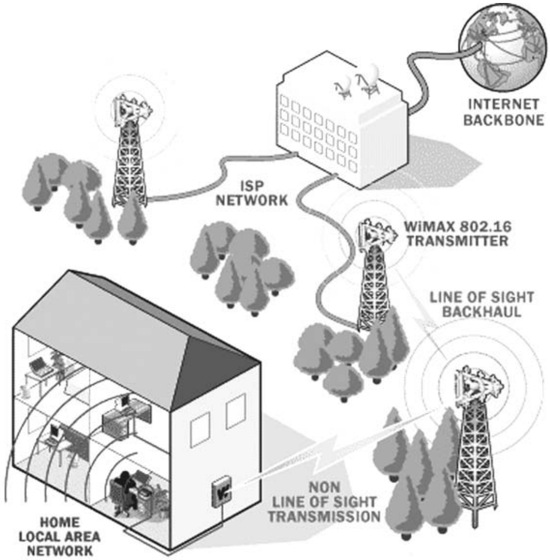


Fig. 19
How WiMax works

2) There is **line-of-sight** service, where a fixed dish antenna points straight at the WiMAX tower from a rooftop or pole. The line-of-sight connection is stronger and more stable, so it's able to send a lot of data with fewer errors. Line-of-sight transmissions use higher frequencies, with ranges reaching a possible 66 GHz. At higher frequencies, there is less interference and lots more bandwidth.

WiFi-style access will be limited to a 4-to-6 mile radius (perhaps 25 square miles or 65 square km of coverage, which is similar in range to a cell-phone zone). Through the stronger line-of-sight antennas, the WiMAX transmitting station would send data to WiMAX-enabled computers or routers set up within the transmitter's 30-mile radius (2,800 square miles or 9,300 square km of coverage). This is what allows WiMAX to achieve its maximum range.

The final step in the area network scale is the global area network (GAN). The proposal for GAN is IEEE 802.20. A true GAN would work a lot like today's cell phone networks, with users able to travel across the country and still have access to the network the whole time. This network would have enough bandwidth to offer Internet access comparable to cable modem service, but it would be accessible to mobile, always-connected devices like laptops or next-generation cell phones.

Essential vocabulary (1), (2)

Words

accessible *adj*
backhaul *n*
bend *v*
comparable (to) *adj*
diffract *v*
disrupt *v*
erase *v*
extend *v*
give up *v*
high-bandwidth *adj*

line-of-sight *adj*
lounge *v*
microwave *adj, n*
mode *n*

obstacle *n*
obstruction *n*
painless *adj*
point (at) *v*

remote *adj*
rural *adj*
sparse *adj*
stable *adj*
straight *adv*
suburban *adj*
tower *n*
GAN
WiMAX

Word Combinations

broadband access
to find a WiFi hotspot
on the road
dial-up access
sparse / broad coverage
to extend to suburban / rural area
to come into being
a land line
in favor of
the closest available WiMAX antenna
to make better
a remote location
to erase blackout areas
non-line-of-sight / line-of-sight service

WiMAX tower / receiver
to be similar in concept to smth.
to provide coverage
to connect directly to smth.
line-of-sight / microwave link
a next-generation cell phone

lower frequency range
a physical obstruction / obstacle
dish antenna
higher frequencies

cell-phone zone
to achieve one's maximum range
the final step in smth.

EXERCISES

1. Find in parts 1 and 2 of text 3 English equivalents for the following words and phrases:

широкополосный доступ; использовать линию Т-3; сидеть в Интернете; во время путешествия; доступ по коммутируемой телефонной линии; что если бы была новая технология ... ; намного легче расширить до загородных и сельских районов; широкое покрытие; общемировая совместимость широкополосного беспроводного доступа; отказываться от наземных линий связи в пользу сотовых телефонов; заменять кабельные и цифровые абонентские линии; подключать к ближайшей доступной антенне WiMAX; улучшить WiMAX; будущее беспроводного Интернета; работать на более высоких скоростях и для большего числа пользователей; тянуть необходимые провода в отдалённые места; телефонные и кабельные компании; обеспечивать покрытие очень большой зоны; быть встроенным в ноутбук; проводное соединение с высокой пропускной способностью; использовать линию СВЧ-связи, работающую в пределах прямой видимости; режим непрямой видимости; использовать нижний частотный диапазон; низкочастотная передача; физические препятствия; дифрагировать или огибать препятствия; стационарная параболическая антенна; передавать много данных с меньшим количеством ошибок; более мощные антенны, работающие в пределах прямой видимости; достигать максимальной зоны охвата; глобальная компьютерная сеть; все время иметь доступ к сети; всегда подключённые устройства; сотовые телефоны следующего поколения.

2. Transcribe and learn to read the following words:

either, lounge, suburban, microwave, concept, backhaul, obstruction, achieve, disrupt, actually.

3. Write the Past Indefinite and the Past Participle of the verbs:

think, access, surf, lounge, reach, provide, extend, give, mean, run, bend, cover, erase, replace.

4. Find in parts 1 and 2 of text 3 synonyms to the following words and word combinations:

high-priced, country (adj), in lieu of, global, to forgo, possibility, to supply, pain-free, like (adj), distant, straight (adv), hindrance.

5. Find in parts 1 and 2 of text 3 antonyms to the following words and word combinations:

urban, painful, to make worse, close (adj), disabled, initial (adj).

6. Write the expansions of the following abbreviations and learn them:

WiMAX, PCMCIA, GAN.

7. Match the verbs on the left with the action or state they denote on the right.

1. Think	a) To destroy all traces of; remove completely.
2. Use	b) To arrive at or get to (a place, person, etc.) in the course of movement or action.
3. Surf	c) To renounce (an activity, belief, etc.).
4. Reach	d) To put at the disposal of; furnish or supply.
5. Solve	e) To pass (time) lazily or idly.
6. Extend	f) To gain knowledge of (something); learn.
7. Provide	g) To denote or connote; signify; represent.
8. Give up	h) To consider, judge, or believe.
9. Find out	i) To find the explanation for or solution to (a mystery, problem, etc.).
10. Erase	j) To put into service or action.
11. Lounge	k) To reach a certain point in time or distance.
12. Mean	l) To move freely from website to website.

8. Translate the passages in writing.

A) WiMAX has the potential to do to broadband Internet access what cell phones have done to phone access. In the same way that many people have given up their «land lines» in favor of cell phones, WiMAX could replace cable and DSL services, providing universal Internet access just about anywhere you go. WiMAX will also be as painless as WiFi — turning your computer on will automatically connect you to the closest available WiMAX antenna.

B) There is line-of-sight service, where a fixed dish antenna points straight at the WiMAX tower from a rooftop or pole. The line-of-sight connection is stronger and more stable, so it's able to send a lot of data with fewer errors. Line-of-sight transmissions use higher frequencies, with ranges reaching a possible 66 GHz. At higher frequencies, there is less interference and lots more bandwidth.

9. Use the information from parts 1 and 2 of text 3 to complete the dialogue in your own words.

A: What are three different options to access the Internet today?

B : …
A : What are the main problems with broadband access?
B : …
A : And what is the main problem with WiFi access?
B : …
A : What new technology can provide the high speed, wireless access and broad coverage?
B : …
A : What the potential does WiMAX have?
B : …
A : What is the difference between WiMAX and WiFi?
B : …
A : How many parts does a WiMAX system consist of? What are they?
B : …
A : How many miles can a single WiMAX tower cover?
B : …
A : What forms of wireless service can WiMAX provide?
B : …
A : In what mode does WiMAX use a lower frequency range?
B : …
A : What can you say about line-of-sight service?
B : …
A : What is GAN?
B : …

10. Look through parts 1 and 2 of text 3 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. There are basically two different options to access the Internet today. ☐
2. The main problems with broadband access are that it is rather expensive and it doesn't reach all areas. ☐
3. The main advantage of WiFi access is that hotspots are very large, so coverage is broad. ☐
4. WiMAX doesn't provide the high speed, wireless access and broad coverage. ☐
5. WiMAX also goes by the IEEE name 802.16. ☐
6. WiMAX could replace cable and DSL services, providing universal Internet access. ☐

7. WiMAX operates similar to WiFi but at lower speeds, over small distances and for a smaller number of users. ☐
8. A WiMAX system consists of two parts: a WiMAX tower and a WiMAX receiver. ☐
9. A single WiMAX tower can provide coverage to a very large area — as big as 5,000 square miles. ☐
10. Non-line-of-sight transmissions use higher frequencies, with ranges reaching a possible 66 GHz. ☐
11. The final step in the area network scale is the universal area network (UAN) ☐
12. A true GAN would work a lot like today's cell phone networks, with users able to travel across the country and still have access to the network the whole time. ☐

11. Make summary of parts 1 and 2 of text 3.

12. Read the text and fill in suitable prepositions in paragraphs 1, 4, 7 and 9.

Skip through the text and find the passages where the following ideas are expressed:

a) Concerns about WiMAX success. ☐
b) Fixed wireless standard. ☐
c) Limitation of broadband access. ☐
d) Amendment to the 802.16-2004 specification. ☐
e) The first mobile WiMAX chip. ☐
f) Base stations and customer premise units. ☐
g) Lagging of mobile WiMAX. ☐
h) An inexpensive alternative to DSL and cable broadband access. ☐
i) Frequencies of WiMAX technology. ☐

WiMAX Technology

1. Although broadband has been available ... some time, access ... most people is still limited. ... the end of 2002, it was estimated that only 46 million subscribers worldwide had broadband access, with only 17% ... households ... the USA being connected. Moreover, the problem isn't one of demand, but of supply.

2. Worldwide Interoperability of Microwave Access (WiMAX) is a fast-emerging wide-area wireless broadband technology that shows great promise as the last mile solution for delivering high-speed Internet access to the masses. It represents an inexpensive alternative to digital subscriber lines (DSL) and cable broadband access, the installation costs for a wireless infrastructure based

on IEEE 802.16 being far less than today's wired solutions, which often require laying cables and ripping up buildings and streets.

3. Wireless broadband access is set up like cellular systems, using base stations that service a radius of several miles/kilometres. Base stations do not necessarily have to reside on a tower. More often than not, the base station antenna will be located on a rooftop of a tall building or other elevated structure such as a grain silo or water tower. A customer premise unit, similar to a satellite TV setup, is all it takes to connect the base station to a customer. The signal is then routed via standard Ethernet cable either directly to a single computer, or to an 802.11 hot spot or a wired Ethernet LAN.

4. The original 802.16 standard operates ... the 10-66GHz frequency band and requires line-of-sight towers. The 802.16a extension, ratified ... January 2003, uses a lower frequency ... 2-11GHz, enabling non-line-of-sight connections. This constitutes a major breakthrough ... wireless broadband access, allowing operators to connect more customers ... a single tower and thereby substantially reduce service costs.

5. The IEEE 802.16-2004 standard subsequently revised and replaced the IEEE 802.16a and 802.16REVd versions. This is designed for fixed-access usage models. This standard may be referred to as fixed wireless because it uses a mounted antenna at the subscriber's site. The antenna is mounted to a roof or mast, similar to a satellite television dish. IEEE 802.16-2004 also addresses indoor installations, in which case it may not be as robust as in outdoor installations.

6. The IEEE 802.16e standard is an amendment to the 802.16-2004 base specification and targets the mobile market by adding portability and the ability for mobile clients with appropriate adapters to connect directly to a WiMAX network.

7. ... early 2005, delays ... the start of certification testing had led ... concerns that WiMAX might yet struggle to gain market share as a result. ... that time, expectations were that the first standard for 802.16e to be signed off by the middle ... the year, for the first commercial 802.16e products to be available ... 2006 and for the first laptops integrating an Intel WiMAX chipset to appear the following year.

8. In the event, Intel launched its much-anticipated mobile WiMAX chip in July 2006, promising commercial trials of the chip in Europe by the end of the year. Rosedale 2 is a low-cost

system-on-chip that supports IEEE 802.16-2004 and IEEE 802.16e-2005, enabling WiMAX modems for use with fixed or mobile networks. Service providers can therefore choose to immediately deploy a mobile WiMAX network, or alternatively, deploy a fixed WiMAX network now that can be easily and cost-effectively upgraded to a mobile WiMAX network.

9. By mid-2006, while the planned deployment … fixed WiMAX networks … selected areas … the UK was well advanced, mobile WiMAX was lagging behind … development. Many … the mobile operators such as Orange and T-Mobile were promoting the rival HSDPA or Super 3G as the technology to bring high-speed, long-range wireless connectivity … laptops and handheld devices.

(By Marshall Brain)

13. Fill in suitable words from the box.

low-cost, high-speed, mobile, smartphones, next-generation, efficient, pervasive, camcorders

WiMAX Technology

WiMAX is the **(1)** … of wireless technology designed to enable **(2)** … , high-speed mobile Internet access to the widest array of devices including notebook PCs, handsets, **(3)** … , and consumer electronics such as gaming devices, cameras, **(4)** … , music players, and more. As the fourth generation **(4G)** of wireless technology, WiMAX delivers **(5)** … , open networks and is the first all IP mobile Internet solution enabling **(6)** … and scalable networks for data, video, and voice. As a major driver in the support and development of WiMAX, Intel has designed embedded WiMAX solutions for a variety of **(7)** … devices supporting the future of **(8)** … broadband on-the-go.

(By Marshall Brain)

14. Render the following text in English.

Что такое технология WiMax?

По оценкам специалистов и маркетологов компании Intel, в ближайшем будущем около миллиарда пользователей по всему миру будут подключены к Интернету с использованием технологии WiMax стандарта IEEE 802.16. Что же это за технология?

Консорциум WiMax Forum — основная некоммерческая организация, занимающаяся разработкой и сертификацией нового стандарта широкополосной Wireless-технологии в частотном диапазоне 10-66 Ггц. WiMax Forum был основан в 2001 году ведущими операторами связи и крупнейшими всемирно известными производителями электронного и телекоммуникационного оборудования. В данный момент, эта организация насчитывает несколько сотен членов, включая такие крупнейшие компании, как Intel, Fujitsu, AT&T, BT, Motorola, Samsung, Siemens Mobile и др.

Технологической основой WiMax (Worldwide Interoperability for Microwave Access), действительно, является новый протокол IEEE 802.16, который позволяет обеспечить одновременно широкополосный высокоскоростной доступ в Интернет и передачу данных, а также, и услуги телефонии без использования кабельных линий. В отличие от других технологий радиодоступа, WiMax позволяет работать в условиях плотной городской застройки вне прямой видимости базовой станции.

Еще один немаловажный плюс WiMax, в отличие от Wi-Fi — это зона покрытия, которая, при определенных условиях, может достигать 50 км. Поэтому, эта технология может быть полезна таким людям, для которых недоступен Интернет или даже обычная телефония, например, в отдаленных районах, где просто нет возможности провести кабельные сети или DSL.

(«Мир беспроводных технологий», www.asusrouter.ru)

LANGUAGE FOCUS 25

ABILITY : CAN, COULD, BE ABLE TO

In English there are different ways of describing ability:

1. To describe ability in the present **can** and **be able to** are used, but **can** is more common.

Example:

Swarming robots **can** work together to perform searches.

Washing machines **are able to** report any breakdowns for repair.

2. For general abilities in the past **could** is used.

Example:

Professor Warwick had a chip fitted into his arm which **could** activate sensors in doors and computers as he approached.

3. To describe an ability on a specific occasion in the past **was/were able to** is used.

Example:

Marconi **was able to** send a radio signal from Britain to Newfoundland.

Both verbs are possible for past negatives and questions.

Example:

Early computers **could not/were not able to** operate at high speeds.

Could they/were they able to store much data?

This table summarizes the ways to describe ability:

Ability		
present	**can**	**be able to**
future	—	**will be able to**
present perfect	—	**has/have been able to**
-ing form	—	**being able to**
past (specific action)	—	**was/were able to**
past (general and with verbs of sensation)	**could**	—

15. Read the text and fill in the correct form of *can* or *be able to*. In some cases there is more than one possible answer.

Imagine **(1)** ... open doors and switch on computers as you approach them. Professor Warwick **(2)** ... because he had an electronic chip fitted into his arm for a month. He **(3)** ... demonstrate to the press how computers would greet him with, 'Good morning, Professor Warwick' as he walked past. Next he wants to record the signals from his brain to his arm to see if he **(4)** ... program a computer to operate his arm. In the long term, this may help people who **(5)** ... use their limbs. His wife too will have a chip implanted. They hope **(6)** ... feed messages into each other's brains. According to the Professor, one day we **(7)** ... communicate directly with machines. If he is right, we **(8)** ... drive a car from the passenger seat and we **(9)** ... operate a computer without using a mouse or keyboard. However, there is also the alarming prospect that someone **(10)** ... hack into your brain.

UNIT 26

PART 3. WIMAX COVERAGE AND SPEED

WiMAX operates on the same general principles as WiFi — it sends data from one computer to another via radio signals. A computer (either a desktop or a laptop) equipped with WiMAX would receive data from the WiMAX transmitting station, probably using encrypted data keys to prevent unauthorized users from stealing access.

The fastest WiFi connection can transmit up to 54 megabits per second under optimal conditions. WiMAX should be able to handle up to 70 megabits per second. Even once that 70 megabits is split up between several dozen businesses or a few hundred home users, it will provide at least the equivalent of cable-modem transfer rates to each user.

The biggest difference isn't speed; it's distance. WiMAX outdistances WiFi by miles. WiFi's range is about 100 feet (30 m). WiMAX will blanket a radius of 30 miles (50 km) with wireless access. The increased range is due to the frequencies used and the power of the transmitter. Of course, at that distance, terrain, weather and large buildings will act to reduce the maximum range in some circumstances, but the potential is there to cover huge tracts of land.

IEEE 802.16 Specifications:

- Range — 30-mile (50-km) radius from base station.
- Speed — 70 megabits per second.
- Line-of-sight not needed between user and base station.
- Frequency bands — 2 to 11 GHz and 10 to 66 GHz (licensed and unlicensed bands).
- Defines both the MAC and PHY layers and allows multiple PHY-layer specifications.

PART 4. WIMAX COST

A citywide blanket coverage of wireless Internet access sounds great, but companies aren't going to go around setting up WiMAX base stations out of sheer kindness. Who's going to pay for WiMAX?

It depends how it will be used. There are two ways WiMAX can be implemented — as a zone for wireless connections that single users go to when they want to connect to the Internet on a laptop (the non-line-of-sight «super WiFi» implementation), or as a line-of-sight hub used to connect hundreds of customers to a steady, always-on, high-speed wireless Internet connection.

Under the «super WiFi» plan, cities might pay to have WiMAX base stations set up in key areas for business and commerce and then allow people to use them for free. They already do this with WiFi, but instead of putting in a bunch of WiFi hotspots that cover a few hundred square yards, a city could pay for one WiMAX base station and cover an entire financial district. This could provide a strong draw when city leaders try to attract businesses to their area.

Some companies might set up WiMAX transmitters and then make people pay for access. Again, this is similar to strategies used for WiFi, but a much wider area would be covered. Instead of hopping from one hotspot to another, WiMAX-enabled users could have Internet access anywhere within 30 miles of the WiMAX base station. These companies might offer unlimited access for a monthly fee or a «pay as you go» plan that charges on a per-minute or per-hour basis.

The high-speed wireless hub plan has the potential to be far more revolutionary. If you have high-speed Internet access now, it probably works something like this: The cable (or phone) company has a line that runs into your home. That line goes to a cable modem, and another line runs from the modem to your computer. If you have a home network, first it goes to a router and then on to the other computers on the network. You pay the cable company a monthly fee, which reflects in part the expense of running cable lines to every single home in the neighborhood.

PART 5. WIMAX TECHNOLOGY AT HOME

Here's what would happen if you got WiMAX. An Internet service provider sets up a WiMAX base station 10 miles from your home. You would buy a WiMAX-enabled computer or upgrade your old computer to add WiMAX capability. You would receive a special encryption code that would give you access to the base station. The base station would beam data from the Internet to your computer (at speeds potentially higher than today's cable modems), for which you would pay the provider a monthly fee. The cost for this service could be much lower than current high-speed Internet-subscription fees because the provider never had to run cables.

If you have a home network, things wouldn't change much. The WiMAX base station would send data to a WiMAX-enabled router, which would then send the data to the different computers on your network. You could even combine WiFi with WiMAX by having the router send the data to the computers via WiFi.

WiMAX doesn't just pose a threat to providers of DSL and cable-modem service. The WiMAX protocol is designed to accommodate several different methods of data transmission, one of which is Voice Over Internet Protocol (VoIP). VoIP allows people to make local, long-distance and even international calls through a broadband Internet connection, bypassing phone companies entirely. If WiMAX-compatible computers become very common, the use of VoIP could increase dramatically. Almost anyone with a laptop could make VoIP calls.

(By Marshall Brain and Ed Grabianowski)

Essential vocabulary (3), (4), (5)

Words

accommodate *v*	dramatically *adv*	put in *v*
beam *v*	encrypt *v*	reflect *v*
blanket *v*	equip *v*	revolutionary *adj*
bypass *v*	expense *n*	specification *n*
charge *v*	fee *n*	steady *adj*
circumstance *n*	go around *v*	terrain *n*
condition *n*	huge *adj*	tract *n*
define *v*	licensed *adj*	unlicensed *adj*
dozen *n*	outdistance *v*	VoIP

Word Combinations

encrypted data keys	to pay for access
to steal access	unlimited access for a monthly fee
unauthorized users	«pay as you go» plan
under optimal conditions	on per-minute / per-hour basis

to blanket a radius of … miles
to reduce the maximum range
in some circumstances
huge tracts of land
a licensed / an unlicensed band
blanket coverage
to do smth. out of sheer kindness
a steady / always-on connection
for free
to make a local / a long-distance / an international call
a cable modem
in part
a special encryption code
to beam data
to pose a threat to smb. / smth.
Voice over Internet Protocol
to bypass a phone company
a WiMAX-compatible computer
an entire financial district

EXERCISES

1. Find in parts 3, 4 and 5 of text 3 English equivalents for the following words and phrases:

работать по тем же самым основным принципам, что и WiFi; компьютер, оснащённый WiMAX; использовать ключи шифрования данных; предотвращать кражу доступа неавторизованными пользователями; в оптимальных условиях; несколько дюжин предприятий; эквивалент скорости передачи кабельного модема; обгонять на мили; благодаря используемым частотам; уменьшать максимальную зону охвата; покрывать огромные участки земли; лицензированный диапазон; физический уровень; полный охват города; приступать к установке базовых станций; устойчивое, всегда включённое, высокоскоростное беспроводное Интернет-соединение; бесплатно пользоваться ч-либо; вместо того, чтобы вводить в эксплуатацию множество точек доступа WiFi; покрыть целый финансовый квартал; заставлять людей платить за доступ; вместо того, чтобы перемещаться из одной точки доступа в другую; предлагать неограниченный доступ за ежемесячную плату; тарифный план с поминутной или почасовой оплатой пользования сетью; частично отражать затраты на … ; получать специальный зашифрованный код; предоставлять доступ к базовой станции; передавать данные; текущая абонентная плата за высокоскоростной Интернет; представлять угрозу провайдерам; предоставлять несколько различных методов передачи данных; передача голоса по IP-сетям; делать местный вызов; делать междугородний звонок; делать международный вызов, полностью минуя телефонную компанию; значительно увеличиваться.

2. Transcribe and learn to read the following words:

equipped, equivalent, radius, circumstance, unlicensed, specifications, kindness, commerce, financial, revolutionary, neighborhood, encryption, subscription, threat.

3. Write the Past Indefinite and the Past Participle of the verbs:

equip, prevent, outdistance, act, define, pay, attract, charge, reflect, happen, beam, combine, pose, accommodate.

4. Find in parts 3, 4 and 5 of text 3 synonyms to the following words and word combinations:

to fit out, to pilfer, immense, to leave behind, authorized, client, stable, trading (n), free of charge, high-velocity, to send, danger.

5. Find in parts 3, 4 and 5 of text 3 antonyms to the following words:

specific, to permit, worst, partial, to downgrade, incompatible.

6. Write the expansions of the following abbreviations and learn them:

PHY layer, VoIP.

7. Below you can see definitions with one word missing in each of them. Use the words from the box to fill in the gaps.

television, network, transmission, information, providers, connection

1. *Access* — the connection to the Internet or other ... or system.

2. *Line* — a ... , usually a physical wire or other cable, between sending and receiving (or calling and called) devices, including telephones, computers, and terminals.

3. *Base station* — a ... tower for wireless phone signals. Commonly known as cell towers, base stations also encompass the radio antennas and electronics that handle wireless calls.

4. *Code* — a system of symbols used to convert ... from one form to another. A code for converting information in order to conceal it is often called a cipher.

5. *Cable modem* — a modem that sends and receives data through a coaxial cable ..... network instead of telephone lines, as with a conventional modem. Cable modems, which have speeds of 500 kilobits per second (Kbps), can generally transmit data faster than current conventional modems.

6. *Fee* — a payment asked by ... for their services.

8. Translate the passages in writing.

A) The biggest difference isn't speed; it's distance. WiMAX outdistances WiFi by miles. WiFi's range is about 100 feet (30 m). WiMAX will blanket a radius of 30 miles (50 km) with wireless access. The increased range is due to the frequencies used and the power of the transmitter. Of course, at that distance, terrain, weather and large buildings will act to reduce the maximum range in some circumstances, but the potential is there to cover huge tracts of land.

B) Some companies might set up WiMAX transmitters and then make people pay for access. Again, this is similar to strategies used for WiFi, but a much wider area would be covered. Instead of hopping from one hotspot to another, WiMAX-enabled users could have Internet access anywhere within 30 miles of the WiMAX base station. These companies might offer unlimited access for a monthly fee or a «pay as you go» plan that charges on a per-minute or per-hour basis.

C) WiMAX doesn't just pose a threat to providers of DSL and cable-modem service. The WiMAX protocol is designed to accommodate several different methods of data transmission, one of which is Voice Over Internet Protocol (VoIP). VoIP allows people to make local, long-distance and even international calls through a broadband Internet connection, bypassing phone companies entirely.

9. Answer the following questions using the information from parts 3, 4 and 5 of text 3.

1. How does WiMAX operate? 2. What does a computer equipped with WiMAX use to prevent unauthorized users from stealing access? 3. What is WiMAX transfer rate? 4. What radius will WiMAX blanket with wireless access? 5. What can reduce the maximum range in some circumstances? 6. What can you say about IEEE 802.16 specifications? 7. How many ways are there for WiMAX to be implemented? What are they? 8. Who pays for

WiMAX base stations under the «super WiFi» plan? 9. What might some companies do? 10. What way of using WiMAX has the potential to be far more revolutionary? 11. Describe what would happen if you got WiMAX? 12. What is the WiMAX protocol designed for? 13. What does VoIP allow people to do?

10. Look through parts 3, 4 and 5 of text 3 and mark the statements as true (T) or false (F). If you think a statement is false, change it to make it true.

1. WiMAX sends data from one computer to another via radio signals. ☐
2. WiMAX can transmit up to 90 Mbps. ☐
3. The biggest difference between WiMAX and WiFi is speed. ☐
4. WiMAX blankets a radius of 30 miles with wireless access. ☐
5. Terrain, weather and large buildings can reduce the maximum WiMAX's range in some circumstance. ☐
6. There are four ways WiMAX can be implemented. ☐
7. Instead of hopping from one hotspot to another, WiMAX-enabled users can have Internet access anywhere within 100 kilometers of the WiMAX base station. ☐
8. A user receives a special encryption code that gives him access to the base station. ☐
9. WiMAX poses a threat to providers of DSL and cable-modem service. ☐
10. VoIP allows people to make only international calls through a broadband Internet connection, bypassing phone companies entirely. ☐

11. Make summary of parts 3, 4 and 5 of text 3.

12. Read the text and fill in suitable prepositions from the box. Think of a suitable title for each paragraph of the text.

of, at, to, in, of, on, of, to, for, within, for, in, of, with, from, to, of, to

WiMAX Technology Design

1. The design of the Wimax is ideal ... challenges related with earlier versions of wired and wireless access networks. ... the same time the backhaul connects the WiMAX system to the network,

it is not an integrated part of WiMAX system. Normally a WiMAX network consists ... two parts, a Wimax Base Station (BS) and a Wimax receiver also referred as Customer Premise Equipment (Wimax CPE).

2. A Wimax base station comprises ... internal devices and a Wimax tower. A Wimax base station can normally cover the area ... about 50 kilometres or 30 miles radius, but some other and environmental issues bound the limits of Wimax range ... 10 km or 6 miles. Any wireless user ... the coverage area would be able to access the Wimax services. The Wimax base stations would use the media access control layer defined ... the standard and would allocate uplink and downlink bandwidth to subscribers according to their requirements ... real-time basis.

3. A Wimax receiver, which is also referred as Customer Premise Equipment (Wimax CPE), may have a separate antenna or could be a stand-alone box or a PCMCIA card inserted ... a laptop or a desktop computer. Access ... a Wimax base station is similar to accessing a wireless access point (AP) in a Wi-Fi network, but the coverage is more.

4. So far one of the biggest restrictions ... the widespread acceptance ... WiMAX has been the cost of Wimax CPE (Wimax Receiver). This is not only the cost ... Wimax CPE (Wimax Receiver) itself, but also that of installation. In the past, Broadband Wireless Access (BWA) was predominantly Line Of Sight (LOS), requiring highly skilled labour and a truck role to install and provide a service ... customer. The concept of a self-installed Wimax CPE (Wimax Receiver) has been difficult ... BWA ... the beginning, but ... the advent of WiMAX technology this issue seems to be getting resolved.

(By Marshall Brain)

13. In the text below, there are some statements concerning either WiFi or WiMAX. Insert «WiFi» or «WiMAX» to make these statements true.

WiMAX and Wi-Fi Comparison

WiMAX is similar to the wireless standard known as WiFi, but on a much larger scale and at faster speeds. A mobile version would keep WiMAX-enabled devices connected over large areas, much like today's cell phones. We can compare it with Wi-Fi based on the following factors.

1. ... is based on IEEE 802.11 standard whereas ... is based on IEEE 802.16. However both are IEEE standards.

2. ... typically provides local network access for around a few hundred feet with speeds of up to 54 Mbps, a single ... antenna is expected to have a range of up to 40 miles with speeds of 70 Mbps or more.

3. ... is designed to efficiently support from one to hundreds of Consumer premises equipments (CPE)s, with unlimited subscribers behind each CPE. Flexible channel sizes from 1.5 MHz to 20 MHz. ... is intended for LAN applications, users scale from one to tens with one subscriber for each CPE device. Fixed channel sizes (20 MHz).

4. ... works at 5 bps / Hz and can peak up to 100 Mbps in a 20 MHz channel. ... works at 2,7 bps / Hz and can peak up to 54 Mbps in 20 MHz channel.

5. ... does not guarantee any QoS but ... will provide your several level of QoS. As such, ... can bring the underlying Internet connection needed to service local ... networks. ... does not provide ubiquitous broadband while ... does.

14. Read the text and put the verbs in brackets into the correct tense-aspect form. Be careful with non-finite forms.

Two Dimensions of WiMax Network

WiMax network (to compose) of two parts: the WiMax tower and the WiMax receiver. WiMax tower (to connect) directly to the internet backbone (to use) a wired connection such as optical fiber. It can (to connect) to the WiMax tower (to use) a line-of-sight link or a non-line-of-sight link. The line-of-sight communication (to involve) the use of fixed antenna or dish. This antenna (to fix) or (to deploy) on the rooftop or the tower of your building. Line-of-sight connection (to consider) as more strong and stable connection. Therefore it (to send) lot of error-free data over the network. It (to use) a frequency range of 66 GHz. Higher frequency (to decrease) the chance of signal weakness and interference and (to provide) more bandwidth. On the other hand the non-line-of-sight connection (to provide) you connectivity with the installation of small antenna in your PC. This mode (to provide) lower frequency range from 2 GHz to 11 GHz. The lower band signals (to be not prone) to obstructions like trees and walls. Hence the signal strength (to be) more and the user (to receive) the quality of service. For every WiMax connectivity and architecture it (to be) important (to connect) to an internet backbone via swift wired connection.

(By Marshall Brain)

15. Render the following text in English.

Технология WiMAX

WiMAX (Worldwide Interoperability for Microwave Access) — это технология предоставления беспроводного широкополосного доступа в интернет. WiMAX основывается на стандарте IEEE 802.16. Технологию WiMAX развивает международный WiMAX Forum, основанный в 2001 году. На сегодняшний день эта некоммерческая организация объединяет сотни компаний — производителей оборудования и поставщиков услуг мобильной связи и доступа в интернет.

Сети WiMAX могут работать в двух вариантах доступа: фиксированном и мобильном.

Мобильный WiMAX дает возможность пользователю получать как фиксированный доступ (похожий на привычный xDSL, только без проводов), так и выход в Сеть из любого места в пределах зоны покрытия или даже в движении.

Подобно проводному широкополосному доступу, который является сейчас самым распространенным видом подключения, Mobile WiMAX дает пользователю высокую скорость доступа в интернет — до 10 Мбит / с. Это позволяет быстро скачивать большие файлы (например, фильмы), смотреть видеоролики или телепередачи, участвовать в онлайн-играх в мобильном режиме.

При этом для выхода в Сеть вам не нужно подключать провода — в зоне покрытия ваш компьютер или мобильное устройство со встроенным чипом или модемом самостоятельно найдет сеть. Это похоже на WiFi, но зону действия невозможно сравнить: для WiFi — это локальная сеть, ограниченная масштабом офиса или кафе, а для Mobile WiMAX — целый город!

(«Мир беспроводных технологий»,
www.asusrouter.ru)

LANGUAGE FOCUS 26

PREDICTIONS 2 :

FUTURE PERFECT AND *IT* IN SUBJECT POSITION

We use the Future Perfect to predict actions which will be completed before a particular time in the future. It is often used with time expressions such as **by 2030, before the end of the century**.

Example:

By 2015 scientists **will have developed** active contact lenses.

We can vary the strength of our predictions using the certainty verbs studied in Unit 22 instead of **will**.

Example:

By 2030 geneticists **may/might/could** have created the first biologically optimized humans.

We can also make predictions using **it** in subject position when the true subject of the prediction is a **that** clause.

Example:

It's likely **that** computers will be used to develop other faster computers.

It's possible **that** we'll work from telework centers in future.

16. Make predictions for 2020 for each of the following using the methods studied here. You may wish to use these verbs:

develop, disappear, increase, replace, take over

1. the Internet
2. shops
3. monitors
4. keyboards
5. interfaces
6. money
7. machine intelligence compared to human intelligence
8. computing power
9. teleworking
10. speech recognition

17. Write sentences similar in meaning to each of these predictions with *it* in subject position.

Example:

I don't think we'll use cable connections in future. (unlikely)

It's unlikely that we'll use cable connections in future.

1. I don't think we'll replace teachers with robots. (unlikely)

2. We may well have electronic chips in our bodies. (probable)

3. Computers could easily be used to develop other computers. (likely)

4. I'm almost sure we'll replace the CRT monitor in the next few years. (highly probable)

5. There's a chance we'll develop alternatives to silicon. (possible)

6. I really don't think we'll have replaced the motor car before 2020. (very unlikely)

7. Doctors may be able to operate on patients at a distance. (quite likely)

8. I'm definite we'll have more virtual personalities on the Web. (certain)

9. We might adopt Bluetooth as a standard for wireless applications. (possible)

10. I'm sure we won't use magnetic tape. (certain)

ANSWERS TO QUIZZES

QUIZ 1

1. b — correct

Dale Dougherty, a publisher from O'Reilly Media (founded by Tim O'Reilly), coined the term Web 2.0 in 2004 during a joint conference held with MediaLive International. Although Dougherty was probably just doing his job, he managed to set off a firestorm of debate — no one completely agrees on what Web 2.0 actually means.

2. b — correct

In September 2005, about a year after the term Web 2.0 was coined, Tim O'Reilly posted a blog entry in which he gave his thoughts on the subject. On top of using the Web as an applications platform and employing new methods for distributing information, Web 2.0 allows for the democratization of the Internet.

3. a — correct

Web 1.0 sites are generally static, meaning they may contain useful information, but there's no public interaction. With comments and updates, Web 2.0 sites may change several times a day.

4. c — correct

Most official online encyclopedias, unlike online wikis that include user-generated content, are considered Web 1.0 because they are fact-checked, edited and attributed to a specific author. Online bookstores like Amazon.com and social networking sites like Facebook.com fall under the umbrella of Web 2.0 because of the interaction the sites allow.

5. c — correct

In 1990, Tim Berners-Lee developed the hypertext transfer protocol (HTTP), the backbone of the World Wide Web. HTTP is simply the set of rules Web browsers use to interpret Web documents.

6. a — correct

Although it may be easy to confuse HTTP and HTML — especially since they both have the word hypertext in their names — they mean two different things. Hypertext transfer protocol (HTTP) is the set of rules Web browser use to communicate with each other, while hypertext mark-up language (HTML) describes to your Web browser how a page should look.

7. b — correct

The Internet is technically a network of a wide variety of networks. These networks connect to each other in different configurations, which gives you several different types — your school may have a specific network, for instance, while satellites and cell phones have their own networks. All of them are considered part of the Internet.

8. a — correct

The World Wide Web uses hypertext to access several types of information over the Internet — browsers like Internet Explorer, Firefox and Safari interpret HTML in order to display text, images and videos on our computer screens.

9. b — correct

The Web is the most popular way of accessing the Internet, but it isn't the only system we can use. It's possible to access the Internet without using HTTP with e-mail or instant messaging.

10. b — correct

In 1958, soon after the Soviet Union launched Sputnik, the world's first satellite, Dwight D. Eisenhower started the Advanced Research Projects Agency (ARPA) to increase U.S. technological advancements. By 1969, the first ARPANET network connection was launched — it crashed, but after the second try, the network that would become the Internet was born.

QUIZ 2

1. b — correct

Yes, we're already opening up that can of worms. But no, it's not true — nor is it true that Gore ever made the claim.

2. a — correct

According to Advanced Micro Devices, 1.5 billion people — or about a quarter of the world — have Internet access.

3. c — correct

At the end of the first quarter of 2009, there were 180 million domain names. Quick — how many can you name?

4. b — correct

All false, actually. The network was ARPANET, it was 1969, and the schools were Stanford and UCLA.

5. c — correct

It was the Nokia, but it didn't really catch on because of its price and the fact that networks weren't quite developed enough yet.

6. — correct

True — but it was only about a year before Netscape Navigator came along and took over.

7. a — correct

Yep. March 10 was the day the NASDAQ reached its peak, and it was a long slide downhill after that.

8. c — correct

Yep, it's called «Green Dam» software, and it blocks pornography and any sites that are critical of the Chinese government. All Chinese PCs sold after July 1, 2009, will have it.

9. a — correct

True. Don't ask us how they figured it out — or how much time we've spent cyberslacking.

10. b — correct

Yeah, that was lame. But admit it — it worked back when you first got on the Internet back in 1996!

QUIZ 3

1. a — correct

A print server isn't necessary for a basic home network. It requires more than one computer, hardware and software to coordinate the exchange of information and a path for the information to follow from one computer to another.

2. b — correct

A router is responsible for directing traffic among connected devices in both wireless and Ethernet home networks.

3. a — correct

Firestorm isn't a reputed creator of software-based firewalls. McAfee and Symantec are, however, and you can download free firewall protection as well as buy advanced security options from them.

4. a — correct

The terms Ethernet network and wired network may be used interchangeably. Essentially, Ethernet networks are called wired networks because they require cables to transfer information from one device to another within the network.

5. b — correct

A network interface card or NIC is necessary for connecting just two computers. Run a cable between them (like the commonly used Category 5 Unshielded Twisted Pair, or UTP) and presto: You've got a home network.

6. a — correct

Wired networks are fast and fairly secure, but they're not necessarily cheap. The cost of cable adds up quickly. The more computers you have and the farther apart they are, the higher the cost of your network.

7. c — correct

The biggest selling point of wireless networks is that they're, well, wireless. Multiple — but not infinite — computers can share the connection as long as they all have a built-in wireless card or a plug-in wireless adapter.

8. b — correct

Media Access Control (MAC) address filtering and Wired Equivalency Privacy (WEP) are both types of wireless security options. While MPA is not, another option is Wi-Fi Protected Access (WPA).

9. c — correct

A range extender (or repeater) can help you achieve greater coverage with your wireless router. Depending on the size and shape of your home, as well as the range of your router, you may need to add one of these to your network.

10. b — correct

WEP isn't as secure as other wireless security options. If you use WEP in your network, you can enhance security by adding Temporal Key Integrity Protocol (TKIP) to your operating system.

QUIZ 4

1. c — correct

The Bluetooth networking standard is basically a set of rules for radio frequencies and communication. When you buy a Bluetooth earpiece for a phone, you're simply buying a device that knows how to use the standard.

2. b — correct

Harald Bluetooth Gormson ruled Denmark in the late 1900s. The Bluetooth standard was named for him to honor Nordic contributions to communications technology.

3. a — correct

Bluetooth shares its part of the radio spectrum with industrial, scientific and medical devices, also known as ISM devices.

4. a — correct

Just like WiFi, cell phones and car radios, Bluetooth uses radio waves to communicate. Bluetooth speakers don't make your cell phone ring because these devices use different radio frequencies.

5. b — correct

The short range of Bluetooth signals make them perfect for handling communications between a phone and an earpiece or a computer and a set of speakers. This also cuts down on the amount of required power.

6. a — correct

Each device in a Bluetooth network switches back and forth among 79 random frequencies. This makes it unlikely that your baby monitor, which uses the same part of the radio spectrum, will horn in on your GPS receiver.

7. a — correct

Communicating Bluetooth devices establish a network known as a piconet. A piconet might be as small as the distance from your earpiece to the belt clip for your phone. Or, it may stretch from the base station in your kitchen to the cordless phone handset in your living room. If your GPS chimes in, the other devices will ignore it — it's not part of the network.

8. b — correct

One of the big benefits of Bluetooth is its ability to make connections automatically, but this can also present a security risk. By putting a Bluetooth device in non-discoverable mode, you're keeping it off the radar of strange devices.

9. — correct

Bluetooth transmissions are always on the move. Their constant jumping from frequency to frequency is what keeps them from disrupting each other and with non-Bluetooth devices.

10. b — correct

Bluebugging lets someone take over another phone remotely. Once a bluebugger has gained access to a phone, he or she can use it to place calls or send text messages.

QUIZ 5

1. c — correct

Wi-Fi is also referred to as 802.11 networking. No matter what you call it, it's pretty flexible as far as Internet connections go: It requires no wires.

2. b — correct

Like cell phones, TVs and radios, a wireless network uses radio waves to transmit signals. Communication across wireless networks is pretty comparable to two-way radio communication.

3. c — correct

A wireless router includes an adapter that decodes the data that's transmitted in radio waves by an adapter's antenna.

4. b — correct

WiFi radios transmit signals at 2.4 GHz or 5 GHz. These high frequencies allow the signal to carry more data.

5. b — correct

802.11c isn't used as a networking standard — but 802.11a, 802.11b, 802.11g and 802.11n are used.

6. b — correct

The slowest and least expensive networking standard is 802.11b. It transmits in the 2.4 GHz frequency band of the radio spectrum and carries up to 11 megabits of data per second.

7. b — correct

All three of these standards use OFDM, a coding technique that splits signals into sub-signals before they reach a receiver to reduce interference, but 802.11a was the first.

8. b — correct

The wireless standard used for WPANs is 802.15 — it's also commonly used for Bluetooth technology.

9. a — correct

Wireless adapters plug into USB ports and PC card slots. Most new laptops have built-in wireless adapters. If you'll be accessing a wireless network with your desktop, you can insert an adapter into the PCI slot inside the computer's case.

10. c — correct

Routers use channel by default — if you live in an apartment complex and your neighbors are using this same channel, you can sometimes get some interference. In addition to changing the channel, other settings you may wish to change include the name of your network and your router's security options.

SOME OPENING PHRASES WHICH CAN HELP YOU WITH YOUR SUMMARY

- The title of the text (article, paper) is … .
- The author of the text (article, paper) is … .
- The text can be divided into … (three, four …) logical parts.
- The text (article) is about … .
- The text (article) deals with the problem of (the issue of) … .
- The text / article under review … (gives us a sort of information about …)
- According to the text (article) … .
- At the beginning (of the text, article) the author describes … (dwells on … ; explains … ; touches upon … ; analyses … ; comments … ; characterizes … ; underlines … ; reveals … ; gives account of …).
- In the first part the author tells the reader about … .
- The article begins with the description of … , a review of … .
- The article opens with … .
- It is clear from the text (article) that … .
- Among other things the text (article) raises the issue of … .
- The problem of … is of great importance.
- Then (after that, further on, next) the author passes on to … .
- It further says that … .
- The author gives a detailed (thorough) analysis (description) of … .
- The author goes on to say that … .
- One of the main points to be singled out is … .
- Great importance is also attached to … .

- The author describes ... .
- The author suggests the idea of ... .
- The author underlines the fact that ... .
- The author (he) draws our attention to the fact that ... .
- We shouldn‘t forget that ... .
- The author shares his opinion that ... .
- The author’s point of view on this problem is ... .
- The author wants to point out (that) ... .
- Finally, the author comes to the conclusion that ... .
- To finish with, the author describes ... .
- At the end of the article the author draws the conclusion that ... .
- The author sums it all up by saying ... .
- In conclusion the author ... .
- I think that (I’m sure that) ... .

LIST OF WEB-LINKS AND BIBLIOGRAPHY FOR FURTHER READING

1. Информационные технологии. — URL : http://information-technology.ru.
2. Мир беспроводных технологий. — URL : http://www.asusrouter.ru
3. *Олифер, В. Г., Олифер, Н. А.* Компьютерные сети. Принципы, технологии, протоколы : Учебник для вузов. — 3-е изд. — СПб. : Питер, 2006. — 958 с. : ил.
4. *Bialoglowy, M.* Bluetooth security review // Security Focus. — 2005. — URL : http://www.securityfocus.com/infocus/1830 (July 14, 2008).
5. *Boeckner, K., Brown P. Ch.* Oxford English for Computing. Oxford : Oxford University Press, 1996.
6. *Bogatin, D.* Google CEO's new paradigm: 'cloud computing and advertising go hand-in-hand' // ZDNet. — 2006. — URL : http://blogs.zdnet.com/micro-markets/?p=369 (March 11, 2008).
7. *Borisov, N.* (In)Security of the WEP algorithm / N. Borisov, I. Goldberg, D. Wagner. // Berkeley University. — URL : http://www.isaac.cs.berkeley.edu/isaac/wep-faq.html (February 10, 2007).
8. *Borisov, N.* Security of the WEP algorithm / N. Borisov, I. Goldberg, D. Wagner // Berkeley University. — URL : http://www.isaac.cs.berkeley.edu/isaac/wep-faq.html (August 7, 2008).
9. *Brieger, N., Pohl, Al.* Technical English : Vocabulary and Grammar. Andover : Summertown Publishing, 2006.
10. *Broadcom.* Securing Home Wi-Fi Networks : A Simple Solution Can Save Your Identity. — 2008. — URL : http://54g.org/pdf/Wireless-WP200-RDS.pdf (May 18, 2005).
11. *Brodkin, J.* IBM unveils 'cloud computing' // Network World. — Nov. 19, 2007. — Vol. 24, Iss. 45. — Pg. 10.
12. *Broida, R.* Stop Internet poachers from stealing your Wi-Fi. // Network World. — 2009. — URL : http://www.networkworld.com/news/2009/012709-stop-internet-poachers-from-stealing.html (April 18, 2009).
13. *Brown, M.* Comparing traditional grids with high-performance computing // IBM. — June 13, 2006.

14. *Carr, N.* World Wide Computer is on horizon // USA Today. — February 25, 2008.
15. *Center for the Digital Future.* Annual Internet Survey by the Center for the Digital Future Finds Shifting Trends Among Adults About the Benefits and Consequences of Children Going Online. // USC Annenberg School. — 2008. — URL : http://www.digitalcenter.org/pdf/2008-Digital-Future-Report-Final-Release.pdf (April 29, 2009).
16. *Center for the Digital Future.* Web Insight 6 : Time spent watching TV or using the Internet by those under 18 in your household // USC Annenberg School. — 2007. — URL : http://www.digitalcenter.org/pages/Archive_content.asp?intGlobalId=9&intTypeId=1 (April 29, 2009).
17. *Collin, S. M. H.* Dictionary of Computing. — 5th ed. — London : Bloomsbury Publishing Plc, 2004.
18. *Computer History Museum.* Computer Pioneer Robert Kahn with Ed Feigenbaum // YouTube. — 2007. — URL : http://www.youtube.com/watch?v=t3uTKs9XZyk (April 23, 2010).
19. *Congressional Digest.* Internet History : From ARPANET to Broadband. — February 2007. — Pp. 35–37, 64.
20. *Coyle, K.* The Technology of Rights : Digital Rights Management. Based on a talk originally given at the Library of Congress, Nov. 19, 2003. — URL : http://www.kcoyle.net.drm_basics.pdf (January 10, 2007).
21. *Downing, D.* Dictionary of Computer and Internet Terms / D. Downing, M. M. Covington. — 10th ed. — New York : Barron‘s Educational Series, Inc., 2009.
22. *Fackler, M.* In Korea, a Boot Camp Cure for Web Obsession // New York Times. — Nov. 18, 2007. — URL : http://www.nytimes.com/2007/11/18/technology/18rehab.html (April 29, 2009).
23. *Foster, I.*, et al. The Anatomy of the Grid // The Globus Alliance. — 2001.
24. *Foster, I.*, et al. The Physiology of the Grid // The Globus Alliance. — 2002.
25. *Geier, J.* 802.11 WEP : Concepts and Vulnerability // Wi-Fi Planet. — 2002. — URL : http://www.wi-fiplanet.com/tutorials/article.php/1368661 (August 6, 2008).
26. *Glendinning, E. H.* Oxford English for Information.
Technology / E. H. Glendinning, J. McEwan. — Oxford : Oxford University Press, 2002.
27. *Grid Computing Info Centre.* — URL : http://www.gridcomputing.com.
28. *Hallberg, J.* Bluetooth positioning / J. Hallberg, M. Nilsson, K. Synnes // Lulee University of Technology : Centre for Distance-spanning Technology, Department of Computer Science and Electrical Engineering. — URL : http://media.csee.ltu.se/publications/2002/hallberg02bluetooth.pdf (July 21, 2008).
29. *Haskin, D.* FAQ : 802.11n wireless networking // Computerworld May. — 2007. — URL : http://www.computerworld.com/action/article. do?command=printArticleBasic&articleId=9019472 (February 10, 2007).

30. *Hauben, R.* From the ARPANET to the Internet // Columbia University. — 1998. — URL : http://www.columbia.edu/~rh120/other/tcpdigest_paper.txt (April 26, 2010).
31. *Hickins, M.* Cloud Computing Gets Down to Earth // eWeek. — January 21, 2008. — Pg. 14.
32. Howstuffworks. — URL : http://www.howstuffworks.com.
33. *IBM.* IBM Introduces Ready-to-Use Cloud Computing // IBM. — 2007. — URL : http://www-03.ibm.com/press/us/en/pressrelease/22613.wss (November 15, 2007.).
34. *IEEE.* IEEE 802.16 Backgrounder //IEEE. — 2002. — URL : http://ieee802.org/16/pub/backgrounder.html.
35. *IEEE.* IEEE 802.11 //IEEE. — 2002. — URL : http://standards.ieee.org/getieee802/802.11.html (July 30, 2008).
36. *IEEE.* IEEE Standard for Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements. — 2008. — URL : http://standards.ieee.org/getieee802/download/802.11-2007.pdf.
37. *Information Sciences Institute.* Internet Protocol. — 1981. — URL : http://www.ietf.org/rfc/rfc791.txt (April 26, 2010).
38. *IrDA.* IrDA Data Specifications. — URL : http://www.irda.org/displaycommon.cfm?an=1&subarticlenbr=69 (July 30, 2008).
39. *IT Week.* Grid computing expands its reach. // IT Week. — Dec. 17, 2007.
40. *Joseph, J.* Grid Computing. / J. Joseph, C. Fellenstein. // IBM Press. — 2004.
41. *Kane, B.* IrDA. // SearchMobileComputing. — 2007. — URL : http://searchmobilecomputing.techtarget.com/dictionary/definition/214041/IrDA.html (July 30, 2008).
42. *Kay, R.* Open Grid Services Architecture // Computerworld. — Nov. 5, 2007. — Vol. 41, Iss. 45. — P. 36.
43. *Lane, Ch.* Should overuse of the Internet become a mental disorder? // Psychology Today Blog. — 2009. — URL : http://blogs.psychologytoday.com/blog/side-effects/200903/should-overuse-the-internet-become-mental-disorder (April 29, 2009).
44. *Lange, P.* WiFi Update // PC Update Online. — 2004. — URL : http://www. melbpc.org.au/pcupdate/2404/2404article6.htm (February 10, 2007).
45. *Larkin, E.* WinHEC : Gates on Mobile Computing, Home Networks, Windows Server // Today@PC World. — 2007. — URL : http://blogs.pcworld.com/staffblog/archives/004390.html (January 10, 2007).
46. *Leary, A.* Wi-Fi cloaks a new breed of intruder. // St. Petersburg Times. — 2005. — URL : http://www.sptimes.com/2005/07/04/State/Wi_Fi_cloaks_a_new_br.shtml (April 20, 2009).
47. *Lohr, S.* Cloud Computing and EMC Deal // New York Times. — Feb. 25, 2008. — Pg. C 6.
48. *Lohr, S.* Google and I.B.M. Jon in ‘Cloud Computing’ Research // New York Times. — Oct. 8, 2007. — Pg. C 8.
49. *Lohr, S.* I.B.M. to Push ‘Cloud Computing’, Using Data From Afar // New York Times. — Nov. 15, 2007. — Pg. C 7.

50. *Lorek, L. A.* Computer downtime rising up to work on world's problems // San Antonio Express-News. — Feb. 12, 2005. — Pg. 1 K.
51. *Markoff, J.* An Internet Critic Who Is Not Shy About Ruffling the Big Names in High Technology // New York Times. — Apr. 9, 2001. — Pg. C 6.
52. *Marks, J.* Check your English Vocabulary for Computers and Information Technology. — 3d ed. — London: A&C Black Publisher Ltd, 2007.
53. *McAllister, N.* Server virtualization // InfoWorld. — Feb. 12, 2007.
54. *MonsterGuide.net.* How to tell if someone is stealing your Wi-Fi. — 2009. — URL : http://monsterguide.net/how-to-tell-if-someone-is-stealing-your-wifi (April 19, 2009).
55. *Mosteller, R.* 3 Reasons Moms Are Addicted to the Internet // Parenting.com. — 2009. — URL : http://www.parenting.com/article/Mom/Work—Family/3-Reasons-Moms-Are-Addicted-to-the-Internet (April 29, 2009).
56. *Musil, S.* Michigan man dodges prison in Wi-Fi theft // CNET.com. — 2007. — URL : http://news.cnet.com/8301-10784_3-9722006-7.html (April 17, 2009).
57. *Naone, E.* Computer in the Cloud // Technology Review. — 2007. — URL : http://www.technologyreview.com/Infotech/19397/?a=f (March 12, 2008).
58. *New Millennium Research Council.* Not in the Public Interest — The Myth of Municipal WiFi Networks. — 2005. — URL : http://www.newmillenniumresearch.org/archive/wifireport2305.pdf.
59. *Opus, O.* What is IPv6? — URL : http://www.opus1.com/ipv6/whatisipv6.html (April 27, 2010).
60. *Parizo, E. B.* Replacing your T1 with nothing but air //SearchMobileComputing. — 2003. — URL : http://searchmobilecomputing techtarget.com/qna/0,289202,sid40_gci896772,00.html.
61. *Penenberg, A. L.* The Fight over Wireless // Slate. — 2005. — URL : http://www.slate.com/id/2128632/.
62. *Pogue, D.* Bluetooth and the end of audio wiring // New York Times. — 2007. — URL : http://www.nytimes.com/2007/08/16/technology/circuits/16pogue.html?scp=1&sq=bluetooth&st=cse (July 14, 2008).
63. *Publishing, S.* Web Services and Stateful Resources. — 2006. — URL : http://www.devarticles.com/c/a/Web-Services/Web-Services-and-Stateful-Resources/ (March 12, 2008).
64. *Regan, K.* Ten Scary Things About Home Networks, Part 1 // Tech NewsWorld. —.2007. — URL : http://www.technewsworld.com/story/55882.htm (January 10, 2007).
65. *Regan, K.* Ten Scary Things About Home Networks, Part 2. // ECommerce Times. — 2007. — URL : http://www.ecommercetimes.com/story/65022.html (January 10, 2007).
66. *Rist, O.* The Grid Takes Over // PC Magazine. — Jan. 2008. — Vol. 27, Iss. 1/2. — P. 81–82.
67. *Schell, B.* Webster's New World™ Hacker Dictionary / B. Schell, Cl. Martin Cl. — Indianapolis, IN : Wiley Publishing, Inc., 2006.

68. *Shaw, K*. The future of IT? It's not all bad news, Nick Carr says // Network World. — 2008. — URL : http://www.networkworld.com/chat/archive/2008/011008-nick-carr-it-jobs.html.
69. *Skerrett, P. J*. Future Computers : The Teraflops Race. // Popular Science. — March 1992. — Pg. 50.
70. *Snyder, J*. Explaining TKIP /J. Snyder, Th. Rodney // Network World. — Oct. 4, 2004. — URL : http://www.networkworld.com/reviews/2004/1004wirelesstkip.html (Faberury 10, 2007).
71. *Stankovic, J. A*. Wireless Sensor Networks for In-Home Healthcare : Potential and Challenges. — Department of Computer Science, University of Virginia. — URL : http://www.cs.virginia.edu/papers/wlsn_health_HCMDSS05.pdf (September 9, 2007).
72. *The TCP / IP Guide*. TCP / IP dynamic host configuration protocol (DHCP). — URL : http://www.tcpipguide.com/free/t_TCPIPDynamicHostConfigurationProtocolDHCP.htm (April 18, 2009).
73. *THINK project*. A Technical History of the ARPANET // The University of Texas at Austin. — URL : http://userweb.cs.utexas.edu/users/chris/nph/ARPANET/ScottR/arpanet/index.htm (April 26, 2010).
74. *USB*. Introducing Certified Wireless USB From the USB-IF. — URL : http://www.usb.org/developers/wusb/About_WUSB_FINAL5.pdf (July 30, 2008).
75. *Ward, M*. Troubled times for home networks // BBC News. — Aug. 21, 2007.
76. *Whiteford, S*. Bluejacking 'a harmless prank' // ITWeb. — 2003. — URL : http://www.itweb.co.za/sections/telecoms/2003/0311251150.asp?S=Cellular&A=CEL&O=FRGN (July 14, 2008).
77. WiFi Alliance. — URL : http://www.wi-fi.org/ (July 30, 2008).
78. WiFi Net News. — URL : http://www.wifinetnews.com/ (July 30, 2008)
79. *Wilson, J. M*. The Next Generation of Wireless LAN Emerges with 802.11n // White paper : Intel Communications Technology Lab. — 2004. — URL : http://www.intel.com/technology/magazine/communications/wi08041 (Janury 10, 2007).
80. *Woltr, Ch*. New Orleans, BellSouth in Wi-Fi VoIP Tussle // New Telephony. — 2006. — URL : http://www.newtelephony.com/news/63h2284939.html.
81. *Woodward, M*. Bluetooth phones have cavities // Ars Technica. — 2004. — URL : http://arstechnica.com/news.ars/post/20040205-3376.html (July 14, 2008).

CONTENTS

Section two
THE ETHERNET

Section three
THE SWITCH

Наталья Анатольевна БЕСЕДИНА
Владимир Юрьевич БЕЛОУСОВ

АНГЛИЙСКИЙ ЯЗЫК ДЛЯ ИНЖЕНЕРОВ КОМПЬЮТЕРНЫХ СЕТЕЙ.
Профессиональный курс

ENGLISH FOR NETWORK STUDENTS.
Professional Course

Учебное пособие

Издание второе, переработанное

Зав. редакцией инженерно-технической
литературы *В. А. Моисеева*
Технический редактор *И. П. Редькина*
Корректор *Н. В. Черезова*
Подготовка иллюстраций *Е. В. Ляпусова*
Верстка *М. И. Хетерели*
Выпускающий *О. И. Смирнова*

ЛР № 065466 от 21.10.97
Гигиенический сертификат 78.01.07.953.П.007216.04.10
от 21.04.2010 г., выдан ЦГСЭН в СПб

Издательство «ЛАНЬ»
lan@lanbook.ru; www.lanbook.com
192029, Санкт-Петербург, Общественный пер., 5.
Тел./факс: (812) 412-29-35, 412-05-97, 412-92-72.
Бесплатный звонок по России: 8-800-700-40-71

Подписано в печать 20.02.13.
Бумага офсетная. Гарнитура Школьная. Формат 84×108 1/32.
Печать офсетная. Усл. п. л. 18,48. Тираж 1000 экз.

Заказ № .

Отпечатано в полном соответствии
с качеством предоставленных диапозитивов
в ОАО «Издательско-полиграфическое предприятие «Правда Севера».
163002, г. Архангельск, пр. Новгородский, д. 32.
Тел./факс (8182) 64-14-54; www.ippps.ru