中青新世纪英语阅读文库

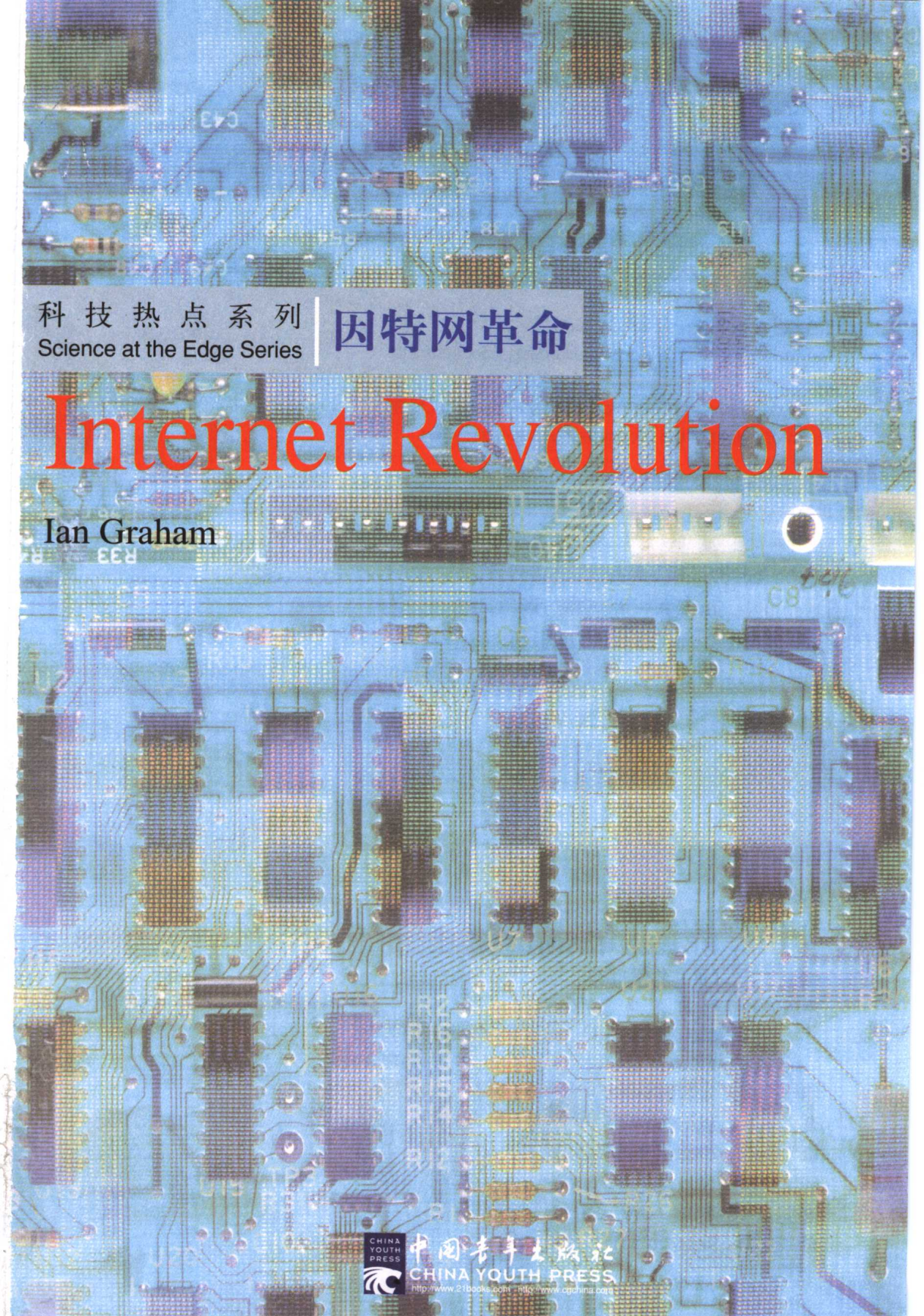
科技热点系列
Science at the Edge Series

因特网革命

Internet Revolution

Ian Graham

CHINA YOUTH PRESS 中国青年出版社
CHINA YOUTH PRESS
http://www.21books.com http://www.cgchina.com


科技热点系列
Science at the Edge Series
因特网革命
Internet Revolution
Ian Graham
CHINA YOUTH PRESS
中国青年出版社
CHINA YOUTH PRESS

（京）新登字083号

版权登记号：01-2005-0331

Internet Revolution by Ian Graham
Harcourt Global Library, part of Harcourt Education Ltd.

图书在版编目(CIP)数据

因特网革命 /（英）格雷厄姆著. －北京：中国青年出版社，2005
（中青新世纪英语阅读文库 · 科技热点系列）
ISBN 7-5006-5711-0
I.因... II.格... III.英语 — 语言读物 IV. H319.4
中国版本图书馆CIP数据核字（2005）第000013号

丛 书 名：中青新世纪英语阅读文库
书　　名：科技热点系列 / 因特网革命
编　　著：（英）格雷厄姆
出版发行：中国青年出版社
地址：北京市东四十二条21号　邮政编码：100708
电话：（010）84015588　传真：（010）64053266
印　　刷：北京朝阳新艺印刷有限公司
开　　本：787 × 1092　1/16　总 印 张：40
版　　次：2005年2月北京第1版
印　　次：2005年2月第1次印刷
书　　号：ISBN 7-5006-5711-0/H · 115
总 定 价：98.00元（共10分册）

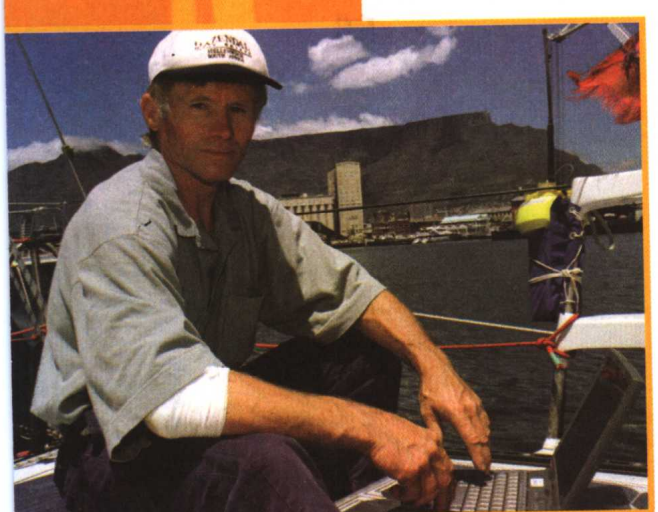
Contents

The Internet revolution

When Russian sailor Viktor Yazykov developed an **abscess** on his elbow, he guessed that it was serious. However, he couldn't just go to his doctor for treatment, because he was taking part in a solo round-the-world **yacht** race. He was on the first leg of the 1998 Around Alone race, from Charleston, South Carolina, to Cape Town, South Africa – more than 600 km away from the nearest port.

Do-It-Yourself surgery

His solution was to e-mail a doctor in the United States via his yacht's satellite communications system. Dr Daniel Carlin, a specialist in infectious diseases at the New England Medical Center in Massachusetts, knew the abscess could burst under the skin and trigger a fatal infection, so it had to be dealt with immediately. He gave Yazykov instructions by e-mail on how to cut into the abscess and drain it safely. With the surgery successfully completed, Yazykov faced a further problem. He had taken too much aspirin to cope with the pain of the surgery. One effect of aspirin is to thin the blood. As a result, his blood wouldn't clot and his wound wouldn't stop bleeding. Dr Carlin e-mailed him instructions to apply pressure to the wound to halt the bleeding. Without his satellite e-mail connection, Yazykov could have died. Dr Carlin started helping sailors, explorers and mountaineers in remote places by telephone and fax, but the introduction of the Internet in the mid-1990s has revolutionized his work. As well as being able to describe their injuries in text form, it enables patients to e-mail him digital photographs of their injuries. This gives him far more information than he could get from a description over the telephone or in a fax. When his medical centre receives an emergency e-mail, the system automatically activates staff pagers and mobile phones to summon help.



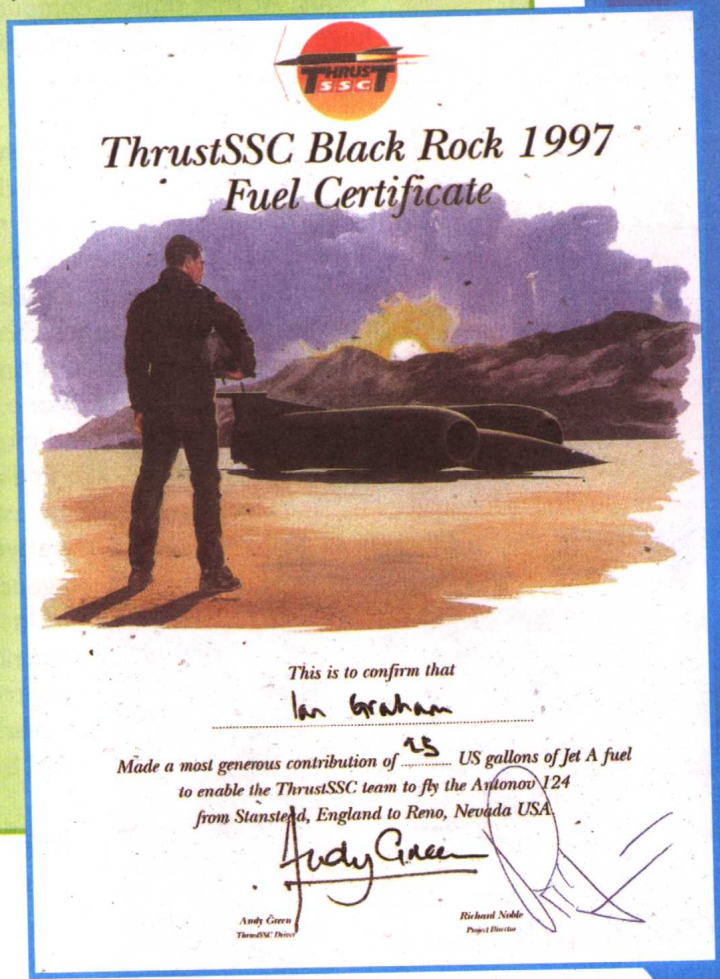
Round-the-world sailor Viktor Yazykov probably owes his life to medical advice he received by e-mail.

Fuel crisis!

As the Thrust SSC team prepared to go to the United States to set the first **supersonic** land speed record in 1997, they faced a problem. They had been loaned a heavy-lift transport plane to fly them there from Britain, but it came without fuel. They needed to buy a quarter of a million **gallons** of fuel for it. After spending millions of pounds developing and testing their jet-car, they risked losing the chance to set this unique record. Their American rival, Craig Breedlove, was also preparing to make the same record attempt in his own car.

They solved the problem by using their website to ask people to buy the fuel for them in US$25 (£18) lots. People all over the world were following the progress of the project on this website. When they saw the team's appeal for help, they started buying the fuel by typing their credit card numbers into the website. The fuel was paid for at the rate of up to 136,380 litres (30,000 gallons) a day.

As a result, Thrust SSC went to the USA and on 15 October 1997, the team set the first supersonic land speed record. Without the Internet, they could not have contacted so many people in so many places around the world for help and the record books might have told a different story!



Without the Internet sale of fuel certificates, the Thrust SSC team might not have been able to set the first supersonic land speed record.

Going online

It seems that today, if you want to be part of modern society, Internet access is almost essential. Internet users have a choice of more than eight million websites. About 500 million people had access to the Internet in mid-2001, almost double the 260 million who were online at the end of 1999. In China alone, the number of Internet users had exploded from 8.9 million in 1999 to 26.5 million in mid-2001.

Why the Internet?

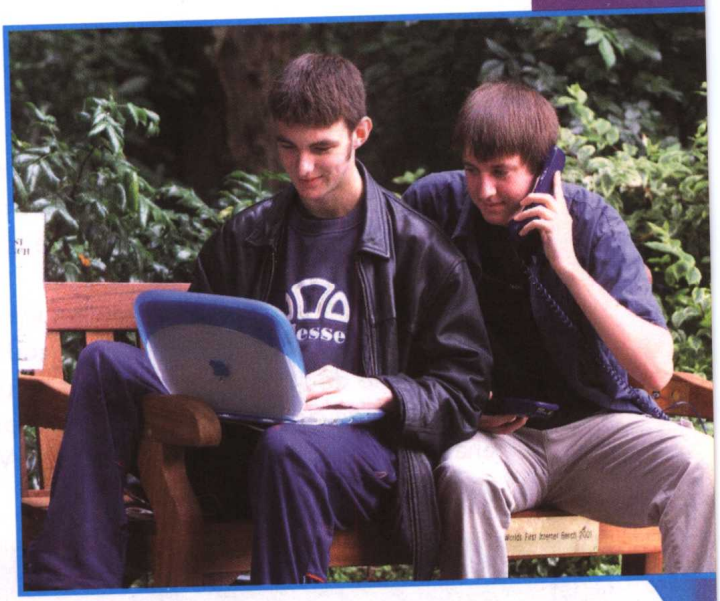
The Internet was developed in the United States in the 1960s. At that time, a computer system consisted of one huge computer, called a mainframe, connected to lots of terminals with their own screens and keyboards. A mainframe was big enough to fill a room. Damaging the mainframe could knock out the whole computer system. ARPA (the Advanced Research Projects Agency) solved this problem by developing a new type of computer system, called a decentralized computer network. It had no central computer controlling everything, but was made from lots of smaller computers linked together in a network called ARPAnet. If one computer was damaged, the others still worked. If one link between them broke down, they could still send messages to each other by using different links – like finding a way round a traffic jam by using other roads. The network grew as more research agencies and universities joined it. In 1990, the US National Science Foundation took over control of ARPAnet and the other networks that, together, had become the Internet.

In the 1960s, a computer filled a whole room and needed a team of people to operate it.

Mobile access

In the beginning, using the Internet meant sitting at a computer at home or at work. The arrival of the Internet café let people 'surf the Net' in more public places. And now, people

can go online using laptop or handheld computers or by means of mobile phones. Mobile (wireless) Internet access (see pages 10-11) is expected to be the most popular way of going online within a few years. The latest generation of mobile phones, called 3G (third generation), promises to offer faster access, faster downloads and better quality images than the older WAP phones.



An Internet bench enables people to go online outdoors by plugging their laptop computers into telephone sockets on the bench.

One of the strangest ways to go online is to plug into a park bench! In 2001, an Internet bench was set up in an English park. It allowed up to four people to connect to the Internet by plugging their laptops into the bench. However, this bench was **vandalized** shortly after it 'opened'. Elsewhere in England, a **cyber-**park enables up to twenty users at a time to use the Internet wirelessly, unlike the park bench. Wireless public access points, where you can access the Internet without having to plug your computer into something, are harder for **vandals** to damage.

Social contact

Some critics of the Internet paint a picture of people **hunched** over their computer screens, dangerously cut off from the real world. The reality is less clear. Some studies confirm that the hours that Internet users spend online might otherwise be spent doing other things, such as talking to friends and family. A survey carried out in the USA by **psychologists** at Stanford University, California, found that more hours online meant fewer hours in contact with 'real' people. However, another American survey found that 72 per cent of adults with an online account had visited a relative or friend the previous day, while only 61 per cent of those without an online account had done so. This survey also found that sending e-mails often led to follow-up contacts by telephone or in person.

The World Wide Web

In its early days, the Internet was so difficult to use that only academics bothered with it. The invention that transformed the Internet into the global phenomenon that millions use today was the World Wide Web.

The World Wide Web is an online library of millions of documents. Each document has its own unique address so that the network can find it. The documents are created by using a language called hypertext mark-up language (html). A computer program called a **browser** enables computer users to request a Web document, **download** it and display it on a computer screen.

The World Wide Web made it so easy to find information online that millions of ordinary people connected to the Internet.

The birth of the Web

The Web was invented by Tim Berners-Lee and his team at the European Nuclear Research Centre (CERN) in 1990. It was released on the Internet for other people to use in 1991. Then in 1992, Marc Andreesen created the first user-friendly Web browser, called Mosaic. It was the first browser with links that could be clicked on to take the user to other pages. It was also the first browser to allow images and text to appear on the same page. By making the Internet easy to use, browsers like Mosaic and, later, Netscape and Internet Explorer, enabled millions of people to use the Web.

Net talk

The terms 'Internet' (or 'Net') and 'Web' are often used to mean the same thing, but they are not the same. The Internet can exist without the Web, but the Web cannot exist without the Internet. The Internet is a network of computers. The connections between these computers are the cables and radio links that carry their communications signals. The Web is a huge number of pages stored in Internet computers. The connections between the pages are the software links put there by the people who create the pages.

Glass cables

The Internet makes use of telephone networks. When long distance telegraph communication was invented in the nineteenth century, messages were carried by electric currents flowing along metal cables. Telephone calls were carried in the same way. In the 1950s, scientists discovered that light could carry information along thin strands of glass called **optical** fibres. In the 1970s, telephone companies began experimenting with sending telephone calls down optical fibres. The first optical fibre telephone line was laid in England in 1978. Now, optical cables link the world's major cities and carry much of the Internet's data. With the introduction of new **broadband** technology (see page 20), the amount of data that can be carried is greatly increasing. One hair-thin glass fibre can carry hundreds of thousands of voice and data calls at the same time.

Is it right to censor the Net?

The Web allows the free exchange of information and ideas – anyone can put his or her thoughts and opinions online. Some websites contain unpleasant material. Most are harmless, but some are a cause for concern – if they urge a person to commit a crime, for example. Parental controls, called censorware or **nannyware**, in browsers and programs can block access to some pages. Sometimes, censorware is also used to prevent access to websites dealing with lifestyles or politics that the agency providing the access disapproves of. Many people feel that this is censorship, not protection. Many websites contain objectionable material, but does that mean it is right to censor them? If so, who should decide what is acceptable?

'If computer science were a traditional science, [Tim] Berners-Lee would win a Nobel Prize.'

Eric Schmidt, Chief Executive Officer, Novell, talking about the inventor of the World Wide Web

The digital divide

While thirteen-year-old Myra Jodie was surfing the Web at her school in Arizona, USA, she found a website offering a computer as a prize. She typed in her details and won that computer. Arizona is the next state to California, where many of the world's leading computer and Internet companies are based. Even so, she couldn't use her new computer to surf the Web at home. Myra lived in a Navajo (a Native American tribe) reservation. In her neighbourhood, less than one home in four has a telephone – Myra's family did not have a telephone line, so she could not connect to the Internet. So, even in a wealthy country like the USA, there is a 'digital divide' between those who can access the Internet and all its benefits, and those who can't.

As few as 3 per cent of people in the poorest areas of a developed country may have access to the Internet, compared to more than 50 per cent of people in wealthier parts of the same country. One answer is to open IT (Information Technology) centres, where people can call in and go online, or to make the Internet available in public places, such as libraries. Another is to offer people free or cheap IT training courses. IT lessons at school also play an important part in introducing children to the Internet. Government schemes to supply second-hand computers to poorer families help, too.

Even in wealthy countries, there are some people who cannot afford access to the Internet. Increasingly they will form a new digital underclass.

Half the people in the world have never made a telephone call, never mind **logged** on to the Internet. Two billion people do not even have a reliable electricity supply to power a computer. As Internet use in developed countries grows, the developing world is being left behind, creating another digital divide. Africa is coming online, but the growth is mainly in large cities – most of the continent still has no Internet access. Even if it did, cost would prevent most people from going online. Internet access in Africa costs approximately US$68 per month. This is about as much as someone in one of the continent's poorer countries earns in a year!

Mobile Internet access

The old-fashioned telephone system in some African countries is a major obstacle to introducing the Internet. In 1999, there were fewer telephone lines in the whole of Africa than in the central area of New York City in the USA, or in Tokyo, Japan. In the poorest African countries, such as Mali, Niger and the Democratic Republic of the Congo, there are only about two telephone lines for every 1000 people. Continent-wide, only about 2 per cent of Africans have phones. Bringing that up to the global average of 10 per cent would cost US$60 billion. One answer is to use mobile telephones, although these are often considered to be less secure than traditional cable-based networks.

In developing countries in general, the use of mobile phones to access the Internet is growing twice as fast as in developed countries. There could be 729 million mobile data **subscribers** in developing countries by 2010, overtaking the numbers with standard phones. But again, this is confined mainly to major cities. Governments are beginning to recognize the problem and find ways to close the gap between rich and poor countries. Japan has pledged to provide US$15 billion over five years to help train IT experts in developing countries.

In Africa, where there are fewer land lines, the use of mobile phones for accessing data is growing faster than in developed countries.

Communication on the Internet

The Internet is mainly used to send e-mails. More than eight billion e-mails are sent every day. By 2005, that figure is expected to be 26 billion per day!

Getting the mail through

We can communicate with each other because the same words mean the same thing to different people (when you are talking the same language). In the same way, all computers connected to the Internet must process information in the same way or they wouldn't be able to make sense of it. The sets of rules about processing information used by computers that are connected to the Internet are called **protocols**.

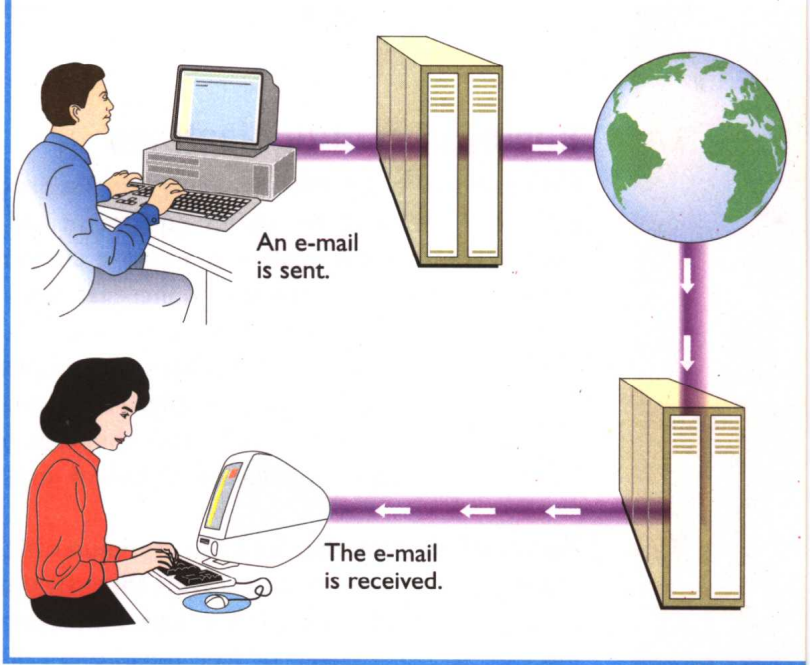
The Internet's basic communication protocol is called TCP/IP. Among other things, this ensures that e-mails arrive safely. First, the TCP (Transmission Control Protocol) part splits information up into smaller packets of data. Then the IP (Internet Protocol) part labels them all with the address they are going to and sends them through the Internet.

Each packet of data travels on its own. Each Internet computer – called a router – that it passes through on the way reads its address and sends it on the next part of its journey by the fastest route. This means that the packets often travel by different routes and arrive in the wrong order. The TCP/IP software in the computer that receives them slots them back into the correct order. If any packets are lost, TCP/IP asks for them to be sent again. The information doesn't appear on the screen until all the packets have been received, checked and reassembled in the correct order.

A second important Internet protocol is File Transfer Protocol (FTP). FTP is a standard way of copying a file from one computer to another over the Internet. A file may contain data or it may be a computer program. Millions of files are stored on Internet computers – FTP enables Internet users to download these files onto their own computers.

Breaking down social barriers

You cannot tell someone's colour, age, religion, wealth or sex from an e-mail. This makes it difficult to discriminate against people. However, this can also be a problem, because you can't be sure that strangers who contact you are really who they claim to be. This can be dangerous, especially as most of the people who use Internet chat rooms and IRC are under twenty years old, and some are very much younger than that.



An e-mail travels from computer to computer through the Internet until it reaches its destination. It is stored there until the person it is addressed to accesses it.

Another problem is that e-mails are easy to misunderstand. Most of the information we receive when we talk to people comes from the expressions on their faces, their body language, tone of voice and so on. E-mails contain none of this information, so it can be easy to give the wrong impression with a badly worded e-mail.

Younger people often use the same language in e-mails that they use in mobile phone text messages, for example, 'r u ok 2day?' In a recent survey, half of nine to twelve year olds said they expect e-mail to replace handwritten letters. Language experts feel that this may influence the way this generation uses language.

Raising expectations

People who use e-mail often expect an instant response. If scores of e-mails arrive, all requiring an instant response, it can make normal work impossible. The average office worker already sends or receives about 40 e-mails every day.

Business communications

Companies use the Web to advertise the products and services they sell. They are happy to pay for equipment and training, because using the Internet can cut costs and improve customer service. This should in turn attract more customers, increase sales and lead to higher profits. E-mail is an efficient and cost-effective way for companies to communicate with their customers and suppliers. However, some companies use e-mail irresponsibly. They send the same promotional message to all the e-mail addresses they can get hold of. This is called 'spam' and it is the Internet equivalent of junk mail.

People often think that Internet communication means e-mailing text alone. In fact, the data that travels through the Internet can represent anything – including people's voices. Some people already use the Internet to make cheap or free telephone calls by using a microphone connected to their computer to send the call through the Internet. Companies could use the Internet for telephone calls, too, but they haven't because the quality of the sound is so unpredictable. When someone wants to speak to someone else via the Internet, that person's voice is **digitized** and divided into packets of digital data. The packets are then sent along communications channels chosen by Internet computers. Different packets will almost certainly travel along different communications channels. As some communications channels are better quality than others, the sound quality of a telephone call sent through the Internet can vary a lot. Poor sound quality means that companies will not use the public Internet for telephone calls.

Computer-satellite links mean information travels fast, even if the quality of digitized sound through Internet connections can be poor or suffer delays.

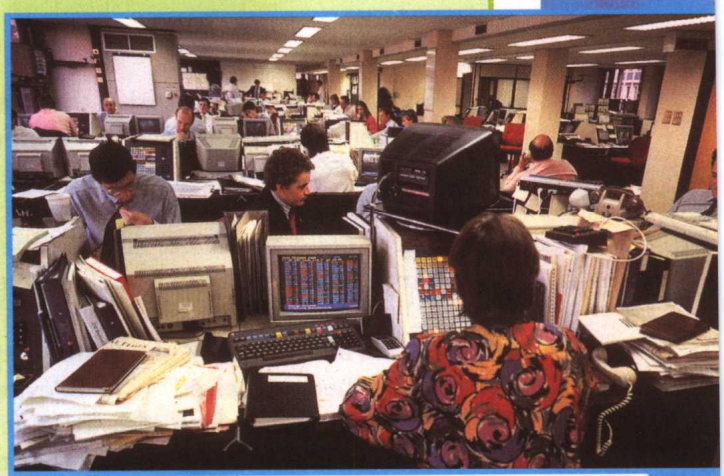
Voice Over Internet Protocol

Instead, they are beginning to use something different, called Voice Over Internet Protocol (VOIP), which does give them the guaranteed quality and reliability that they need. It also enables them to cut their communication costs. VOIP doesn't use the same public Internet links that the rest of us use. Instead, it uses tightly controlled communications links provided by a new type of communications company, called Internet Telephony Service Providers (ITSPs). These companies buy, rent or set up their own high-quality communications links and make them available to businesses for telephone calls and data communications.

What makes VOIP so useful is that voice and computer data can share the same communications channel at the same time and they are carried in the same form, using Internet Protocol. VOIP is particularly useful when people need to be able to talk to each other and also share data at the same time.

Internet Protocol (IP) Telephony

When a 'normal' telephone call is made, a circuit is set up to connect the two telephones. The circuit is used only for that one call. No one else can use it, even in the silences when no one is actually saying anything. This is very wasteful. It is more efficient to treat phone calls like Internet data. This is called Internet Protocol (IP) telephony. In this case, a caller's voice is changed into packets of data. Each packet is sent on its way separately in the next available free 'slot' in a communications channel – like fitting boxes into spaces on a busy conveyor belt. The same channel carries packets of data from many telephone calls. That way, lots of different calls can share the same channel at the same time, and costs are cut.



All types of businesses now depend on the Internet for accessing information and also for some of their communication needs.

Prioritization

Packets of data travelling through the public Internet are all treated in the same way. None of them is more important than any others. But packets travelling through business Internet channels are treated differently depending on what they represent. Voice packets are treated as being more important than the others. If packets of e-mail text or data are delayed or lost, all that happens is that information may take a little longer to appear on a screen. But if voice packets are delayed or lost, sound quality suffers. There may be gaps in the sound and, as a result, conversation may become difficult or impossible. Giving voice packets top priority **eliminates** this problem and guarantees good sound quality.

Virtual Private Networks

Large companies often have people working in several different places worldwide. Many of these companies are setting up their own Internet-style private networks to link their various offices together. These are known as Virtual Private Networks (VPNs), and they use VOIP to enable people to talk to each other and share data. For example, they might want to discuss a project while at the same time looking at designs or other information related to the project.

Some companies have decided not to use VOIP because they think Internet communications means poor quality and reliability. However, they are probably using it already without knowing it! Their telephone calls are probably travelling part of the way over Internet-style communications links called IP backbones.

Video over the Net

The TCP/IP rules (see page 12) that were developed to send e-mails were never actually intended to be used to send live sound or video pictures. If TCP/IP discovers that packets of data have been lost, it asks the sender to send the data again. That works well with e-mails and recorded sound and video clips. All the data is downloaded before the e-mail appears on the screen or the sound or video clip is played.

Live sound and video are different. They have to be played while the data is still being received. Your television set doesn't download a whole programme before showing it. It shows the pictures as soon as they are received. The Internet has to be able to handle sound and video in the same way. Internet companies have agreed on a set of rules for sending sound and pictures on the Internet. This is called Real-time Transfer Protocol (RTP), because sound and video are called real-time applications.