



Apple and the Internet: The Macintosh Advantage



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Introduction

The Internet. It's a term that has quietly climbed from relative obscurity in technical and academic fields to the front pages of publications read by millions of people each day. Scores of companies, television and radio shows, celebrities, elementary schools, and even governments now advertise their Internet electronic-mail addresses. "Check out my home page," has become a stock phrase, and pundits cite statistics about usage growth rates of up to 20 percent per month. New resources in the fields of information and reference, education, entertainment, and customer service appear every day.

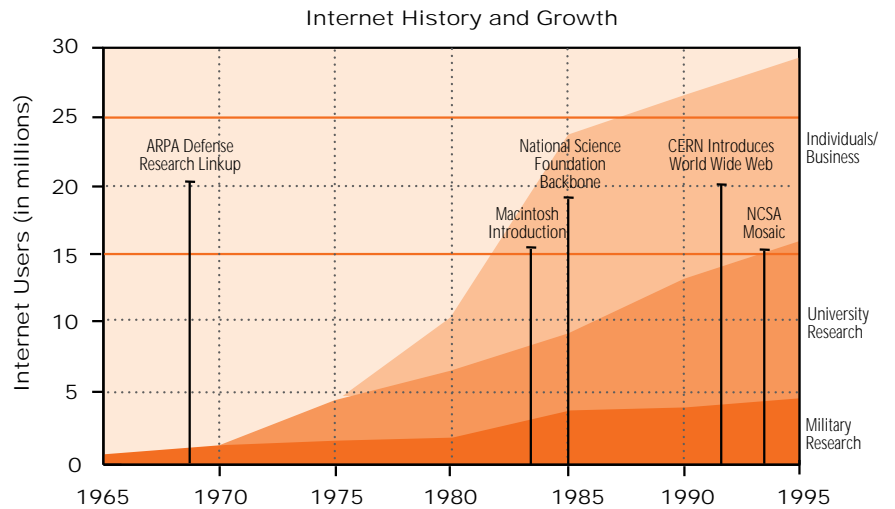
The Internet is immense, changes incredibly quickly, and may be one of the most important technological achievements of the 20th century. Apple has played an important role in increasing the popularity of the Internet and stands poised to grow with it into the next century, when Internet access will become as ubiquitous as the telephone and television are today.

What exactly is the Internet? It's many things—a collection of millions of computers scattered around the globe, a set of standard software protocols, the network of networks. Most important, the Internet is tens of millions of people from all parts of the world and from all walks of life, who share their thoughts, fears, beliefs, opinions, and knowledge. Many of those people communicate on the Internet through the Apple® Macintosh®, the most personal of personal computers.

Macintosh computers provide the fastest and easiest way to participate in the global Internet community. Internet users need easier access to the Internet and more intuitive navigation of the vast quantities of Internet content; they also need to integrate existing content, whether it's traditional text and graphics or multimedia, into Internet publishing projects on the World Wide Web (a part of the Internet). Apple has committed significant technology and development resources to improving the Internet experience for users and publishers in Apple's strongest markets—design and publishing, education, small business, and scientific research.

A Brief History of the Internet
The ARPAnet, the precursor of the Internet, came into being in the late 1960s in an effort to link institutions performing defense research for the U.S. government. Many of the standards—such as TCP/IP, which later formed the basis of what we know as the Internet—were created for the ARPAnet and its Cold War specifications of being able to withstand a nuclear attack.

Gradually, as the number of universities and other organizations on the ARPAnet increased, it became clear that making communication easier between colleagues around the country had benefits that went well beyond facilitating military research. In 1985, with the goal of connecting five super-computer sites around the country, the National Science Foundation created regional networks using the TCP/IP protocols from the ARPAnet. This network, the NSFnet, formed the backbone of the global Internet, and in the late 1980s and early 1990s made it possible for students and faculty at colleges and universities throughout the United States to communicate more easily. In 1992, the Swiss high-energy physics research organization CERN unveiled the World Wide Web (WWW), with its support for fonts, graphics, sounds, and video. The 1993 release of the first WWW browser, NCSA Mosaic, rocketed the Internet to its current position.



The Internet has experienced explosive growth, particularly during the last 15 years. This time line shows when important Internet events occurred, as well as the growth in the three main groups of Internet users. Note that the tremendous growth in the commercial segment of the Internet (individuals and businesses) coincides with developments such as the World Wide Web and NCSA Mosaic browsing software.

Apple's History on the Internet

The Macintosh computer's arrival in 1984 brought with it the built-in plug-and-play networking capabilities that have been included with every Macintosh model since. Apple's strength in networking and in the education market set the stage for the company's entry into the world of the Internet in 1988. Apple's MacTCP® software enables Macintosh computers to communicate on networks based on the TCP/IP standards—namely, the Internet. With this development, Apple gave the Macintosh a significant advantage as an Internet client machine, because it was far less expensive than workstations based on UNIX®, and other PCs were mired in proprietary solutions that made interoperability difficult or impossible.

Inexpensive licensing arrangements for educational institutions enabled universities to use MacTCP to connect thousands of Macintosh computers to the Internet. Programmers at those universities took advantage of the coherent standard offered by MacTCP and began producing ground-breaking programs such as NCSA (National Center for Supercomputing Applications) Telnet and Fetch, which gave a graphical interface to the previously text-only Internet. Macintosh computers brought the graphical interface to personal computing in 1984, and four years later, brought that same ease of use to the Internet.

Early MacTCP Applications

Organization/Developer	Application	Internet Service
NCSA	NCSA Telnet	Telnet, FTP server
Stanford University	MacIP	Telnet, FTP, Finger, Whois
InterCon Systems	TCP/Connect II	Telnet, FTP, FTP server

Since those early days, networking with Macintosh computers has become increasingly easy for the user, with built-in Ethernet capability on many models and technologies such as the Macintosh Communications Toolbox software for developers. Equally as important was the development in 1987 of routing technology, first seen in Kinetics Fastpath, which enabled a network administrator to connect

an entire LocalTalk® network of Macintosh computers to the Internet for about \$2,500, at a time when an Ethernet card for a single PC or a UNIX-based workstation cost almost \$1,000. This technology made the per-computer cost to connect Macintosh computers to the Internet very inexpensive (about \$100), and allowed organizations to leverage the networks they already had in place for other uses, such as printing. This low cost made the Macintosh the most cost-effective solution for adding incremental systems to the Internet.

Apple also pointed to the future with its early Internet services. An anonymous FTP (File Transfer Protocol) site called ftp.apple.com was one of the most popular sites for Macintosh users on the Internet for years. In addition, users of AppleLink® software have long been able to send and receive e-mail through the AppleLink Internet gateway, and users of Apple's eWorld™ on-line service have been able to send and receive Internet e-mail since the introduction of eWorld in 1994.

Apple and the Internet

Today more and more people are choosing Macintosh computers for their Internet connection over PCs or UNIX-based workstations, for a number of reasons:

- Macintosh computers are easier to use than other computers, so they invite Internet exploration. Macintosh users can move beyond the boundaries of one or two applications to the wide world of the Internet.
- Macintosh computers, with built-in LocalTalk networking on all models, built-in Ethernet on many new models, and network support included in the Mac™ OS, have set the standard for ease of networking.
- Apple adopted TCP/IP, the Internet communications protocol, with the 1988 release of MacTCP, ensuring that all Internet programs for Macintosh worked together simultaneously. In contrast, the WinSock standard used on PCs running Microsoft Windows wasn't adopted until 1992, giving Macintosh applications developers a four-year head start.
- Building on their heritage in the desktop publishing market, Macintosh computers provide the best platform for Internet publishing.
- Mac OS–based servers are far less expensive than UNIX-based workstations. Macintosh hardware and software are much less expensive, and Macintosh computers have a significantly lower cost of ownership. Ease of setup and maintenance pays off in lower costs.
- Macintosh computers connected to the Internet are more secure than UNIX-based workstations, a welcome fact for anyone working with the Internet as a user or publisher. UNIX-based workstations typically require firewall software and an experienced UNIX system administrator to provide even minimal security. Apple's Workgroup Servers, however, are not subject to unauthorized access, and software such as WebSTAR from StarNine (formerly MacHTTP from BIAP Systems) prevents unwanted access to the entire document tree.

Myth:

You have to run UNIX to use the Internet.

Fact:

Nearly 20 percent of the people on the World Wide Web are using a Macintosh.

Macintosh Market Share Among WWW Users

Two surveys conducted among WWW users in 1994 show the popularity of Macintosh computers. The first survey was conducted by the Georgia Institute of Technology's Graphics, Visualization, and Usability Center. Of the 3,522 responses from WWW users, 678 (19 percent), used a Macintosh computer as their primary platform. Results are available on the World Wide Web (http://www.cc.gatech.edu/gvu/user_surveys/survey-09-1994/graphs/Platform.html).

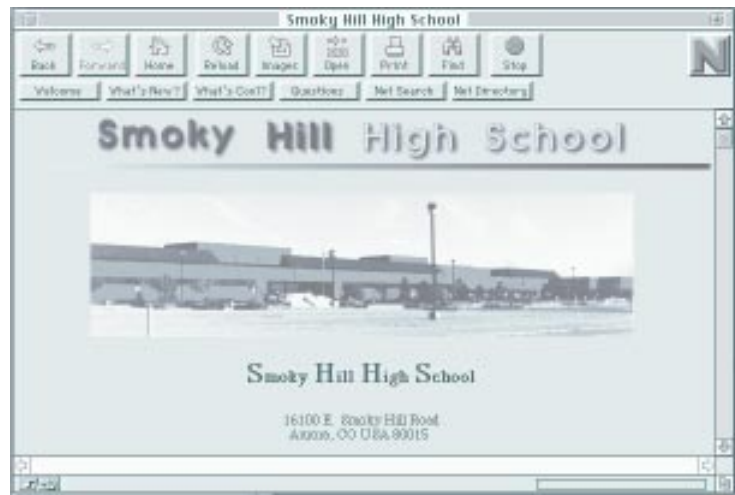
The second survey that corroborates this high market share among WWW users was conducted by Mika Rissa & Co. of Helsinki. Of the 554 users responding to this survey, 92 (16.8 percent) used a Macintosh computer as their primary workstation. These results are also published on the World Wide Web (<http://www.mroy.fi/dec94.htm>).

The Macintosh Advantage

The Macintosh computer's strengths as an Internet client are built on the foundations of ease of use, publishing and multimedia leadership, and Apple's open approach to the Internet.

Ease of Use

In the 1980s, the easy-to-use Macintosh interface helped to expand the Internet beyond the small number of people willing to learn the UNIX commands previously required. Today advances such as the dynamic on-line assistance of Apple Guide further extend the ease of use of Macintosh, and enable users to explore the Internet without the confusion of a complicated command-line interface.



Macintosh Computers Make Exploring the Internet Easy

Seldom do people say that using the Internet is "so easy that even a child could do it." Well, children are quite capable of exploring the Internet with Macintosh computers. Check out the Hillside Elementary School (Minnesota) WWW server running on a Macintosh LC (<http://hillside.coled.umn.edu/>). Or look up the Smoky Hills High School (Colorado) WWW server (<http://smokywww.ccsd.k12.co.us/>). Inexpensive servers such as Apple's Workgroup Server 6150/66 work well with the Internet, and are ideal for budget-constrained school districts.

Users don't want to fuss with low-level Internet protocols such as TCP any more than they want to tweak config.sys and autoexec.bat files in DOS. Apple's single TCP stack, MacTCP, and its forthcoming replacement in Apple Open Transport, offer both programmers and users a coherent and easily understood way to connect to the Internet. Unlike PC users, Macintosh users don't have to worry about compatibility between applications and different TCP stacks, or how to configure and operate different TCP stacks. Apple Open Transport will make TCP even easier for individuals and network administrators to configure, will improve performance significantly, and will make possible new types of TCP applications. Although Apple Open Transport will replace MacTCP, both existing MacTCP-compatible network configurations and MacTCP-based applications will work without modification under Apple Open Transport.

Apple's Macintosh System 7 and System 7.5 software resulted in integrated technologies such as Apple events, which enables applications to communicate with one another, and AppleScript™, which provides scripting tools that allow users to write custom Common Gateway Interfaces (CGIs) that can capture information or search databases. The upcoming OpenDoc™ software, the new open standard for component software, will enable users to combine the power of multiple software tools. In addition, technologies such as PlainTalk® can bring the still primarily text-based data on the Internet to users with disabilities who cannot easily read on screen, by converting text to speech.

Along with software, Macintosh hardware continues to set the standard for ease of use. Examples range from the built-in LocalTalk networking connector in the original Macintosh 128K to the high-speed GeoPort® serial port in all Power Macintosh® computers. GeoPort enables the addition of specific inexpensive "pods" for data communications over different types of connections, including the standard analog phone line today and high-speed ISDN connections in late 1995. Even without GeoPort, you don't have to worry whether your Macintosh contains the right serial chip to communicate at the full speed of your modem.

The Macintosh Advantage over PCs Running Windows: An Example

As an example of how applications for Macintosh use Apple events to work together, consider this typical example, which requires no scripting or additional work by a Macintosh user, but is quite a chore for users of PCs running Microsoft Windows 3.1. As the table at right demonstrates, the process with a Macintosh computer requires a minimal number of user-initiated steps, while the PC running Windows 3.1 requires many more steps, making it a less productive computing environment.

Macintosh



1. In NewsWatcher, point to an FTP URL (Uniform Resource Locator, an Internet address) for a new Internet utility in a news posting, then press Command and click the mouse.



2. NewsWatcher realizes it's an FTP URL, launches Anarchie, and passes the URL to Anarchie. Anarchie then connects to the specified FTP site, and downloads the file in the background.



3. When Anarchie is done downloading the file, it calls StuffIt Expander to expand the compressed file, presenting you with the Internet utility you wanted and sparing you from the details of each step in the process.

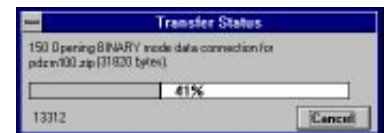
PC Running Windows 3.1



1. In WinVN, select an FTP URL for a new Internet utility in a news posting. Copy the machine name from within the URL.



2. Switch back to the Program Manager and launch WS_FTP. In WS_FTP, start a new connection and paste the machine name.



3. Navigate through the remote host's directories until you find the file, and download it into a TEMP directory.



4. Assuming you have set up Windows to link .ZIP files with PKUNZIP, switch to the File Manager and double-click the just-downloaded file to expand it, redirecting the output to a different directory. This screen shot shows the step needed if this linkage is not configured, which is to run PKUNZIP in DOS.



5. Switch back to the Program Manager, choose New from the File menu, and create a new icon for the utility you just downloaded.

Leadership in Publishing and Multimedia

In 1986, Apple invented desktop publishing with the release of the Macintosh Plus computer and the Apple LaserWriter® printer. Subsequent years brought the Macintosh II, large-screen displays, and third-party page-layout programs such as Aldus PageMaker and QuarkXPress, making it ever easier to design and produce a publication electronically. Macintosh has long enjoyed a reputation as the ideal choice for publishing professionals, and is now the ideal computer for publishing on the Internet. Features such as built-in networking hardware and software, as well as third-party server software such as WebSTAR, enable Macintosh computers and Workgroup Servers from Apple to take electronic publishing past the printed page and launch it onto the entire Internet.

Macintosh applications such as NCSA Mosaic, Netscape Navigator, and EInet's MacWeb provide a window onto World Wide Web-based publications. And, because of the ease of setup and security features provided by WebSTAR, anyone can easily publish information on the Internet. Whether you're a scientist publishing the results of a genetics study, a marketing manager making the next quarter's plans available to your company, or a sixth-grade student sharing the results of a history project with other kids on the Internet, you can be an Internet publisher, reaching as many or as few people as you desire.

In the 1980s, desktop publishing brought publishing within the reach of the individual, and made publishing professionals more productive by providing them with simple, yet powerful tools. Today electronic publishing on the Internet brings a massive audience to the individual publisher, with less work and lower costs than traditional desktop publishing. In the past, an individual or a small organization could barely hope to start a magazine or even a newsletter in print and bear the costs of printing and distribution; on the Internet, however, those printing and distribution costs drop to almost nothing. And, for the professional publisher, migrating existing content to the Internet provides an efficient and cost-effective way to reach a larger audience without the overhead of learning to use a new platform.

According to a Dataquest study in 1994, 63 percent of multimedia developers use Macintosh computers to create their content. This evidence of the popularity of Macintosh computers for creating multimedia shows how Macintosh will continue to lead the way as the premier platform for creating content for the Internet, whether it's composed of text in HTML format, graphics in GIF or JPEG format, or video in QuickTime® or MPEG format. And as different forms of media converge, publishers can develop content on Macintosh computers and use it, where appropriate, in print, on CD-ROM, in video, or on the Internet.

Dataquest also found that Apple is the leading vendor of multimedia computers, with a 22.9 percent market share of worldwide multimedia personal computers

*"Macintosh
distills order
from the chaos
of the Internet."*

(defined as computers with a CD-ROM drive and sound capabilities). As the Internet moves beyond the text-based interfaces of the past to text with graphics, sound, and video on today's World Wide Web, users need a computer capable of displaying full-color graphics and playing sound and video clips. With its built-in multimedia capabilities, the Macintosh computer is the ultimate Internet client for working with multimedia.

Open Approach

The Internet has become so pervasive through the support and advancement of open standards such as TCP/IP and higher-level protocols such as SMTP and POP for e-mail, NNTP for Usenet news, and HTTP for the World Wide Web. Apple's approach to the Internet has been as an active member of the Internet community, supporting the existing open standards and working with Internet standards organizations to create new standards that Macintosh developers can use to create best-of-class programs. These developers, hailing from such educational institutions as Dartmouth College, Cornell University, and the NCSA, placed simple graphical interfaces on top of these standard protocols, bringing the power of the Internet within the reach of both the individual user and the often-overloaded network administrator.

In contrast to Apple's strategy of making open standards easy to use, consider the other two major operating systems in use on the Internet—UNIX and Microsoft Windows. UNIX adheres closely to the philosophy of open standards, but is neither coherent nor easy to use. Many different versions of UNIX exist, each with its own quirks and confusions. Although on the surface of things, the WinSock-based programs for Windows seem easy to use, the underlying complexity of the interaction between Windows and DOS turns what is a simple task on the Macintosh into a significantly more difficult one under Windows.

Apple's Internet Solutions

Apple provides simple, yet powerful Internet solutions for different types of users with varied needs, including the individual, the network administrator, the publisher, and the developer.

Solutions for the Individual

Today the Macintosh environment supports the richest set of third-party Internet solutions available on any platform, ranging from freeware MacTCP-based applications such as John Norstad's NewsWatcher to shareware such as Peter Lewis's Anarchie FTP client, all the way up to full-fledged integrated commercial applications such as InterCon's TCP/Connect II. Although they come from different developers, these third-party Internet programs work together seamlessly, because they use Apple events and AppleScript, and they adhere to Apple's Human Interface Guidelines. And because they share interfaces wherever possible, they increase the level of consistency for the user.

Third-Party Internet Client Programs for Macintosh

Organization/Developer	Application	Internet Service
Qualcomm	Eudora	E-mail
John Norstad	NewsWatcher	Usenet News
SW15 Software	NewsHopper	Usenet News
NCSA	NCSA Telnet	Telnet
Peter Lewis	Anarchie	FTP and Archie
Dartmouth College	Fetch	FTP
Software Ventures	Snatcher	FTP
EINet	MacWAIS	WAIS
University of Minnesota	TurboGopher	Gopher
NCSA	NCSA Mosaic	World Wide Web
EINet	MacWeb	World Wide Web
Netscape Communications	Netscape Navigator	World Wide Web
InterCon Systems	TCP/Connect II	Integrated
Synergy Software	VersaTerm-Link	Integrated
Cornell University	CU-SeeMe	Videoconferencing
The Electric Magic Company	NetPhone	Audioconferencing

A Thought About the Future

Apple's tools for using the Internet that are based on OpenDoc may open a new way of sharing content—call it “ad hoc publishing”—in which one individual quickly assembles a number of parts consisting of static information and live links to Internet servers in a single document.

*Apple is committed to providing Internet access with our computers, out of the box. As a first step, Apple has shipped the Apple Education Series: Personal Internet Solution Bundle, which contains Netscape Navigator and other Internet software along with a modem, to the K-12 market. For the entire installed base of Macintosh users, System 7.5 includes MacTCP and PowerTalk® software to provide every Macintosh user with TCP and e-mail on the Macintosh desktop. With the addition of StarNine's Mail*Link Internet for PowerTalk gateway, any Macintosh user can send and receive Internet e-mail as easily as PowerTalk mail on the local network. These technologies enable communications and collaboration, cornerstones of both the Internet and Apple's strategy for the Macintosh platform.*

Apple has also been working to provide Internet access to the individual user by ensuring that eWorld has supported Internet e-mail from the very beginning. In mid-1995, an upgrade to eWorld will add support for other basic Internet services, such as FTP and Usenet news, and eWorld itself will become accessible via the Internet, providing speedy eWorld access for users who already have Internet access. World Wide Web access for eWorld users will follow shortly, and for those who want to move beyond what eWorld provides today, Apple plans in the future to provide full TCP Internet access and to ensure that every Macintosh computer is Internet ready.

eWorld isn't primarily about tools, though—it's about content. And Apple plans to provide a significant quantity of unique content that focuses on the Internet. eWorld will also provide assistance to users who are overwhelmed by the wealth of resources available on the Internet, both in terms of support and by providing easy access to the best of the Internet's resources.

Integration will reach new heights with OpenDoc and continued cooperation between Apple and third-party developers. Apple's next generation of Internet support, due in early 1996, relies on OpenDoc to provide the first coherent integration of Internet services, complete with the replaceability and extensibility of OpenDoc components. Replaceability and extensibility ensure that third-party developers can provide either replacements for specific OpenDoc components, such as a Gopher or FTP component, or extensions to the core set provided by Apple.

Simplifying Life for the Network Administrator

Network administrators have long appreciated the ease of maintaining a network of Macintosh computers. Connecting an entire Macintosh network to the Internet is similarly easy, thanks to applications such as the Apple Internet Router, the Apple IP Gateway, and AppleSearch® with the WAIS (Wide Area Information Server) gateway.

These applications make building Macintosh networks easy and facilitate bringing Internet services to all connected Macintosh computers. Once your Internet provider has installed the equipment to connect your local area network (LAN) to the Internet, these applications help deliver Internet access to all Macintosh computers on the LAN and help you make the most of your Internet connection. Extensions for these products, such as the IP Wide Area Extension, which adds capabilities to the Apple Internet Router, even let you use an Internet connection to allow networks of Macintosh computers at different sites to share AppleTalk® services. With this additional software installed at two or more Internet sites, all AppleTalk applications, such as Macintosh File Sharing, can be used between the sites via their connections to the Internet.

In conjunction with Apple's domain name server, MacDNS™ a number of third-party Internet server software solutions provide the base from which the network administrator can set up and run Internet services for both the local network (many companies run internal WWW servers that cannot be accessed from outside the company network) and the Internet at large. These programs bring with them the ease of use of Macintosh, often taking advantage of work the network administrator has already done. For instance, Peter Lewis's FTPd FTP and Gopher server uses the Users & Groups settings in either File Sharing or AppleShare® to ensure secure, controlled access to server information. And with WebSTAR software, setting up a WWW server on a Macintosh is an easy, one-step process—just double-click the WebSTAR application icon.

Third-Party Server Software Programs

Organization/Developer	Application	Internet Service
Glenn Anderson	MailShare	E-mail
Mikael Hansen	AutoShare	Mailing lists
StarNine	ListSTAR	Mailing lists
Peter Lewis	Daemon	Finger and Whois
World Benders	Meeting Space	Virtual conferencing
Bittco Systems	Co-Motion	Brainstorming
Peter Lewis	FTPd	FTP and Gopher
University of Minnesota	GopherSurfer	Gopher
StarNine	WebSTAR	World Wide Web
SoftArc	FirstClass	BBS
ResNova	NovaLink Professional	BBS

Remote Internet Access

The combination of Apple Remote Access and the Apple IP Gateway provides a reliable dial-up method of accessing both the local AppleTalk network and the Internet via MacTCP-based applications. This combination allows a site that's already on the Internet to easily extend Internet connectivity to Apple Remote Access users. Using Apple Remote Access and MacTCP is the easiest solution available for mobile users, and even allows them to move from the office to a remote connection without changing the network configuration. The Mac OS allows this mobility to be seamless and easier to manage than other operating systems, which require reconfiguring of the network any time a portable computer is moved.

As a server platform, Macintosh has a number of advantages over UNIX for the network administrator. A UNIX-based workstation costs more than a Mac OS-based server and requires far more attention, often even a dedicated system administrator. Mac OS-based servers are not only easier to use, they're less expensive, in terms of both the hardware and the maintenance. In addition, UNIX was designed to be an open, multiuser environment; though that has its advantages, it also means there are many more security holes than with the Mac OS.

Mac OS-based servers enable the most efficient use of limited network resources. For example, schools with limited budgets can easily use less-expensive servers such as Apple's Workgroup Server 6150/66. And, if a school (or any other type of site, such as a small business) has only a single, low-speed connection to the Internet, a network administrator can help as many people use the link as possible by using AppleSearch software's "reporters," which go out and search WAIS servers on the Internet at night, when the connection would otherwise be unused.

Finally, with the myriad competing network protocols and types of physical cabling, network administrators can rest easy knowing that whatever comes up—LocalTalk, Ethernet, ISDN, Token Ring, FDDI, or ATM—Macintosh computers can work with it. Plug and play isn't a promise for the future with the Macintosh and networking—it's a fact of life.

Aiding the Publisher and the Communicator

The Internet is about communication, and Apple is working to provide solutions, both hardware and software, to make it possible for anyone to publish on the Internet. In fact, the Apple Internet Server Solution provides the easiest and most complete World Wide Web publishing solution available today. The Apple Internet Server Solution consists of a Workgroup Server 6150/66, 8150/100, or 9150/120, and a CD-ROM that contains all the software you need to get established on the WWW: WebSTAR from StarNine; BBEdit from Bare Bones Software; Netscape single-user client software; MacDNS domain name server software; HyperCard® Claris® FileMaker® Pro, and Everyware Butler server software for databases; AppleSearch

and AppleSearch CGI; Adobe™ Acrobat™ Pro; clickable maps and e-mail CGIs; customizable sample WWW pages and forms; and Apple RAID, Retrospect Remote (with configurations that include a digital audio tape drive), and AppleShare Client for Windows.

Five key advantages separate the Apple Internet Server Solution from competing solutions. First, the Apple Internet Server's price/performance value cannot be matched. Second, with the Mac OS behind it, the Apple Internet Server Solution is by far the easiest-to-use solution for publishing on the Internet. Third, the Apple Internet Server Solution is scalable and can be expanded to accommodate growing needs while remaining affordable. Fourth, since the Apple Internet Server Solution uses the Mac OS rather than UNIX, it's secure from remote break-ins. And fifth, because the Macintosh platform is the choice of professional publishers, using a Mac OS-based solution ensures that publishers can easily extend their operations to the Internet without being forced to learn to use and maintain a completely different platform.

Of course, numerous third-party publishing tools, ranging from other Internet servers to a wide selection of software tools for creating WWW pages, are available from a variety of companies. Adobe, for example, has enhanced Adobe Acrobat so that hypertext links within Acrobat can point not just within that Acrobat document, but seamlessly out to the Internet as well. And, with the wealth of software for Macintosh in all forms of publishing, it's not surprising to see tools such as a filter that converts QuarkXPress documents into HTML (hypertext markup language) documents for publishing on the WWW. Because the efficient and appropriate reuse of content, whether it's text, images, sound, or video, is easy to do using a Macintosh computer, users find that the process of moving information to the Internet is easier and the end result is more coherent.

Through eWorld, Apple can also help publishers establish a presence, both on eWorld and on the Internet. For instance, more than 250 companies publish information on eWorld today. Beginning in the summer of 1995, eWorld will offer direct access to Internet-based content, integrated with the eWorld client. Access will be provided initially to FTP sites and Usenet newsgroups, with WWW browsing capabilities to follow shortly thereafter. In the future, Apple plans to expand the amount of original content available on both eWorld and the Internet—with commercial information from leading publishing companies, and with free information from a variety of noncommercial sources. By increasing the amount of high-quality content available on eWorld (whether it's accessed through eWorld or the Internet), Apple will strive to create one of the most compelling Internet information resources.

Supporting the Developer

Much of Apple's strength in the Internet today results from third-party developers who have combined forces to create one of the most extensive Internet toolsets available today. By seeding higher education with inexpensive licenses for MacTCP, and continuing to provide development assistance, Apple has cultivated these developers even though their programs are often available only as freeware or shareware. Before Power Macintosh computers were introduced, Apple made sure that Internet developers such as the Gopher team from the University of Minnesota were able to test their code on prerelease versions of these computers. And, after Power Macintosh was released, Apple showed its gratitude by awarding 11 developers and institutions with "Cool Tools" awards, including Power Macintosh 7100/66 computers. Finally, Apple Developer Technical Support maintains a WWW page (<http://www.info.apple.com>) that contains information of interest to developers, including sample code, articles from *develop* magazine, and technical notes.

Apple and the Internet Community

Apple recognizes that the most important part of the Internet is the people who work, study, and play there. These are the people who have, through the years, established numerous discussion groups and services, all with the goal of support and enjoyment. For example, the long-standing Info-Mac Network runs a discussion group called the Info-Mac Digest, where hundreds of thousands of Macintosh users share information about the Macintosh and help one another. Another part of the Info-Mac Network is the Info-Mac Archive and its 50 mirror sites, which store gigabytes of freely distributable software for Macintosh, including hundreds of programs for use on the Internet. A more recent arrival to the Internet community is



The Multilingual Macintosh

Although the most common language on the Internet is English, the Macintosh computer's multilingual capabilities, combined with localized versions of popular Internet programs such as Eudora, make an excellent solution for speakers of languages other than English.

the Well-Connected Mac WWW site, which brings together a massive quantity of information for Macintosh users, including contact information for more than 1,000 vendors, software and book reviews, and links to numerous other WWW sites containing resources of interest to Macintosh users.

Apple has been an active member of the Internet community for years, with an FTP site that provided Apple software updates and versions of the Macintosh system software (up to version 7.0.1). More recently, Apple has added numerous other FTP sites that carry a full complement of Apple's freely distributable software and updates. Of these, [ftp.support.apple.com](ftp://support.apple.com) and [ftp.info.apple.com](ftp://info.apple.com) (or <http://www.support.apple.com> and <http://www.info.apple.com> on the WWW) have become a most important way of providing updates to the global Macintosh community, serving hundreds of thousands of Macintosh System 7.5 Update 1.0 copies in the spring of 1995.

Apple has a number of WWW servers, all collected under the main server at <http://www.apple.com>. These WWW servers help to distribute information about Apple, provide searchable access to the Apple Technical Information Library, and offer detailed product information for current and future customers. Apple continues to create new Internet resources, such as mailing lists that distribute Apple press releases to interested parties, discussions about Internet client and server programs for the Macintosh, and support for Apple products such as the Macintosh Application Environment. In the future, Apple plans to create even more avenues of communication between the company and customers to provide better on-line support and to take advantage of the direct customer feedback that results from such open lines of communication.

Tomorrow's Internet

It's almost impossible to predict what the future holds for the Internet, especially given the breakneck pace at which the Internet is changing. The World Wide Web barely existed three years ago—who knows what paradigm shifts might occur in the coming years. That said, some of Apple's most interesting technologies, both those currently available and others under development, will soon find their way onto the Internet. As these technologies become common on the Internet, their functionality will appear first in utility applications, and then as programs such as WWW browsers.

In the future, the Mac OS will take full advantage of the presence of an Internet connection. Such a connection could offer not only normal Internet content, but also convenient updates to the operating system or other software, or perhaps a direct link to Apple tech support.

Content publishing on the Internet will mature in a number of ways, thanks in large part to Macintosh users who are bringing the skills developed over years of building the desktop publishing and multimedia markets to the World Wide Web. Searching will become far more sophisticated as the quantity of information increases beyond anyone's ability to find specific information by browsing, and database servers and clients such as AppleSearch become ever more important. Intelligent agent technology, exemplified now in the AppleSearch application's "reporters" function, will also step in to help users sift through masses of raw data.

Content available on the Internet will become increasingly media-rich as connection speeds increase and users find it easier to create sounds, animation, and video without leaving the comfortable environs of the Mac OS. As much as it aids in the creation of such media-rich content, the Mac OS will also continue to be the viewing platform of choice, though perhaps in different guises, such as a consumer-oriented Mac OS–based product that transforms a television into a window on a multimedia world and, with the proper Internet connection, could expand that world a millionfold beyond the confines of a CD-ROM.

Technologies such as QuickTime Conferencing will help change the way we look at the Internet, by enabling applications that rely on real-time transmission of constantly changing data. That data might be voice or video transmissions, for example, or it might be stock market data or information from a security system that requires constant and instantaneous updates.

The act of publishing will become more complex in the future as well, since information published on the Internet lives on until it's removed or pruned, and may need continual updating or tending. These tasks require tools that are sufficiently easy to use, so individual publishers in charge of specific pieces of information can maintain it without the help or intervention of a network administrator. Although tools such as UserLand's AutoWeb, which builds a WWW site from a set of folders containing text files, are starting to appear, these tools must evolve as the Internet grows and become increasingly more powerful while remaining simple to use.

Electronic commerce will become as much a fact of life as mail order is for millions of people today. Although electronic commerce works well in a searching paradigm, where consumers know precisely what they want, the increased use of technologies such as QuickTime VR (the VR stands for virtual reality) will make electronic commerce more palatable in a browsing mode, where consumers know only that they want to see and compare the range of products available within a category. Examples of QuickTime VR-based Internet applications might include an electronic store where the user not only can see a picture of a product, but also can view it from all sides, pick it up, and examine it closely. Or, imagine choosing a vacation package from a QuickTime VR-based Internet application that enables you to experience scuba diving in Australia's Great Barrier Reef, for example.

To foster innovations in this arena, Apple participates in the CommerceNet Consortium, a nonprofit organization that supports electronic commerce activities on the Internet. Apple is also committed to continuing to evolve and advance the Internet Protocol suite through the Internet Engineering Task Force's open standards process. Two areas of special focus are giving the Internet Protocol suite more plug-and-play capabilities, as AppleTalk has now, and increasing security, so that the Internet can realize its potential to become the Information Superhighway.

Throughout all of these changes, Apple will continue to create innovative technologies and interfaces with the goal of enhancing the Macintosh experience, both on and off the Internet. In the end, Apple wants to furnish Internet users with tools that will enable them to create great things.

Author's Biography

Adam C. Engst is the editor and publisher of *TidBITS*, a free electronic newsletter distributed weekly to several hundred thousand readers on the worldwide computer networks. After graduating from Cornell University with a double major in Hypertextual Fiction and Classics, he worked as an independent consultant in Ithaca, New York, where he started *TidBITS* in April 1990. He now lives in the Puget Sound area of Washington, and spends most of his time corresponding via electronic mail with friends and associates around the globe. After writing the first edition of the *Internet Starter Kit for Macintosh* for Hayden Books (now updated to the third edition), he co-authored the *Internet Explorer Kit for Macintosh* with Bill Dickson and the *Internet Starter Kit for Windows* with Cory Low and Mike Simon, now in the second edition. He has written for *MacUser*, appeared on numerous television news shows, and been featured on various radio shows, including National Public Radio's *Weekend*, *All Things Considered*, and *Talk of the Nation*.



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