The Trends
Guide to the Internet
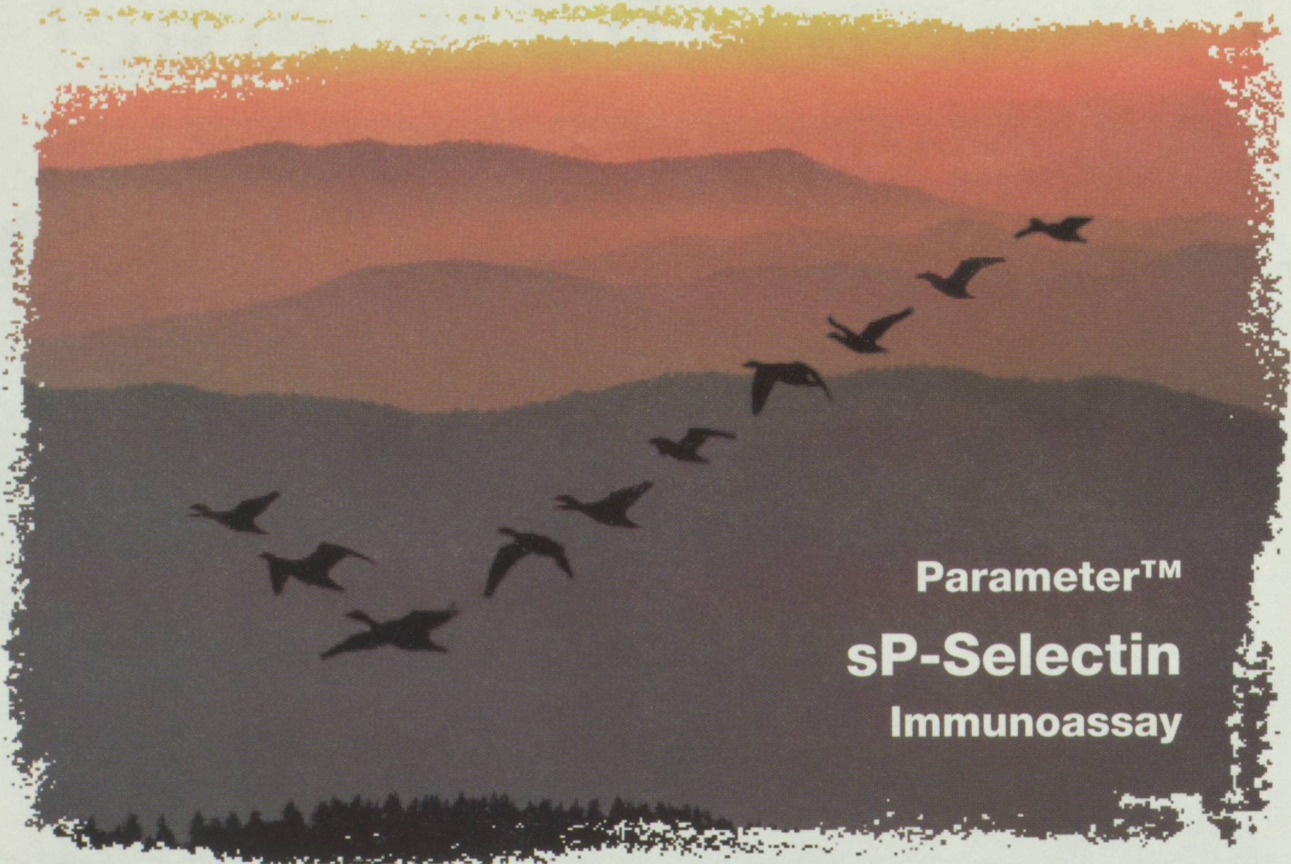
http://www.elsevier.com/locate/trendsguide

1996

Contents

Cover design by Nigel Hynes.

The Internet – the global communication system that connects millions of users – is becoming hard to ignore. How important is the Information Superhighway? Well, it seems likely that the effect of this technological revolution on our lives will be as significant as television, telephone or radio. Soon we will be able to do our shopping in virtual reality supermarkets; read books and journals in virtual libraries; and attend conferences in cyberspace. These facilities will be widespread and taken for granted, both in the workplace and at home.

However, with this enthusiasm and excitement come concerns: how will the infrastructure of the Internet cope with the spiralling demand? At the present rate of increase, the number of people connected to the Internet will equal the current world population by the year 2002. Ironically, the Internet's limitless capacity for providing information can be frustrating rather than enlightening; as the Internet grows, so must the means for searching, sorting and displaying its wares if you are going to find what you want. However, these are exciting times, and as we move towards the 21st century, it is becoming increasingly clear that you can't afford not to be connected.

But where do you start if you are relatively new to this technology? How do you find out what it can offer? How do you connect? Which software should you use? Don't panic! This guide will lead you through those all-important first steps to help you access the wealth of resources available. We have provided a glossary of key terms and, throughout the text, we highlight these acronyms or terms as they appear in each section. Furthermore, you will find all the URLs listed in this guide, as well as links to the Elsevier Science home page, at our Web site: **http://www.elsevier.com/locate/trendsguide**

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Evolution of the Net

The Internet grew out of an experimental network, called the ARPAnet, built for the US Department of Defense in 1969 by the Advanced Research Project Agency (ARPA). This was based on a so-called 'packet-switching network' whereby data, such as an **e-mail** message, is broken up into **packets**. These packets are forwarded individually by adjacent computers on the network, acting as **routers**, and are reassembled in their original form at their destination. Packet switching allows multiple users to send information across the network both efficiently and simultaneously, saving time and costs over phone lines, and satellite and radio connections. And, because packets can take alternative routes through the network, data transmission is easily maintained if parts of the network are damaged or not functioning efficiently. Using this technology, military communications could be maintained in the event that nuclear war or sabotage were to interfere with communication lines. However, even from early on, the use of the network for peaceful scientific research and communication dominated any potential military uses.

Going global

By December 1969, four American universities were connected, forming the first distributed packet-switching network. Over the 1970s and early 1980s, the Internet **Protocol** (IP) – the procedure that determines the addressing and appropriate routing of data packets over the network – was implemented on many different kinds of computers. ARPAnet continued to grow and, by August 1983, there were 562 networked host computers. Other independent networks were also being created at the same time. **USENET** (UNIX Users Group Network) started in 1979, and CSNET (Computer and Science Network) and BITNET ('Because It's There' or 'Because It's Time') in 1981. Networks also began to spring up in Europe, including EARN (European Academic Research Network) and JANET (Joint Academic Network).
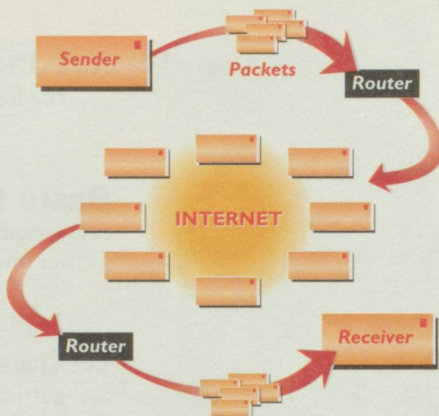
Data transmitted via the Internet is broken into packets, forwarded by routers and reassembled

Correct protocol

In 1983, ARPA changed the original Network Control Protocol, which governed how the electronic message is broken up and reassembled across the network, to the Transmission Control Protocol (**TCP**). The widespread use of TCP together with IP allowed many networks to become interconnected with ARPAnet through devices called **gateways**. Connecting networks, technically known as 'internetworking', gave rise to the term the 'Internet' for this ARPAnet-centred network of networks.
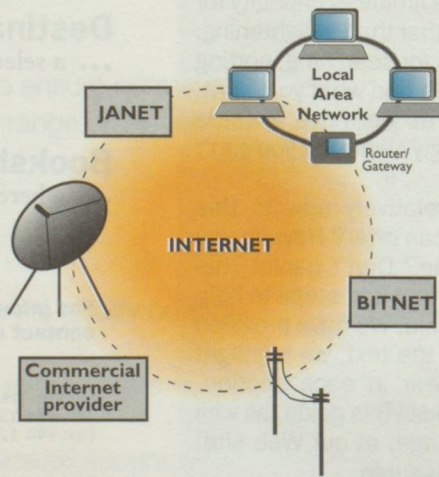
The Internet is a collection of many networks communicating with each other using TCP/IP

Three years later, the US National Science Foundation (NSF) established a national network based on ARPA TCP/IP protocols to connect five supercomputer hubs with a high-speed network backbone (56 000 bits per second – a snail's pace compared with today's rates) using commercial phone lines. Regional, local and campus networks could connect to the NSFnet via the closest hub. The NSFnet brought computer networking to a much larger science research community, and eventually superseded the ARPAnet as the framework for the Internet; ARPAnet was officially decommissioned in 1990. The current NSFnet backbone transmits at 45 million bits per second (Mbps) and upgrades to 155 Mbps and beyond are planned.

Grasping the Net

What now comprises the Internet is hard to define. John Quarterman of the Matrix Information and Directory Services (MIDS) coined the term 'the Matrix' to encompass 'all computers and networks able to communicate with each other', although many of these computers only provide e-mail. Technically, the 'Internet' constitutes only interconnected IP networks and networks that are moving to a new standard called **OSI** (Open System Interconnection) protocol.

Today, approximately half of the Internet networks are commercial and one third are associated with educational and research institutions. There are about 40 000 registered computer networks containing over five million host computers and an estimated 20–35 million users worldwide. Why is the Internet so popular? This technology has revolutionized the way we communicate and obtain information: never before have so many resources been available to so many people. Of these facilities, the World Wide Web (**WWW**) is the newest available, and has spawned tremendous growth of Internet services. Developed in 1992 by Tim Berners-Lee at the European high energy physics laboratory, CERN, it permits the display of data as pages of **multimedia** objects that can include text, graphics, audio and video. These pages are linked together with **hypertext** pointers so that data stored on computers in vastly different locations can be pulled in over the network onto your computer. Currently, there are estimated to be approximately 200 000 WWW sites.

As you might expect from something originally set up by computer experts working for the military, the jargon abounds. But things have changed, and the WWW in particular has made it relatively easy for anyone, no matter how inexperienced, to gain access to all kinds of information. What's more, you don't need to know the first thing about packets and protocols to take advantage of what's out there. So, after a quick tour of the key terms, and a browse of the basic Internet facilities and software, it's just a few steps further to getting connected.

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1996

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3.8×10^6	94
2×10^6	93
1.1×10^6	92 WWW
6×10^5	91
3×10^5	90 ARPAnet decommissioned
1.6×10^5	89
5.6×10^4	88
2.8×10^4	87
5089	86
1961	85
1024	84
562	83 EARN
235	82
213	81 BITNET
	80
	79 USENET
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ARPAnet

Number of networked host computers (data compiled by Network Wizards, http://nw.com)
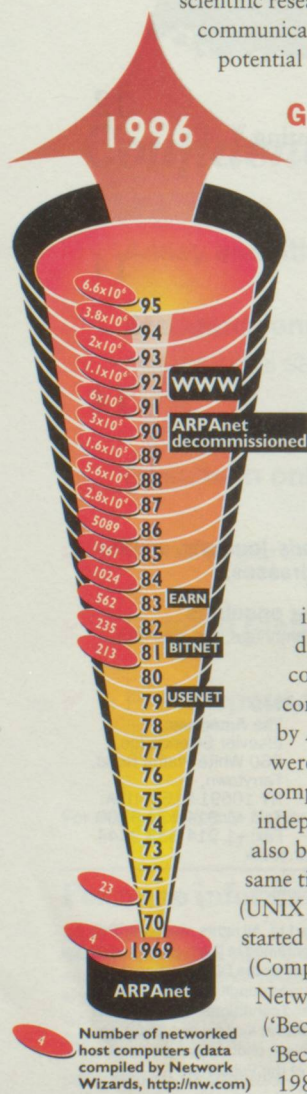
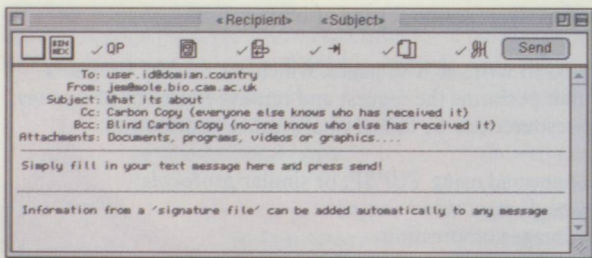|	
active map/imagemap	A picture in which clicking on different areas provides links to different *URLs*
add-ons	Programs that provide extra facilities for a *WWW browser* e.g. sound, video (see *helper application*)
anonymous ftp	A means of retrieving files from the *host* computer as an unnamed guest with limited privileges
Archie	An indexing tool that helps you to find files that are available by *anonymous ftp*
ASCII	American Standard Code for Information Interchange; basically a document without any formatting codes
BBS	Bulletin Board Service
browser	A program that accesses the *WWW* and reads *hypertext* (see *client*)
bulletin board	The Internet equivalent of a notice board, where messages can be posted and read by anyone
CGI	Common Gateway Interface; a programming mechanism for *servers*
client	A computer (or, more specifically, a software application, e.g. a *browser*) that uses the resources provided by another computer (the *server*)
domain	The naming hierarchy of the Internet is based on domains (e.g. a University department), within which each computer has a unique name
domain name server (DNS)	DNS converts between a machine name (e.g. Journals@elsevier.co.uk) and a numerical *IP* Internet address
e-mail	Electronic mail; a means of exchanging messages, which may include enclosed files and graphics, depending on the sophistication of the system
FAQ	Frequently Asked Questions; many *USENET* newsgroups have a list of FAQs
fill-in form	A document on a *WWW* page in which you can enter information
firewall	A combination of software and hardware that limits access to a *WWW* site and provides a degree of security
ftp	File Transfer Protocol; a mechanism for transferring files across a network
gateway	A computer system that joins and translates between two otherwise incompatible networks or applications
GIF	Graphics Interchange Format; an algorithm for image compression developed for the commercial Internet provider CompuServe
gopher	A menu-driven system of disseminating and accessing information on the Internet (see *Veronica*)
graphical browser	A *browser* capable of displaying pictures (e.g. Mosaic and Netscape)
helper application	Another name for *add-ons*, usually applied to Macintosh computers
home page	The starting page for access to the *WWW* or, alternatively, a personal page of information
host	A computer on the network
HTML	HyperText Markup Language; the coding syntax used to write *WWW* pages, which are read by *browsers*
HTTP	HyperText Transfer Protocol; the *WWW protocol* that performs the request and retrieve functions of a *server*
hypertext	The basic concept behind the *WWW*, whereby one resource can be linked to any other information elsewhere on the *WWW*
Internet	The worldwide distributed network of computers connected using *TCP/IP*, or similar *protocols*
IP number	The unique number for a machine on the Internet (see *domain name server*)
JPEG	Joint Photographic Expert Group; an algorithm for image compression
LAN	Local Area Network; a network that serves a small area
list server	A program that sends mailing lists to subscribers by *e-mail*
MIME	Multipurpose Internet Mail Extension; an *e-mail* extension allowing inclusion of nontextual information (e.g. graphics, video), and also used to indicate different types of *WWW* documents
modem	Modulator/Demodulator; hardware that translates digital computer signals into sounds that can be transmitted down a telephone line
MOO	Multi-User Dimension Object Orientated; an enhanced *MUD* with an object-based environment (e.g. BioMOO)
MPEG	Moving Picture Expert Group; a standard for digital encoding of video
MUD	Multi-User Dimension; a virtual reality site on the Internet where multiple users can interact
multimedia	A document or program that integrates text, graphics, audio and video
NCSA	National Centre for Supercomputing Applications; the birth place of NCSA Mosaic and NCSA Telnet
OSI	Open Systems Interconnection; a technical specification of communication *protocols*
packet	The basic unit of data transmitted over the Internet; packets are transmitted independently and then reassembled at their destination
POP	Post Office Protocol; a program that allows mail to be stored and retrieved by remote computer
PoP	Point of Presence; an access point to the Internet provided by your *service provider*
PPP	Point to Point Protocol; a *protocol* that allows a computer to transmit *packets* by *TCP/IP* using a standard telephone line and a *modem* (similar to *SLIP*)
protocol	A means by which different types of computers communicate with each other (see *TCP/IP*)
router	Hardware connecting two networks that use the same *protocols*, allowing transfer of data between them
server	A computer, or a program on the computer, acting as an Internet site whose data is available to the *client*
service provider	A commercial company that sells Internet connection facilities
site	A collective term covering all the Internet facilities offered by one organization
SLIP	Serial Line Internet Protocol; similar to *PPP* and now being superseded by it
TCP/IP	Transmission Control Protocol/Internet Protocol; the communications program common to most connected Internet computers
Telnet	A program that allows users to login to other computers on the Internet via *TCP/IP*
URL	Uniform Resource Locator; an address that specifies the location of a file on the Internet (e.g. http://www.elsevier.com/locate/trendsguide), usually used for the *WWW*
USENET	A system for disseminating news among cooperating computers
Veronica	Very Easy Rodent-Oriented Net-wide Index to Computerized Archives; an indexing tool that helps you find *gopher* files
viewer	A program that allows graphics or video files to be viewed by a *WWW browser*
WWW	World Wide Web (or just the Web); a *hypertext*-based Internet service providing information and resources

Basic Internet Facilities

Communication, discussion, news gathering, information transfer: THE TIP OF THE INTERNET ICEBERG. This section gives you a taster of the basic facilities on offer.

Subscriber sends e-mail

List server copies e-mail

Sent to other subscribers by e-mail

e-mail

e-mail is the electronic equivalent of postal mail or 'snail-mail', and is probably the most widely used facility on the Internet. It is much faster than conventional postal services: messages can reach transatlantic destinations in seconds.

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┌─────────────────────────────────────────────┐
│              «Recipient»    «Subject»        │
├─────────────────────────────────────────────┤
│  ☐ ✓QP   ☐  ✓⊞  ✓↹  ✓▢  ✓▦  (Send)          │
│    To: user.id@domian.country                │
│  From: jes@mole.bio.cam.ac.uk                │
│ Subject: What its about                      │
│   Cc: Carbon Copy (everyone else knows who has received it) │
│   Bcc: Blind Carbon Copy (no-one knows who else has received it) │
│ Attachments: Documents, programs, videos or graphics.... │
│                                              │
│ Simply fill in your text message here and press send! │
│                                              │
│ Information from a 'signature file' can be added automatically to any message │
└─────────────────────────────────────────────┘
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The mail is transferred between machines on the Internet, which act as post boxes that store the mail, so that there's no need to leave your own computer switched on. Although e-mail programs vary, most allow you to save, print or reply to a message, and some allow you to attach word-processing documents, programs, videos or graphics.

An e-mail address has three basic components: the user name, an @ sign and the user's location or '**domain**' (according to a hierarchical structure). Some programs allow you to add a so-called 'signature' to the end of every message – this might give your snail-mail address, telephone and fax number.

Address suffixes

.ac	academic institution (UK)
.com	commercial organization
.edu	educational facility (USA)
.gov	government
.mil	military
.net	network resource
.org	other organizations

Newsgroup nomenclature

alt	various topics; not carried by all sites
bionet	research biology
biz	business
comp	computers
misc	discussions that don't fit anywhere else
news	news about USENET
rec	hobbies, games and recreation
sci	science
soc	'social' groups
talk	politics and related topics
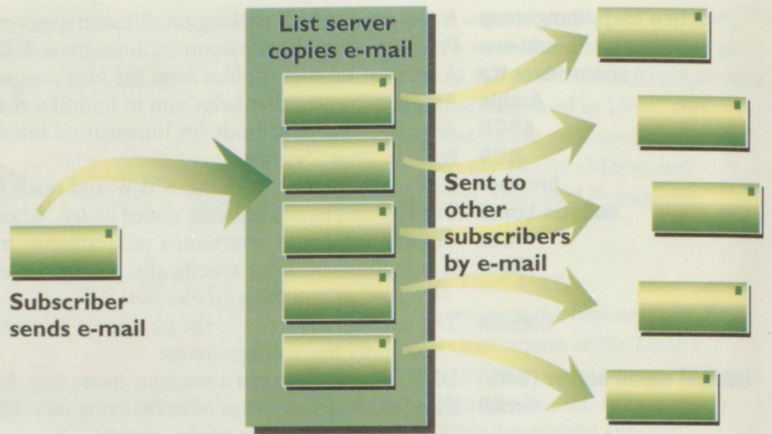
List servers

A **list server**/mail **server** is a discussion group created to share ideas and knowledge on a subject; LISTSERV is the most common list server program. A message sent to a list is copied and then forwarded by e-mail to every person who subscribes to the list, thereby providing an excellent resource for distributing information to a group with a shared interest. Any subscriber can contribute actively to the list by posting messages, or can simply read the ones that others post when they arrive by e-mail.

Discussion groups are usually created and monitored by someone with an interest in that subject and are open to anyone. You join the list simply by sending an appropriately worded e-mail request to the list. The program automatically reads your e-mail message, extracts your address and adds you to the circulation list. Usually, the first message that you receive lets you know that you have successfully subscribed to the list and also tells you how to leave the list – don't lose it!

USENET/newsgroups

Unlike list servers, which disseminate information on a specific topic from one person to many, newsgroup servers (e.g. **USENET**) provide access to thousands of topic-based discussion group services that are open to everyone. Using specific newsreader software (see Software), access is provided through a local **host** or news server machine, often run by an Internet **service provider**. However, not all providers give access to all newsgroups available.

Newsgroups are arranged in a hierarchical tree, beginning with broad categories, with the topics becoming more specific as you move along the branches. Newsreader software allows you to post an article to any group for others to read; the title is what others will see listed in their newsreaders, so it pays to make it informative. If you wish to add a comment to messages that have already been posted, you add it to the 'thread' of the article so that it appears grouped along with other comments. Although the quality of information in newsgroups is very variable, they can be an invaluable way of trying to find an answer to a specific question.

Newsreader software

User's computer

.sci

.news

.rec
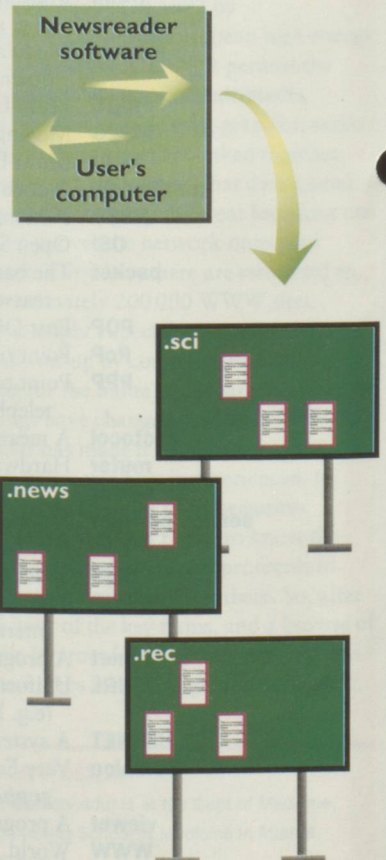
ftp

The placing and retrieving of files over the Internet by **ftp** is one of the most useful facilities: it allows you to download software, product upgrades, information and so on. To connect to a remote computer, you must first know the address, have a user ID and a password. However, many computers are now set up as '**anonymous ftp** servers'; these allow any user to download files or programs. Some even provide 'upload' space.

When you use anonymous ftp, the convention is to give the user identity as 'anonymous' and enter your e-mail address as the password. An indexing tool named **Archie** will help you find specific files among the many available by anonymous ftp. Many ftp servers supply a small amount of text information when you login. Read it carefully since it often gives the answers to specific features found on that ftp site. Using ftp takes a bit of practice, but you can get help at the ftp prompt by typing 'help' or '?'. To get more information on each topic, type 'help' followed by the topic. Files that are not text (e.g. programs, images or video) must be transferred to binary format in the ftp program. One thing to bear in mind: although it doesn't matter what type of computer you have, the connection to the Internet does affect ftp – a dial-in (**SLIP/PPP**) or direct connection allows files to download directly, but a dial-up connection via a service provider will involve a two-step and lengthier download.

NCSA/BYU Telnet 2.5

Telnet

Telnet is a simple program created by the **NCSA** that uses the communication protocol of the Internet (**TCP/IP**) to provide a connection onto another computer. Providing you have Internet access from your computer, you can use Telnet to contact a host machine simply by typing in the host name or **IP number**. You will then be asked for a login identity and your password. Often buried within Telnet is a version of ftp, so you can transfer files from the TCP/IP host to your own computer.

Gopher

Gopher was created by the University of Minnesota Microcomputer Workstation Networks Center, and was one of the first 'user-friendly' ways to find information on the Internet. It is a menu-driven program that allows you to click your way around the network of information servers or 'gopher holes' on the Internet. Each gopher hole is hierarchical and you move up and down the tree using arrow keys, clicking on individual entries to retrieve the information. The information might include text, sound and images. The gopher system is impressive owing to its simplicity, as well as to the volume and variety of information available. To help you retrieve this information, an indexing tool called **Veronica** searches all gopher servers for a set of keywords that you provide. Once the information has been retrieved, it can be displayed directly on your computer.

WWW

The Web has rapidly become the graphical user interface of the Internet, and is so popular and well used that we have devoted a separate section to this facility (see Webwatching).

Connect using ftp host name or IP number
Login with username or anonymously
Enter Password (e.g. e-mail address)
Identify directory (changing directory if necessary) on server

Client

Put (sends file)

Get (retrieves file)

Log off

TCP/IP connection

Server

Emoticons

– a series of letters that sketch out a facial expression when you look at them sideways; widely used in e-mail and newsgroups to indicate an emotion; also known as 'smileys'. Here are just a few.

The basic smileys…   :-) happy   ;-) winking   :-(sad
Smileys for the more advanced…
8-) wearing sunglasses   :-))) rather overweight
(:-) follicularly disadvantaged   :*) one drink too many
:-)' tendency to dribble   #-(badly hungover

What next?

Now you've an idea of the sort of facilities the Internet offers, what choices govern your next steps?

You need to know which software gives you access to the facilities you want for the machine you use, and you'll need to know if you can download it from the Internet free of charge. You'll also need to know what sort of connection to the Internet is best for you. Its worth checking with an Internet provider what is the most cost-effective connection depending on the facilities you want – if you only want to send and receive e-mail, there's no need to have a connection that allows you to publish and administer Web pages. The subsequent sections should help you with these choices…

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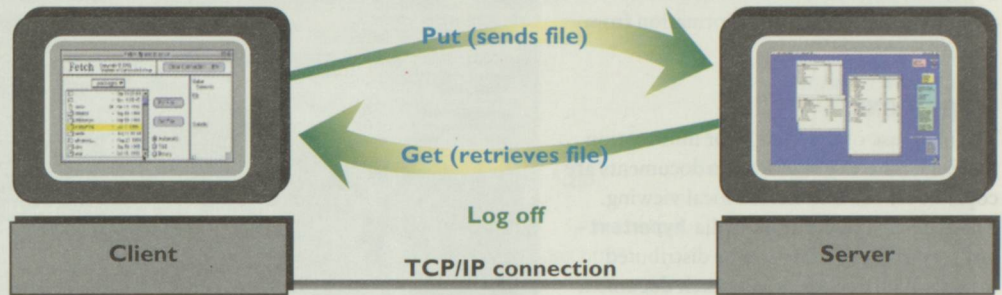

Netiquette

– a term coined to describe the unwritten rules of conduct when communicating over the Internet, particularly when using USENET. These can be summarized as follows:

• Don't SHOUT! Typing in capitals is regarded as shouting.
• Don't spam. 'Spamming' is posting adverts or flooding newsgroups with repeated information.
• Quote at minimum from previous messages – users can always refer back.
• Be relevant. Don't post in the wrong newsgroup.
• Check the FAQs before you ask the same old questions.

Basically, so long as you respect others and don't resort to rudeness, time-wasting, or infringement of netiquette, then you should avoid being flamed – receiving heated, and usually insulting, replies to your message.

Webwatching

For many people, the **WWW** has become synonymous with the Internet. In fact, the Web is just one Internet application, a way of using this vast interconnnected network to find and view information from around the world.

Hypertext

The main use of the Web is for information retrieval, whereby **multimedia** documents are copied over the Internet for local viewing. The Web is in fact a multimedia **hypertext** – any sort of digital data can be distributed inside a Web document, and each document contains links to other documents, as shown by highlighted or underlined text. Simply click on the word and you can travel to the document in question.

Web documents are written using a markup language called **HTML**. The codes may specify attributes such as paragraphs, bold text and so on, or they can refer to image files that are to be incorporated into the document, or they can be cross-references to other documents anywhere on the Web.

Location

Every Web document has a title, called the Uniform Resource Locator (**URL**). The URL consists of the name of the computer on which the document is stored and a file name. Fortunately, when browsing the Web, most URLs will be embedded in other documents so you do not need to type them.

Just browsing

The key to the Web is the **browser** program, which is used to retrieve and display Web documents. The browser is an Internet-compatible program that runs on your local computer, whether it is a Mac, PC or Unix workstation, and does three things for Web documents:

- it uses the Internet to retrieve documents from other computers, called **servers**;
- it displays these documents on your screen, using formatting specified in the document;
- it makes the displayed documents **active**, so that pointing and clicking on a cross-referenced item in a document will take you to the reference.

The image stored at this Web site can be rotated in space by the user.

http://chem.leeds.ac.uk/Project/MIME.html

This sounds simple; in fact, the Web is very simple to use and to find one's way around. The hypertextual nature of Web documents makes navigation straightforward, and many documents provide indexes to other places of interest on the Web.

The choice of browser is central to the way in which you use the Web. All browsers work to Internet standards and, until relatively recently, all Web documents could be viewed by all browsers. However, the recent commercialization of the Internet and the Web has meant that companies see a commercial advantage in adding new features to their browsers. The best example of this is the Netscape Navigator, a browser from Netscape Communications Corp. in the USA. Netscape have added to the Web's HTML standard to provide features like formatted tables, coloured backgrounds and so on. Although these are attractive features, they are not standard and many other browsers do not work properly when they meet them. Nevertheless, the number of people designing for Netscape means that it has succeeded in becoming the *de facto* standard for browsers, and you should look for a browser that supports the 'Netscape extensions' to HTML.

Camera, lights, action!

Although the Web is multimedia, a browser does not automatically know how to deal with every possible type of digital data. With so many different and competing formats for sound, video and images around, it would be impossible to keep up. Instead, each
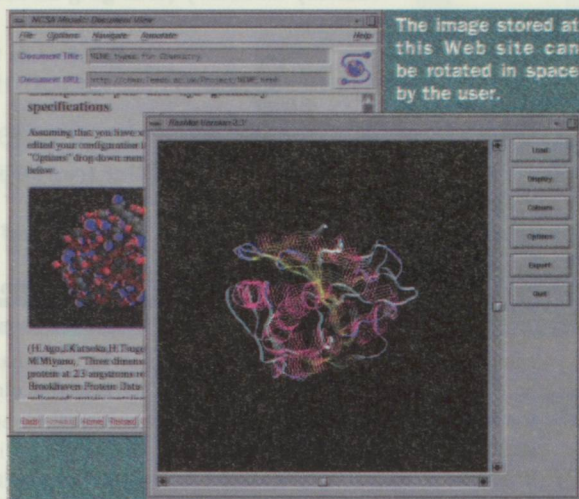
user of the Web can install their own collection of **helper applications** to deal with the sorts of data they plan to use (see Software). The Web browser calls the appropriate helper when needed. For example, users of Microsoft Windows can get a program to let them play Apple QuickTime movies.

Find and seek

For the casual or random user, the Web appears as a multilingual, multimedia bazaar, with thousands of sites offering untold and unstructured riches. However, the lack of any overall control on what is published on the Web does not mean that finding things is a random process. There are two main tools for those using the Web in a directed fashion. First, there are Web catalogues; the best known of these is Yahoo, which organizes Web sites by subject classification. Alternatively, there are the Web databases, where the contents of Web pages are indexed and searchable; Lycos and InfoSeek are the best examples of these.

The Web is large and growing rapidly. The Lycos database indexes over eight million Web documents, and there are probably many more unindexed sites. Finding your way around the Web can therefore seem impossible. But, with the help of a good search tool, things will suddenly seem less daunting. Many software files can be downloaded free of charge from the Internet, as described in the next section…

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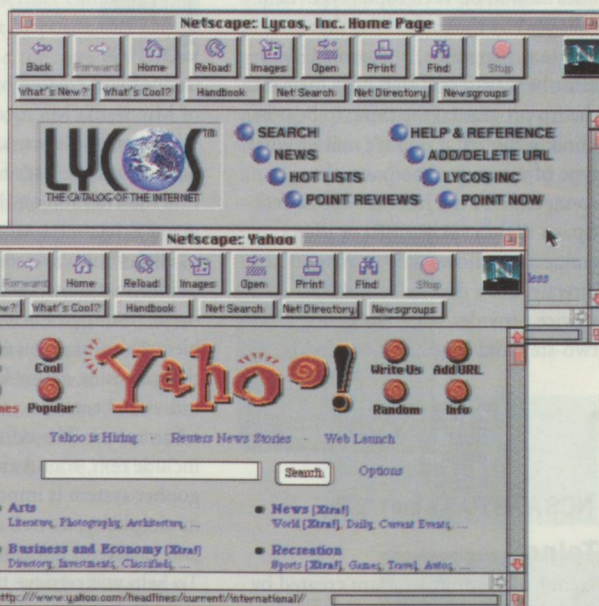
Software

We all know about commercial software: you buy it, register it, and get a manual and the disks to go with it. With freeware, the program is completely free, there may or may not be a manual and, depending upon the developer, there may be some support, often by e-mail. Many of these free programs are outstanding, but there may be the occasional incompatibility, so make sure you look at the 'readme' file. Some freeware is only free if you are a member of the academic community. Shareware sits on the fence between commercial and freeware: you can copy it, distribute it and try it out and, if you decide to keep it, then there is a small cost to pay to the developer, who will often let you know about upgrades to the program. With PostcardWare, you send the developer a postcard, preferably with a picture on the front.

Name	Platform[a]	Free/Share/ Comm[a]	Site	Mac version	PC/Win version
E-mail					
Eudora	Mac/PC	Free/Comm	ftp://ftp.qualcomm.com/quest/	1.51	1.44
Pegasus	Win	Free/Share/ Comm	ftp://risc.ua.edu/pub/network/pegasus/winpm*.zip ftp://tyr.let.rug.nl/pub/pmail/winpm*.zip		1.22
Browsers					
Netscape Navigator	Mac/Win/Unix	FreeAc/Comm	http://home.netscape.com/comprod/mirror/index.html	2.0	2.0
NCSA Mosaic	Mac/Win/Unix	Free	ftp://ftp.ncsa.uiuc.edu/	2.01	2.0
MacWeb	Mac	Free	ftp://ftp.einet.net/einet/mac/macweb/macweb.latest.sea.hqx	1.1	
Newsreaders					
Newswatcher	Mac	Free	ftp://src.doc.ic.ac.uk/packages/mac-umich/util/comm/usenet/newswatcher2.0.sit.hqx	2.0	
WinVN	Win	Share	gopher://micros.hensa.ac.uk:70/00/micros/ibmpc/win/e/e584/		0.99-4
Gophers					
WSGopher	Win	Free	ftp://dewey.tis.inel.gov/pub/wsgopher		1.1
WGopher	Win	Free	ftp://oak.oakland.edu/SimTel/win3/winsock/wgpher.zip		2.2
TurboGopher	Mac	Free	ftp://src.doc.ic.ac.uk/packages/mac-umich/util/comm/gopher/turbogopher2.0.1.sit.hqx	2.01	
FTP software					
WS_FTP	Win	Free	ftp://oak.oakland.edu/SimTel/win3/winsock/ws_ftp.zip		1.0
Fetch	Mac	Free	ftp://src.doc.ic.ac.uk/packages/mac-umich/util/comm/fetch2.12.sit.hqx	3.0	
Telnet					
NCSA Telnet	Mac	Free	ftp://ftp.utexas.edu/pub/mac/tcpip/ncsa-telnet-26.hqx	2.6	
Trumpet	Win	Free	ftp://gatekeeper.dec.com/pub/micro/msdos/win3/winsock/trmptel.zip		
Combined software					
Chameleon[b]	Win	Comm	http://www.netmanage.com/		

[a]Free, freeware (FreeAc, free to academic community); Comm, commercial ware; Share, shareware; Win, Windows. [b]Provides Web browser, newsreader, gopher, e-mail, etc.

Mirror sites

With terabytes of free software out there, finding what you want is not difficult, but it does pay in time and phone bills to find an ftp site near you to download from. There are large and well-known collections all over the globe – many of these 'mirror sites' update on a regular basis. Below are just a few.

UK ftp://src.doc.ic.ac.uk/packages/
Europe ftp://ftp.euro.net/
Australia http://www.unimelb.edu.au/public/aumirrors.html

USA List of Info Mac mirrors http://www-forum.stanford.edu/info-mac-mirrors.html
Lists of University of http://www.ibpc.fr:8080/umich.html
Michigan Archive mirrors http://144.174.149.2/umich-sites.html

Helper applications or viewers

While some Web browsers have the built-in ability to show you pictures, there are other Web resources, such as video or audio, that need additional programs. These are helper applications for the Mac or viewers for the PC. You need to set up the browser to recognize the type of file that is usually specified by the suffix after the full stop (the MIME type). Below are a few common file types and some of the programs you might use.

Program	File type	Platform	Type of software
Images			
GraphicConverter	.gif, .jpg, .tiff, .pict and more	Mac	Shareware
JPEGView	.gif, .jpg and more	Mac	PostcardWare
LViewPro	.gif, .jpg, .tiff and more	Win	Shareware
Adobe Acrobat	PDF	Mac/Win/Unix	Viewer is free
Sound			
Media Player	.avi, .wav, midi	Win	Operating system
Sound Machine	.snd, aiff	Mac	Freeware
Wplany	.voc, .wav, .au, .snd	Win	Freeware
Video			
QuickTime	.qt, .mov	Mac/Win	Operating system
Sparkle	.qt, .mpg	Mac	Freeware
Mpegplay	.mpg, .mpe, .mpeg	Wind	Shareware
Telnet			
NCSA Telnet	TCP/IP terminal connection	Mac	Freeware
Trumpet	TCP/IP terminal connection	Win	Freeware

For further information, Netscape and Mosaic list helper applications and support documentation on the following Web sites:
Netscape: http://home.mcom.com/assist/helper_apps/index.html
Mosaic: http://www.ncsa.uiuc.edu/SDG/Software/

No need to type the URLs listed above – all are included on our Web page at:
http://www.elsevier.com/locate/trendsguide

Compression

Most files are stored in compressed format. This serves two purposes: it reduces the file size and it allows whole groups of files and folders to be collected together so that they can be transferred as one object. Different computers use different programs and the key to which compression program has been used is the suffix.

Suffix	Compression program	Platform
.hqx	BinHex	Mac
.sit	StuffIt Archive	Mac
.sea	Self-expanding archive	Mac
.zip	PKzip	PC
.Z	compress	PC/Unix
.zoo	zoo210	PC
.gz	.gzip	PC
.tar	tar	Unix

Some compression and decompression programs come as one integrated package, while others are two separate programs. The most commonly used compression programs for the Mac are the shareware programs from Aladdin Systems called StuffIt and StuffIt Expander. PKZip and PKunzip are similar programs for the PC. Better still, there are some programs that can encode a file on one machine type and allow it to be expanded on another. For example, UUencode is available for Unix, PC and Mac and will convert binary files (e.g. pictures or programs) to ASCII (text) files. They may then be posted by mail or to newsgroups and read by any user, even if they have a different machine type. DropStuff With Expander Enhancer, again a Mac shareware program from Aladdin Systems, will open nearly all types of file compressed on any other machine type.

How to Connect

The Internet is a set of **INTERCONNECTED NETWORKS**, and you have to find a point on one of these networks to which you can connect.

You may already be connected

If your computer at work is on a local area network (**LAN**), you may already have access to an external connection – ask your systems manager. Almost all universities, and many other large organizations, have permanent connections between their internal systems and the Internet. They probably pay an annual rental of several thousand pounds or dollars for the line, but no extra charge for usage. There is no direct cost for adding additional users, unless they need to buy more equipment or rent a faster line to cope with increasing demand.

If your own organization is not connected, it might be possible to arrange to share a line with a neighbouring institution. If your organization has no connection, then you can set one up in the ways discussed below.

If you have a connection at work, you may be allowed to dial in to access it from home. Your systems manager will tell you what hardware and software you need, and might even provide it for you.

Choosing a service provider

If don't have access to an institutional connection, you have to buy access from an Internet **service provider**. These companies allow you to connect to their computers, which are in turn connected to the Internet. Some have a flat charge per month, while others charge extra for the time you spend connected or for the amount of data you send or receive. There are many such companies, some providing connection points in many countries and others just in their own local areas. Some have special services, such as discussion groups and databases, which are restricted to their own subscribers, possibly at an extra charge.
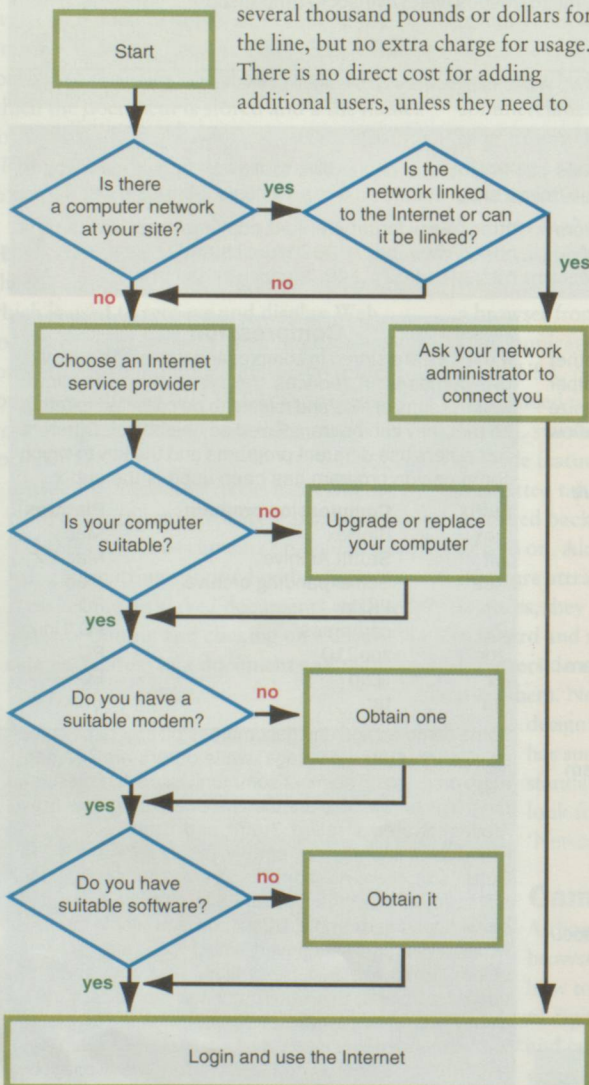
What hardware will you need?

Almost every computer has some form of port on the back for external communications. With a **modem** to connect this to a telephone line, and simple communications software, you will be able to send and receive at least text-based **e-mail** messages.

If your computer is not a PC (IBM compatible), Apple or Unix machine, check with your service provider whether Internet software is available for it. To use graphical programs for the **WWW** on a PC, it is best to have at least a 486 DX 33 MHz processor, with 8 Mb memory and an SVGA display; other types of machine need similar power. You will also need at least 10 Mb of space free on your hard disk, and you will soon find that you need more once you start downloading WWW pages and saving e-mail messages. The minimum reasonable speed for a modem to handle graphics is 14.4 kb/s, but as it does not cost much more to buy one twice as fast, you should go for 28.8 kb/s (V.34 standard) if buying one now.

What software will you need?

Software for applications is discussed elsewhere in this guide, but you will need some basic software before you

Flowchart:

Start → Is there a computer network at your site? — yes → Is the network linked to the Internet or can it be linked? — yes → Ask your network administrator to connect you → Login and use the Internet

Is the network linked to the Internet or can it be linked? — no → (back to) Is there a computer network at your site? — no → Choose an Internet service provider → Is your computer suitable? — no → Upgrade or replace your computer → yes → Do you have a suitable modem? — no → Obtain one → yes → Do you have suitable software? — no → Obtain it → yes → Login and use the Internet

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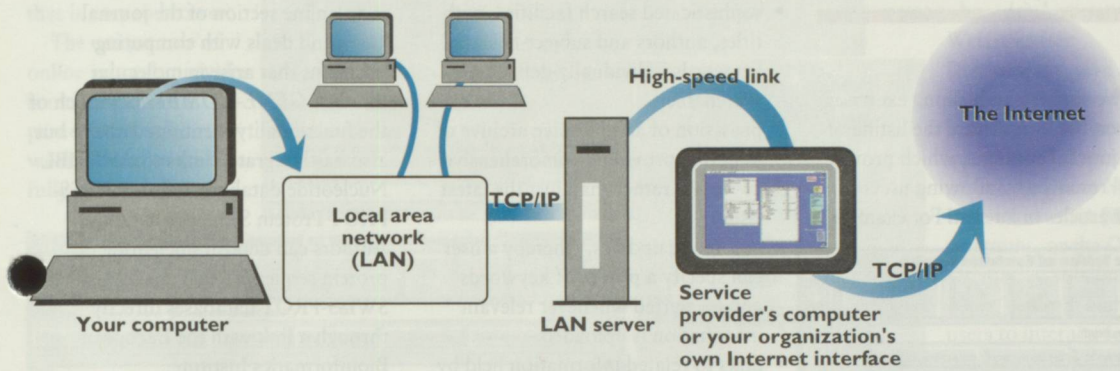### Questions to ask when choosing an Internet provider

- Can I connect by a local telephone call, or will I have to pay long-distance telephone charges?
  Some services have connection points all over the country; others have just one.
- Can I connect and read my e-mail from someone else's Internet connection, or do I have to dial in to your service by telephone?
  Do you need to access the same mailbox from work and from home?
- Can I have more than one user name for a single subscription?
  If so, several people can share a machine and keep their e-mail separate.
- Will I have full access to the Internet, so that I can run a WWW browser on my own machine?
- Can I download e-mail and news rapidly from your machine, and then read it and compose replies off-line?
  No point in paying charges for your reading and thinking time.
- Can you provide, or tell me how to obtain, a full range of software for mail, news, ftp and the WWW, which works reliably with your system and my type of computer?
  You will not be stuck with their software for ever, but you need a reliable set of programs to get you started.
- Do you provide full instructions for setting up and use, or an installation program?
- What do you charge: (a) as a setting up fee; (b) as a monthly or annual fee irrespective of use; (c) per hour of usage, after any free time included in (b); (d) for amount of data sent or received?
  If there is a charge for receiving e-mail, you may be signing a blank cheque.
- Can I cancel at any time without losing more than a month's charges?
- What connection do I need if I just want to use e-mail?
- Can I set up my own WWW pages on your machine for other people to access? What does this cost?
- During what hours is your help desk available?

can get started. You can obtain everything from the Internet itself, either free or as low-cost shareware, but this doesn't help if you haven't yet got a connection! Either make friends with someone who is already connected, or ask your service provider to send you software on a disk. If you have simple communications software such as Terminal, Kermit or Procomm, you may be able to download it from a **bulletin board**. There are also complete packages of Internet software that can be bought commercially, and you may find the convenience of one of these worth the cost.

For a dial-up 'shell' service, all you need is a simple communication package and terminal emulator, but for a full Internet connection you must have software to make your computer use the Internet protocol, **TCP/IP**. If your connection is through a modem, this software will probably use either **PPP** or **SLIP**. Don't worry about the difference between these – ask your service provider which they recommend.

High-speed link

TCP/IP

Local area network (LAN)

Your computer

LAN server

Service provider's computer or your organization's own Internet interface

TCP/IP

The Internet

LAN connection – your computer is connected to your organization's local area network (LAN), which has a connection to the Internet. Facilities depend on the software and connection type your LAN provides.

Character-based communications link

Your computer

Your modem

Service provider's modem

Service provider's computer

TCP/IP
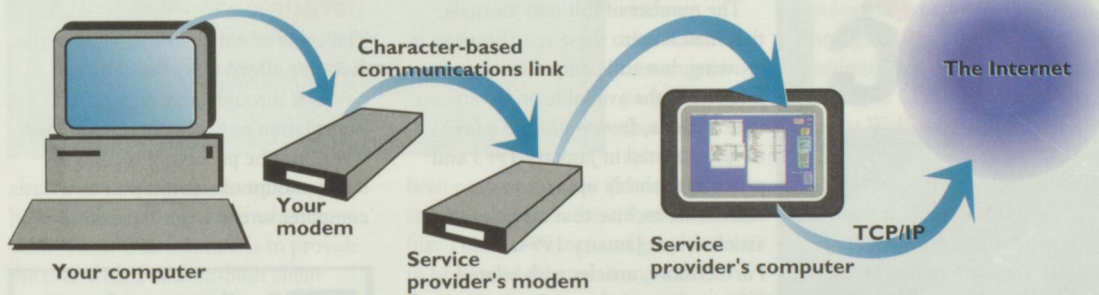
The Internet

Dial-up 'shell' connection – your computer is a terminal attached to your service provider's computer. Internet software is on the service provider's computer, and you can use only what is installed there.

Internet protocol (TCP/IP) communications link

Your computer

Your modem

Service provider's modem

Service provider's computer

TCP/IP
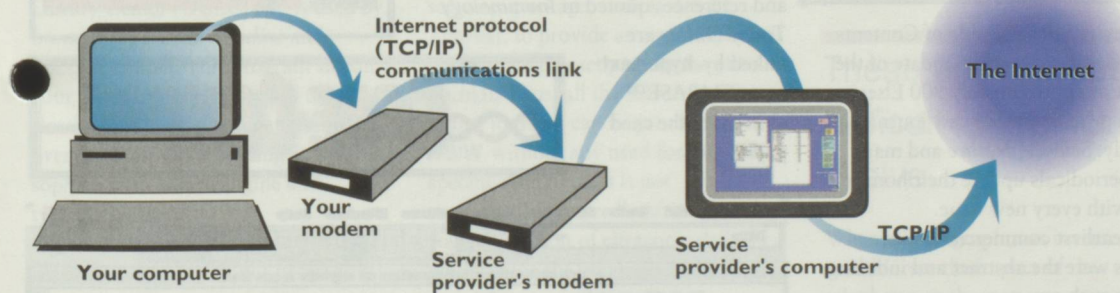
The Internet

Dial-up full connection – your computer is connected to the Internet through your service provider's computer. Internet software is on your computer, and you can use any software you like.

Security – a note for the paranoid

Most Internet users are responsible people but, unfortunately, there is a small group of malicious users, the hackers, who are out to cause trouble. If you have a dial-up connection, don't worry too much about hackers logging in to your system from the Internet: you wouldn't normally configure a personal system to allow remote logins and, even if you did, an intruder would have to know when you were online, thus making your machine accessible. Corporate users with permanent connections often use a 'firewall' computer, which filters traffic between their network and the Internet and which may restrict inward and outward access to certain addresses. It is worthwhile using a good virus-checking program before using any programs you have downloaded from the Internet, and consider using encryption if sending confidential e-mail. If you have doubts about the security of your Internet site, keep confidential material locked in a filing cabinet.

Joining the Internet might seem more of an art than a science.

It's not difficult, but you may have a lot to learn if you are going to take advantage of all the facilities. If you have any problems, you can always discuss them via an appropriate newsgroup.

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Net Publishing

Commercial use of the Internet is growing fast and, although not in the vanguard of ONLINE-INFORMATION PROVIDERS, publishing companies are starting to make their presence felt.

The simplest publishing exercises on the Internet are the listing of journal contents, which provide a useful resource by allowing users to scan for articles of interest. For example,
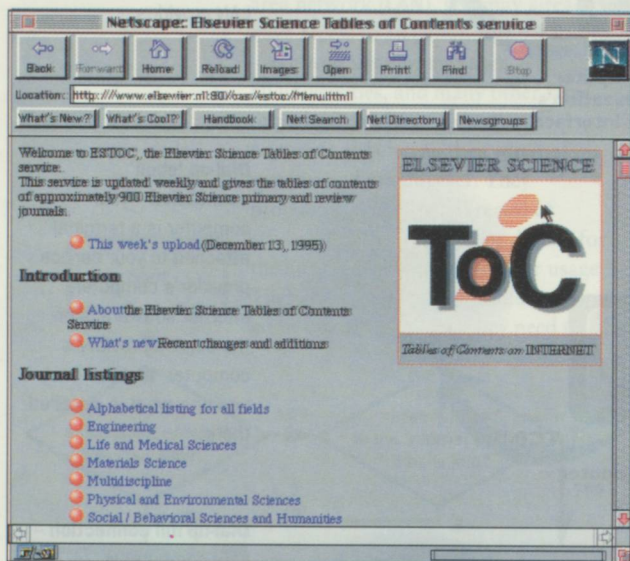
the Elsevier Science Table of Contents (ESTOC) gives a weekly update of the content of approximately 900 Elsevier Science primary and review journals. Similarly, *Science*, *Nature* and many other periodicals update their home pages with every new issue.

The earliest commercial online services were the abstract and indexing services such as those provided by EMBASE™, Chem Abs and Medline. These gave quick and easy access to specific information, selected on the basis of keywords from a vast potential archive of material. Enthusiastic reception of these facilities led to a genuine expectation that online abstracts would quickly be followed by online full-text journals, and these at a fraction of the cost of the paper equivalent. Obviously, these expectations are as yet unfulfilled. Why is that?

What do users expect from online journals?

To justify the price of subscription, the user wants something more than just scanned images of the journal pages: users expect 'functionality'. The features that most easily define such functionality can be broken down as follows:

- access to the abstract, complete text and graphics of any article;
- sophisticated search facilities, with titles, authors and subject-oriented keywords individually defined and searchable;
- provision of an extensive archive of material, providing comprehensive coverage, rather than just the latest issue;
- automatic updates, whereby a user can specify a profile of keywords and be alerted whenever relevant information is uploaded;
- links to related information held by other databases, such as the abstracts of papers cited in reference lists.

The number of full-text journals that match up to these specifications is growing, but still comprise only a tiny fraction of the available print versions. One of these, *Immunology Today Online*, started in January 1995 and provides monthly uploads and a searchable archive that includes all articles since January 1994. Furthermore, articles with related information are electronically grouped and accessible via a 'See Also' command, and references quoted in *Immunology Today Online* are linked by **hypertext** to an EMBASE™ abstract of the cited paper.

Other journals now available online include *Vaccine Online* and *Journal of Biological Chemistry Online*. Contents lists and graphical abstracts for the *Tetrahedron* group of five organic and medicinal chemistry journals are available prepublication via *Tetrahedron Alert*, the first phase of the *Tetrahedron Information System*, and one of the five journals will be online by the end of 1996. *GENE-COMBIS* is an online section of the journal *Gene* and deals with computing problems that arise in molecular biology. *GENE-COMBIS* has much of the functionality mentioned above but also has integrated links to the EMBL Nucleotide database and the SWISS-PROT Protein Sequence database. Authors can deposit nucleotide or protein sequences with the EMBL or SWISS-PROT databases directly through a link with the European Bioinformatics Institute.
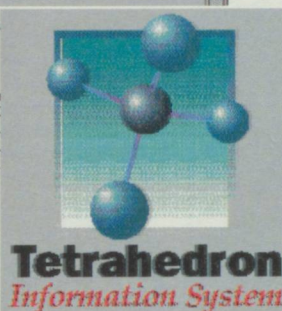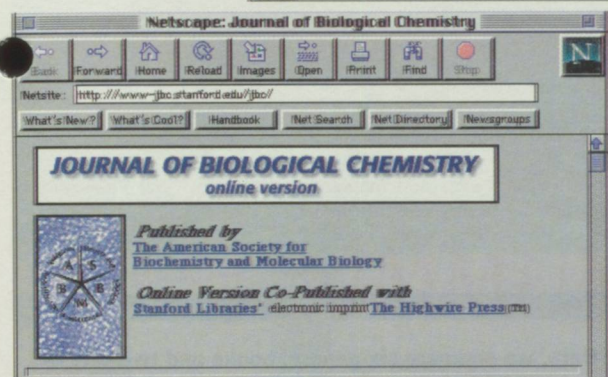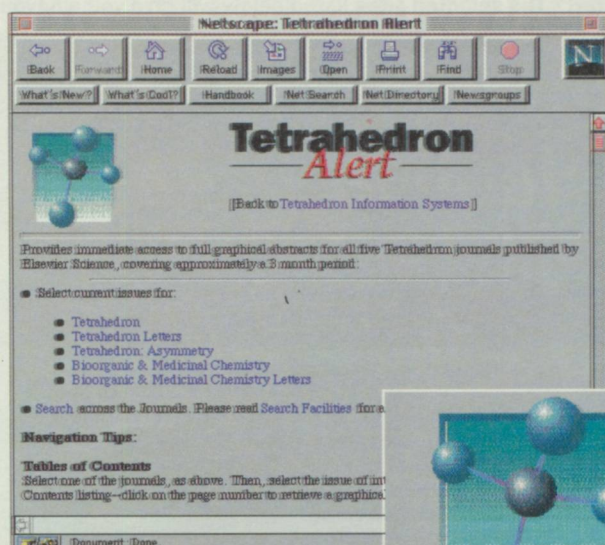
Hard copy: the online paradox

The value of online journals lies in the fact they afford users the ability to navigate through large chunks of information until they find what they want. But the process of reading a large amount of information on a computer screen is not the easiest of
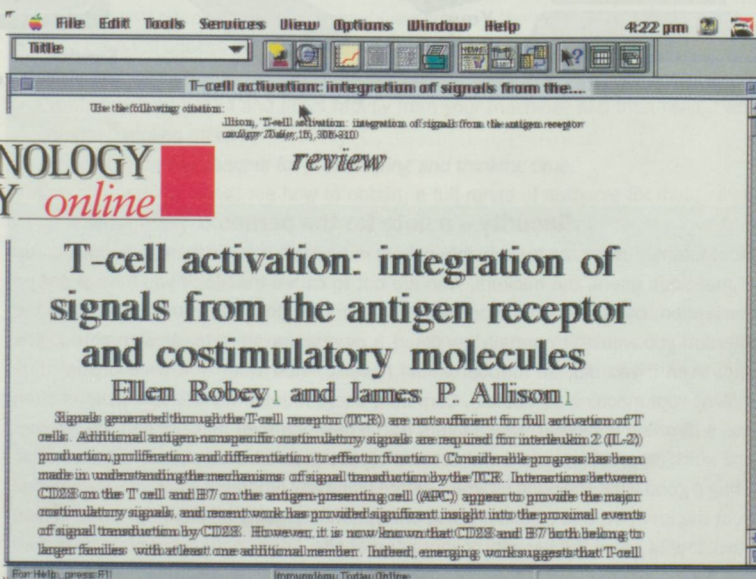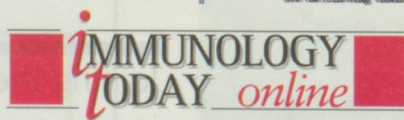
pursuits and, in this respect, the traditional print version still reigns supreme. Thus, online journals are best regarded as complementary to the print version, as a valuable add-on in providing additional information in a format that is easy to browse.

The unique role of online journals provides something of a paradox: having worked hard to create a fully functional

electronic on-screen masterpiece, you have to make it look good when users print it out. One solution is to provide the user with a custom-built client interface such as *Guidon*, which was developed by the Online Computer Library Center (OCLC) and is used by *Immunology Today Online* and *Vaccine Online*. This program sits on your hard disk and interprets the electronic files when you access them over the Internet, providing a sophisticated search engine and typeset-quality print.

However, as the number of online journals increases, it's not necessarily

ideal to have your computer memory chock-full of customized programs of this sort. A solution has been provided by the development of the Portable Document Format (PDF) file. This allows text and graphic files to be viewed through standard Internet **browsers** and then printed off through a separate noncustomized software package, such as Adobe Acrobat, to provide an exact replica of the original typeset page in the print journal. Thus, all the features of the online journals can be provided on the **WWW** without any need for journal-specific interfaces. It is not unreasonable to predict that such standardization of electronic delivery will provide the impetus for the

long-awaited proliferation of full-text online publications.

Virtual reality

Transmitting journals across networks is a major advance, but can the Internet ever substitute for a visit to the library, where you might browse a selection of journals, meet up with your colleagues, check the message boards? A variety of Web sites (see Destinations) give a flavour of where we are heading in this world of interactive information gathering. These Multi User Dimension (**MUD**) programs, or the Object Orientated versions (**MOO**)s, allow many users to interact; for instance, BioMOO at the Weizmann Institute in Israel is a virtual reality meeting place for biologists, where you can wander through different rooms, attend seminars and chat to colleagues in the tea room. Conferences are now held on the Web, where the daily proceedings accompanied by pictures are posted within hours. With the introduction of RealAudio (http://www.realaudio.com/), minutes of sound can be encoded in a few kilobytes. What was once virtual reality is becoming reality.

These are interesting times and it is difficult to predict how things will evolve.

When the telegraph was invented, who could forsee the impact of the telephone on the way we communicate? As Anthony Rutowski, executive director of the Internet Society, says: 'A hundred years from now, history may well record the emergence and implementation of the Internet protocol as a profound turning point in the evolution of human communication – of much greater significance then the creation of the printing press.' [*New Scientist* (1995) 148, 26].

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Who can publish on the Internet?

Anyone can – turning text and graphic images into online pages is surprisingly simple. Programming commands in HTML can be performed by easy-to-use editing programs (available from the sites listed below) in the same way that you might format text using the features of a common word-processing package. Creation of the hypertext links between related elements of a document or series of documents is straightforward, as is the inclusion of graphic components and even e-mail windows through which users can correspond. Thus, a basic home page can be created rapidly and viewed immediately on your screen using an Internet browser. Rent some space on a server, load it up for all to see and you're an Internet publisher. For once, the only limit may truly be your own imagination.

A few useful sites:

Introduction to HTML	http://www.cwru.edu/help/introHTML/toc.html
HTML: Hypertext Mark-up Language	http://www.loc.gov/global/html.html
Tips for Webspinners	http://gagme.wwa.com/~boba/tips1.html
Publishing on the Web	http://www.webcom/html/

Destinations

With millions of sites to choose from, where do you start? The selected sites listed below will give you a flavour of what is out there.

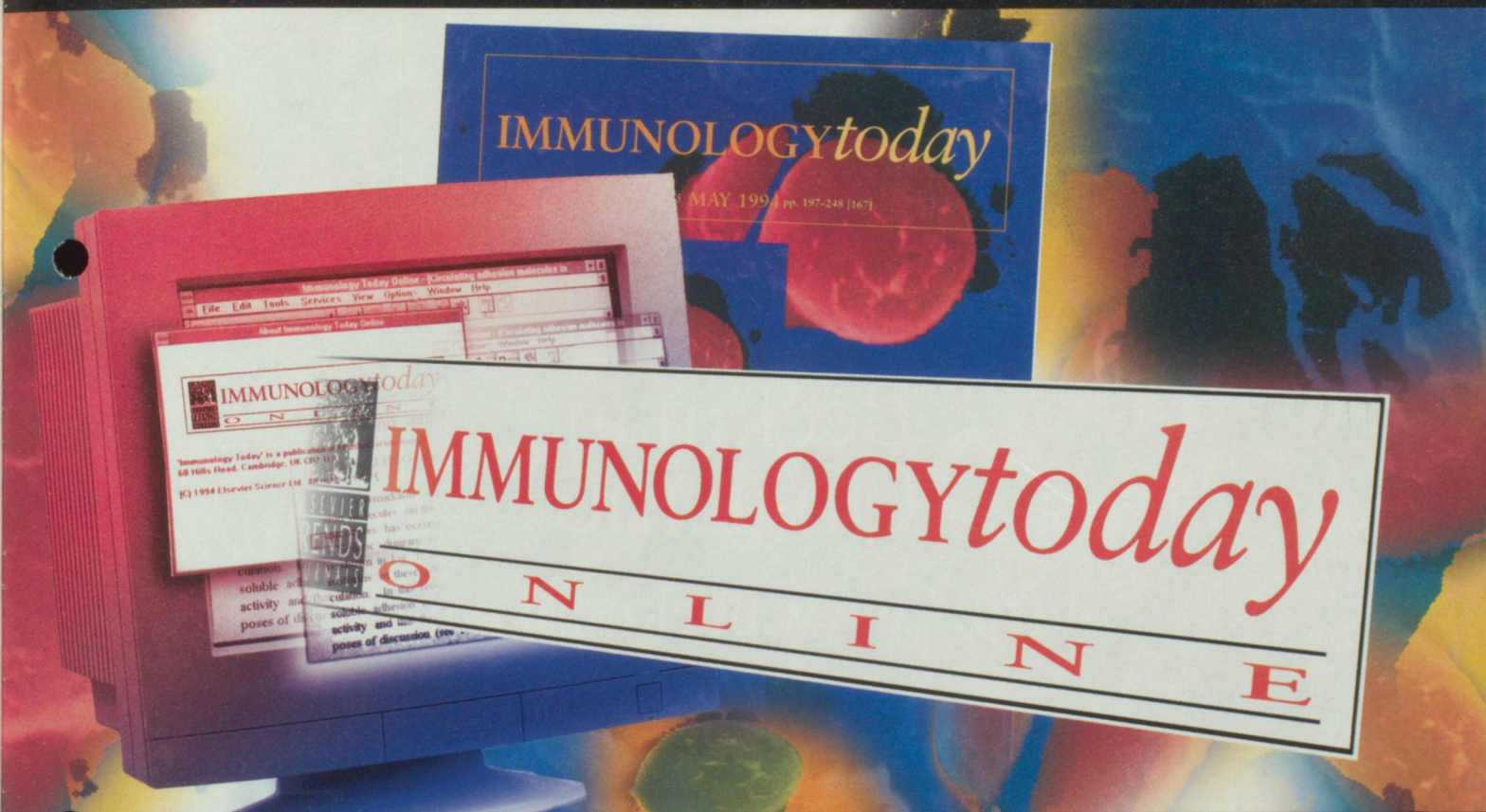| General	Virtual Library	http://www.w3.org/hypertext/DataSources/bySubject/Overview.html
	Virtual Tourist	http://wings.buffalo.edu/world/vt2/
	Summary of World Wide Web Servers	http://www.w3.org/hypertext/DataSources/bySubject/Overview.html
Search tools/catalogues	Lycos	http://lycos.cs.cmu.edu/
	Yahoo	http://www.yahoo.com/
	Web Crawler	http://webcrawler.com/
	World Wide WebWorm	http://www.cs.colorado.edu/home/mcbryan/WWWW.html
	Einet Galaxy	http://www.einet.net/
	All in One Search Page	http://www.albany.net/~wcross/all1srch.html
What's New	Netscape What's New	http://home.netscape.com/home/whats-new.html
	NCSA Mosaic What's New	http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/whats-new.html
Molecular biology/ medicine	National CBI	http://www.ncbi.nlm.nih.gov/
	European Bioinformatics Institute	http://www.ebi.ac.uk/
	Human Genome Mapping Project (UK)	http://www.hgmp.mrc.ac.uk/
	BioMedNet	http://www.cursci.co.uk/BioMedNet/biomed.html
	Pedro's Biomolecular Research Tools	http://www.fmi.ch/biology/research_tools.html
	Online Journals, conferences etc	http://golgi.harvard.edu/journals.html
	Medical Matrix	http://www.kumc.edu:80/mmatrix/
	Virtual Hospital	http://indy.radiology.uiowa.edu/VirtualHospital.html
	National Library of Medicine	http://www.nlm.nih.gov/
MOOs/MUDs	General guide to MOOs and MUDs	http://central.itp.berkeley.edu/~thorne/MOO.html
	Lambda MOO	telnet://lambda.parc.xerox.com:8888
	BioMOO	http://bioinfo.weizmann.ac.il:8888
Officialdom	UK	http://www.open.gov.uk/
	The White House	http://www.whitehouse.gov/
	World Health Organization	http://www.who.ch/
Internet providers	UK	http://www.limitless.co.uk/inetuk/providers.html
	USA/International	http://thelist.com
Self-help on the Internet	Yahoos Guide to Internet Resources	http://www.yahoo.com/Computers_and_Internet/Internet/Guides_and_Publications
	Big Dummys Guide to the Internet (UK site)	http://info.man.ac.uk/BigDummy/bdgtti.html
	World Wide Web FAQ	http://sunsite.unc.edu/boutell/faq/www_faq.html

Bookshelf

Which book do you choose to give you further information on the Internet? Here, we compare six general books and two WWW-specific books to help you decide where to go next for help.

Title	Teach Yourself the Internet	Mastering the Internet	The Essential Internet Information Guide Manager	Using the Internet – the User-Friendly Reference	The Complete Idiot's Guide to the Internet	The Whole Internet Users Guide and Catalogue	The World Wide Web Unleashed	The World Wide Web Complete Reference
Author	Randall, N. et al.	Cady, G.H. & McGregor, P.	Manger, J.J.	Eager, B.	Kent, P.	Krol, E.	December, J. & Randall, N.	Stout, R.
Year (edition)	1995 (2nd)	1995	1995	1994 (2nd)	1994 (2nd)	1996 (2nd)	1995 (2nd)	1996
Publisher	sams.net	Sybex	McGraw-Hill	Que	Alpha Books	O'Reilly & Associates	sams.net	Osborne McGraw-Hill
ISBN	0672307359	0782116450	0077079051	0789700964	156761535X	1565920635	0672307375	0078821428
Level	Basic–Int[a]	Basic–Adv	Basic	Basic	Basic	Basic–Int	Basic–Adv	Int–Adv
e-mail	+++	+++	++	+++	++++	++++		
Newsgroup	+++	+++	++	+++	++++	++++		
Gopher	+++	++	+	+++	+++	++++		
ftp	+++	+++	+	+++	++++	++++		
WWW	+++	+++	+	+++	++	+++	+++++	+++++
Technical	++	+	++		+	++	+++	++++
Disk	No	Yes	No	Yes	Yes	No	No	No
Pages	622	1258	515	369	367	538	1346	593
Price	£22.95 $25.00	£39.99	£22.95 $27.95	£18.99 $19.99	£18.95 $19.95	£18.50	£30.95 $39.99	£21.95 $29.95
Overall	++++	+++++	+	+++	++++	+++++	+++++	+++++

[a] Int, intermediate; Adv, advanced.

BECKMAN

WORLD WIDE WEB
INFORMATION SERVICE

Beckman
On-Line

http://www.beckman.com