高校英语选修课系列教材·ICT(信息与通信技术)英语系列

ICT英语读写译教程

吴　建　张韵菲 主编

A Coursebook on ICT: Reading, Writing and Translation

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前　言

ICT(Information Communication Technology)指信息通信技术，是信息技术与通信技术相融合而成的新的概念和技术领域。ICT 产业是当今经济社会发展最快的科技领域之一，也是其发展的主要推动力量。

本教材面向我国快速发展的 ICT 产业国际化对语言服务人才的需求，读者对象为 ICT 行业涉外人员，语言服务行业从业人员，对 ICT 产业感兴趣的在校本、硕学生，以及面向 ICT 产业从事外语、翻译教学的教师等。

本教材内容编写围绕 ICT 十大领域，各成一章。第一章：互联网；第二章：下一代网络；第三章：大数据；第四章：数据中心；第五章：云计算；第六章：人机交互；第七章：物联网；第八章：移动网络；第九章：虚拟现实；第十章：网络安全。每章选取两篇长度、难度适中的文章。文章讲求知识性，但避免过于专业化，并具备一定的趣味性。文后配以专业术语、单词短语表达，并安排了简答、翻译、写作等多项练习。课文译文与参考答案可在南京大学出版社网站或扫描本书扉页二维码获得。

由于编者水平有限，教材中难免会出现不妥之处，请读者见谅。希望这本教材能为培养 ICT 产业外语服务人才贡献一份力量。

编　者

2016 年 5 月

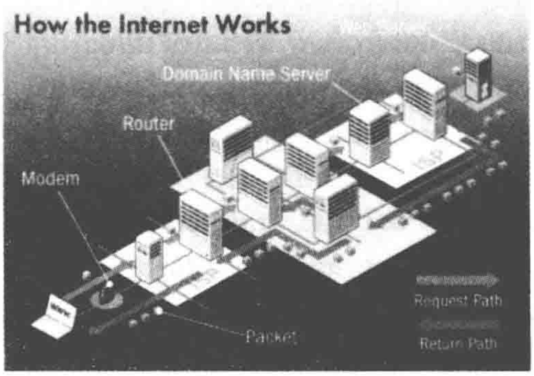
目 录

Chapter One Internet

Text A

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?



Internet architecture

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.

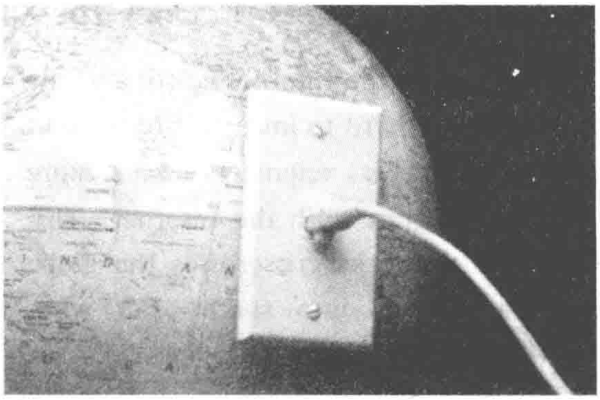
These elements are connections. Some are end points—the computer, smartphone or other device you're using to read this may count as one. We call those end points clients. Machines that store the information we seek on the Internet are servers. Other elements are nodes which serve as a connecting point 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.

Next, we'll take a closer look at protocols and how information travels across the Internet.

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 websites 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.



The Internet is a global entity—you could call it the largest machine on the Earth.

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. Those're 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 servers (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.

Next, let's take a closer look at how information travels across the Internet.

Packet, Packet, Who's Got the Packet?

In order to retrieve this article, your computer had to connect with the web server containing the article's file. We'll use that as an example of how data travels across the Internet.

First, you open your web browser and connect to our website. 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.howstuffworks.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 our web server. Our 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 see this article.

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.

Text B

What Would Happen If the Internet Collapsed?

The Internet is robust. It's not dependent 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 dependence upon it.

A global collapse of the Internet would have circumstances far greater than driving your local IT professional nuts.

Connections across the Internet are flexible. When you use 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 electronic data packets that travel across the Internet. The packets don't all take the same path—the traffic routes are dynamic. If a particular connection is damaged or unresponsive, the data can follow a different path to reach your machine.

This makes the Internet a reliable communications resource. Even if an entire section of the Internet were to go off-line in the wake of a natural disaster or a nuclear attack, other sections could remain functional. While any data stored on machines that were hit by the disaster might be lost, the Internet itself would remain.

It's almost impossible to imagine a set of circumstances that could cause the Internet to collapse. It would require destruction on such a widespread scale that the loss of the Internet would probably be the least of our worries. But what if the Internet did collapse? How would that affect us? Would life change drastically or would we quickly adjust, relying on the older means of communication?

Internet Collapse and Communication Errors

A world without the Internet would probably seem very strange to us now. Depending upon 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 for these services is also part of the Internet infrastructure. If you take this thought to an extreme case, even the phone lines might not work since they, too, form part of the Internet's infrastructure.

Imagine a world without the World Wide Web, Facebook, Twitter or even e-mail and you might start screaming too.

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

You wouldn't be able to log on to social networking sites and services like Facebook or Twitter. You wouldn't be able to fire up an instant messaging service to check up on friends. Many of the tools we rely on to keep up with 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 to writing letters and sending them through the post office.

Transferring files between computers would be difficult, too. You'd either need to store the files on some form of physical media like a compact disc or you'd need to connect the two computers with a physical cable. Projects that depend upon 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.

The Economic Fallout of a Collapsed Internet

If the Internet did collapse somehow, the economic impact would be disastrous. While the loss of services like electronic banking or PayPal would be annoying, the effects would extend much further.

Think of the businesses that depend upon the Internet. Every website would be off-line. Huge companies like Google or Amazon would become obsolete instantly. Other companies like Microsoft would see enormous sections of their operations disappear. Even companies that only use the Web as a means of advertisement would be adversely affected.

Assuming the collapse was either of a permanent or extended nature, many companies would go out of business. Hundreds of thousands of people would be out of a job. Google employs nearly 20,000 people alone. With hundreds of companies folding or cutting back on staff, the market would be flooded with people in need of a job.

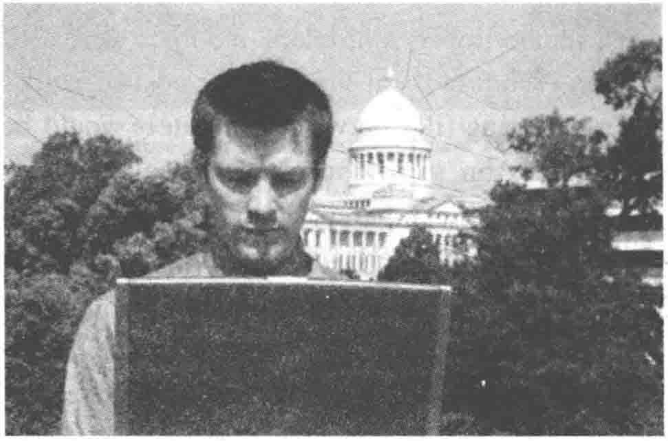
According to the U.S. Census Bureau, e-commerce accounted for 35 percent of all shipments from the manufacturing industry in 2007. That amounts to more than $1.8 trillion for that industry alone. When you extrapolate those numbers to all industries across the entire world, you'll see that commerce on the Internet is big business. If the Internet collapsed, multiple industries would experience an instant recession. There's no easy way to bounce back from a loss of trillions of dollars.

Some countries would feel the sting more than others. Developed countries would face severe economic crises as entire industry sectors either disappeared or struggled to survive in the wake of devastating losses. Other countries wouldn't suffer as many direct effects from the collapse because they don't have much of a presence on the Internet. But these countries would also suffer as the trade and aid they depend upon from other connected countries decreases.

Very few types of businesses would remain unaffected by the collapse of the Internet. The Internet has become pervasive in business.

Political Crises After the Internet Collapse

The economic fallout would probably be the primary crisis governments would face around the world if the Internet were to collapse. But that would just be one problem world leaders would face.



The political fallout following the collapse of the Internet could be devastating.

In the United States, there's a push to develop the power grids around the nation into a smart grid. Smart grids could theoretically respond to customer needs more efficiently, conserve power and communicate with one another over Internet connections. In theory, this system could reduce power outages and other problems. But if the Internet were to collapse, a smart grid would be crippled. Massive power outages could become a problem across any country using such a system.

As the Internet has become more pervasive, countries have used it to gather intelligence and to spy on one another. The loss of the Internet would be an enormous blow to intelligence agencies. Sharing information would become slow and difficult. Some governments might react to such a situation rashly. It's impossible to predict how each government would react; however, it's not hard to imagine a series of events that could escalate into a conflict.

Assuming world leaders could maintain order and resist the urge to blow each other up, other problems would surface. The Internet has become an important part of many educational programs. The loss of the Internet would leave a void that other resources would need to fill. Resources cost money—something that would be in short supply as markets around the world try to recover from staggering losses.

In the United States, military organizations and some research institutions are part of networks that are similar to the Internet but are technically not part of the Internet itself. If these networks remained unaffected, at least some electronic communication and data transmission would be possible. But if our imaginary crisis extended all the way to these computer networks, the country would become vulnerable to all sorts of attacks.

Could the Internet Collapse?

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

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

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

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

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

I Terminology Workshop

terabit 太比特: A terabit is a multiple of the unit bit for digital information or computer storage. The prefix tera (symbol T) is defined in the International System of Units (SI) as a multiplier of 10^{12} (1 trillion, short scale), and therefore

$$1 \text{ terabit} = 10^{12} \text{ bits} = 1\ 000\ 000\ 000\ 000 \text{ bits} = 1\ 000 \text{ gigabits}.$$

router 路由器: A router is a networking device that forwards data packets between computer networks. Routers perform the "traffic directing" functions on the Internet.

end point 终端: A communication end point is a type of communication network node. It is an interface exposed by a communicating party or by a communication channel.

server 服务器: A system that responds to requests across a computer network to provide, or help to provide, a network or data service.

node 节点: A wireless handheld sensor for smart devices.

protocol 协议: A defined set of rules and regulations that determine how data is transmitted in telecommunications and computer networking.

hypertext transfer protocol (HTTP) 超文本传送协议: An application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web.

browser 浏览器: A web browser (commonly referred to as a browser) is a software application for retrieving, presenting, and traversing information resources on the World Wide Web.

Internet protocol (IP) 互联网协议: The Internet Protocol (IP) is the principal communications protocol in the Internet for relaying datagrams across network boundaries.

domain name 域名: A domain name is an identification string that defines a realm of administrative autonomy, authority or control within the Internet. Domain names are formed by the rules and procedures of the Domain Name System (DNS). Any name registered in the DNS is a domain name.

packet 数据包: A formatted unit of data carried by a packet-mode computer network.

ISP 因特网服务提供商: An Internet service provider (ISP) is an organization that provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

Internet infrastructure 互联网基础设施: The Internet infrastructure is an array of remote hardware and software working to send and receive information to various systems.

grid computing 网格计算: Grid computing is a distributed architecture of large numbers of computers connected to solve a complex problem. In the grid computing model, servers or personal computers run independent tasks and are loosely linked by the Internet or low-speed networks. Computers may connect directly or via scheduling systems.

reboot 重新启动: An event sequence when restarting a computer.

PayPal 贝宝: PayPal is an international e-commerce business allowing payments and money transfers to be made through the Internet.

Ⅱ Words and Expressions

crisscross

v. to move back and forth over (使)交叉移动

e.g. From the air, we saw highways crisscrossing the farmland below.

malleable

adj. easily influenced, trained, or controlled 易成型的;可塑的

e.g. Lead and tin are malleable metals.

backbone

n. the most important part of something, providing support for everything else 主干,支柱

e.g. Farming is the backbone of the country's economy.

peripheral

adj. happening at the edge of something, or not as important as the main aim, part, etc. of sth 外围的;次要的

n. a piece of equipment, such as a printer, that can be connected to a computer 周边设备

e.g. Financial turmoil in Europe is no longer a problem of small, peripheral economies like Greece.

inaccessible

adj. remote or unapproachable 难以到达的;不可得到的

e.g. The entire hard disk goes down with its data files, causing data to be inaccessible or corrupted.

fallout

n. the unpleasant results or effects of an action or event 后果;余波

e.g. Now the fallout has spread worldwide, bringing down some of America's largest financial institutions.

extrapolate

v. to guess or think about what might happen using information that is already known 推断

e.g. You can't extrapolate universal rules from such a small amount of data.

sting

v. to make sb feel a sharp pain in a part of their body; to make sb feel angry or upset 刺;使不安

e.g. He was stung by her criticisms.

n. the feeling of being upset by something 痛苦

e.g. This debt-gathering frenzy had two goals: rescue the financial system and ease the sting of a deep recession.

hulk

n. the body of an old ship, car, or very large piece of equipment that is broken and no longer used; a large, heavy, awkward person or thing; a character in a comic who turns from a scientist into a two-metre tall monster (车、船等的)残骸; 高大粗笨的人; 绿巨人(漫画人物)

e.g. Here and there the rusted hulk of an abandoned car dots the landscape.

eventuality

n. something unpleasant or unexpected that might happen or exist in the future (尤指令人不快的)可能发生的事情

e.g. To prevent any eventuality, take drugs and anti-inflammatory drugs with digestion.

do the trick

v. have the necessary or wanted effect 达到目的

e.g. Fresh ingredients and a reliance on olive oil seem to do the trick.

catastrophic

adj. causing ruin or destruction 灾难性的

e.g. This enables the pilot to be saved from a catastrophic failure down to a reasonably low altitude.

Ⅲ Comprehension Questions

1. Is the Internet an inflexible system that stays the same all the time? Why or why not?

____

____

2. What is the function of protocols?

____

____

3. How does a message or a piece of information travel from one computer to another?

____

____

4. What would the world be like if we lost the whole Internet infrastructure?

____

____

5. Should we worry about the collapse of the Internet? why or why not?

____

____

Ⅳ True or False Statements

1. ________ Protocols are rules that dictate ways in which computers send and receive data.
2. ________ Hardware includes everything from the information-carrying cables to the terminal computers.
3. ________ The TCP/IP protocols are a 32-digit address system.
4. ________ The data under TCP/IP protocols always travel along the same route back to the requesting terminal in order to make sure the data are not compromised.
5. ________ Packets can choose different paths in order to avoid traffic and reach their destination more efficiently.
6. ________ The Internet infrastructure is so robust that it can never collapse entirely.
7. ________ Even in the most extreme case of Internet collapse, one can still make phone calls.
8. ________ Internet collapse would take a big toll on the world economy.
9. ________ Developed countries would face more economic difficulties than their developing counterparts in the case of widespread Internet failures.
10. ________ Isolated Internet failures happen all the time.

Ⅴ Translation Practice

1. Put the following passage into Chinese.

The Internet has revolutionized the computer and communications world like nothing before. The invention of the telegraph, telephone, radio, and computer set the stage for this unprecedented integration of capabilities. The Internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location. The Internet represents one of the most successful examples of the benefits of sustained investment and commitment to research and development of information infrastructure. Beginning with the early research in packet switching, the government, industry and academia have been partners in evolving and deploying this exciting new technology. Today, terms like "bleiner@computer.org" and "http://www.acm.org" trip lightly off the tongue of the random person on the street.

2. Put the following passage into English.

互联网的本质是电脑与电脑之间互相通信并交换信息，只不过大多是小电脑从大电脑获取各类信息。这种通信跟人与人之间信息交流一样必须具备一些条件，比如：您给一位美国朋友写信，首先必须使用一种对方也能看懂的语言，然后还得知道对方的通信地址，才能把信发出去。同样，电脑与电脑之间通信，首先也得使用一种双方都能接受的"语言"——通信协议，然后还得知道电脑彼此的地址，通过协议和地址，电脑与电脑之间就能交流信息，这就形成了网络。互联网就是由许多小的网络构成的国际性大网络，在各个小网络内部使用不同的协议，正如不同的国家使用不同的语言，那如何使它们之间能进行信息交流呢？这就要靠网络上的世界语——TCP/IP 协议。

Ⅵ Writing Practice

1. Summarize how Internet works within 150 words.
2. Write an essay of about 200 words on the following topic:

Has the Internet made us more vulnerable?

Ⅶ Supplementary Readings

The Top 30 Internet Terms for Beginners, 2015

Welcome, readers! As you strive to make sense of the Internet and the World Wide Web, these 30 terms are bound to be very helpful.

1. the Web vs the Internet

The Internet is a vast "interconnection of computer networks." It is comprised of millions of computing devices that trade volumes of information. Desktop computers, mainframes, GPS units, cell phones, car alarms, video game consoles, and even soda