

Cruising the Information Highway: Online Services and Electronic Mail for Physicians and Families

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Commercial online service providers, bulletin board services, and the Internet make up the rapidly expanding "information highway." Physicians and their families can use these services for professional and personal communication, for recreation and commerce, and to obtain reference information and computer software. Commercial providers include America Online, CompuServe, GENie, and MCIMail. Internet access can be obtained

indirectly through America Online or directly through specialized access providers. Today's online services are destined to evolve into a National Information Infrastructure that will change the way we work and play.

Key words. Computers; education; information services; communication; online systems; Internet.

(*J Fam Pract* 1994; 39:365-371)

During past year, there has been a deluge of articles about the "information highway." Although they have included a great deal of exaggeration, there are some services of real interest to physicians and their families. This paper, which is based on the personal experience of clinicians who have played and worked with computer communications for the past several years, presents the services of current interest, indicates where the problems lie, and speculates about the future of the information highway.

The term *information highway* has acquired many interpretations, and there is ample speculation about its potential. Cable companies imagine a large number of television channels and related entertainment services. Telephone companies focus on enhanced communication, including video images. Universities, government, and today's online service providers advocate a collection of computers that provide goods and services (particularly

information), computer-based communications, and entertainment. Visionaries imagine this collection becoming the marketplace and the workplace of the nation. In this article we focus on the latter interpretation of the information highway.

There are practical medical and nonmedical reasons to explore the online world. America Online (AOL) is one of the services described in detail. Recently, one of the authors used AOL's Internet access to obtain the latest data on management of testicular cancer. With a few clicks of a computer mouse, an engaging graphical interface allows navigation through a menu of over 165 medical information sources. This menu includes the National Cancer Institute's PDQ database, with a state-of-the-art description of the management of testicular cancer. In the same area, users can review *Morbidity and Mortality Weekly Reports* (MMWRs) from the Centers for Disease Control and Prevention, clinical alerts from the National Institutes of Health, and pressure sore clinical guidelines from the National Library of Medicine. All of this information and much more is stored on computers around the world. AOL allows subscribers to view information through their connection, or gateway, to the Internet, a network that links a huge number of separate resources.

All the online services described in this paper have their own private reference and discussion areas (medical and nonmedical), as well as access to thousands of Inter-

Submitted, revised, June 9, 1994.

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net resources. There is something for everyone: family members who want to keep in touch through electronic mail (e-mail), physicians who want to participate in an electronic exchange of ideas on the social and behavioral aspects of family medicine, or an isolated rural physician who wants to stay connected to a network of educators and other physicians—it is all possible through online services.

We will begin with basic principles, followed by the fundamentals and features of representative online services. Our intent is to give readers a general understanding of the subject and to provide guidance for online exploration.

The Basics

Computer communications is simpler than renal physiology or VCR programming, but it involves a few novel concepts with which users should become acquainted. To that end, the process is described in terms of its components: the user, the user's personal computer and communications equipment, the connection between the user's computer and a distant online service, and some of the services that are bundled together to produce an *online service*.

The user, affectionately known as *wetware*, interacts with online services through reading and typing, and by using menus and a mouse to send directions. Typically, each user has one billing account, although some services allow many users to share an account. Subscribers to some online services can set up a family account in which each person has a private e-mail address.

A personal computer is the current gateway to online services. Computers that run Apple Macintosh, Microsoft Windows, IBM or Microsoft DOS, or IBM OS/2 software are easiest to use with these services. Communications software, which runs on these personal computers, manages communications hardware, and in cooperation with the computer, creates an *interface*, which enables the user to access online services. At one time, a terminal or teletype interface, which consisted of words that appeared one letter at time, was the only type of interface available. Today, menus and pictures commonly help users navigate and work with online services.

A telephone line is usually the connection between the user's personal computer and an online service. The instrument that enables a phone to be used for computer communications is a piece of hardware called a *modem*. This device translates computer signals into sounds, then translates the sounds back into computer signals at the other end. When the connection between a personal computer and a distant modem is achieved, the user is *online*.

Good communications software allows the user to do as much work as possible *offline* (before this connection is established), which is economically advantageous, since online charges typically begin when the connection is made. Even though modems are less costly and more reliable than they used to be, using them can be a frustrating experience. The quality of telephone connections varies, and poor quality telephone lines make high-speed modem communications difficult. Modems are an awkward bridge between the separate worlds of telephone and computer. Experienced computer users eagerly anticipate the day when true computer networks rather than voice lines are available for communications.

Online services is a term applied both to the services that can be accessed by modem and also to the entities that create, maintain, and provide those services (eg, CompuServe). These services include reference materials, communications, information, entertainment, computer services, and commerce ranging from airplane tickets to stock options. An access provider is an organization that provides access to online services, but does not create or maintain them (eg, Internet access providers). Although online service providers vary significantly, ranging from tiny neighborhood electronic bulletin boards to large corporations, they have quite a bit in common.

Computer communications adds a new dimension to our ability to exchange information. Text is the most common content of an electronic message, but sound, images, and computer files also can be exchanged. Communication can take place between two individuals or one message can be sent to many people. Messages may be posted on public electronic bulletin boards, where they can reach many people. In most cases, communications occurs across time, as with a letter, but it can also take place immediately, as with a telephone conversation.

E-mail functions in a manner similar to that of paper mail. It most often consists of text sent from one person to another, but it is possible and easy to "carbon copy" a single message to many recipients. The process of addressing an e-mail message is usually automated by means of software. Newer forms of e-mail allow audio and video attachments or computer files to be sent along with a message. E-mail software can sort messages by date, subject, or sender. E-mail is a useful alternative to telephone messages and paper mail. In theory, a person can retain one e-mail address throughout a lifetime regardless of residential changes, an obvious benefit in our mobile age. Despite the potential of e-mail, the software provided by many online services is disappointing, lacking sufficient addressing features and writing tools.

Conferencing software allows many messages to be typed and viewed simultaneously, although in practice, this is often less useful than a telephone conference call

Table 1. Comparison of Online Services Costs for Typical Users in Urban and Rural Settings (Higher-Value Services Are Designated by a Greater Number of Stars; Lower-Value Services by Fewer Stars)

Service Name	Urban	Rural
America Online ¹	*****	**
CompuServe	***	*
MCIMail ^{2,3}	***	***
Private BBS	*****	*****
GEnie ²	*****	***
CNS Internet ²	****	****

¹America Online costs urban users about \$10.00/mo for 5 hours of use.

²Provide toll-free 800 service at low or no additional cost.

³E-mail and fax only. Estimate is for about 20-30 messages a month; costs rise quickly as more messages are sent.

unless there are text data to be exchanged. Public electronic bulletin boards or *newsgroups* (with or without a moderator) resemble a radio write-in show. A user of a bulletin board or newsgroup may be called a *subscriber*. Subscribers post messages that can be viewed by other subscribers according to author, subject, or date. A collection of such messages is a dialogue among subscribers across time and space.

Now that we have reviewed the key concepts of online services (user, equipment, connections, and services), we are ready to examine samples of these concepts in action.

Online Service Providers

Despite their diversity, online services share common elements. We chose services to highlight based on their value, quality of service, unique characteristics, and special interest to rural users. The providers described here in relative detail are America Online, MCIMail, private bulletin board services, and the Internet. We will compare CompuServe and GEnie with these services. The relative value of service providers for urban and rural users is provided in Table 1. Costs of online service providers are difficult to compare because pricing schemes can be intricate, and specific services (e-mail, conferences) may be bundled differently. Rural users often cannot access service providers through a local telephone call. Service providers with toll-free 800 number access are usually a better value for rural users.

For each of the principal services, we have estimated costs, described features and interface software, and identified problems encountered in the use of these services.

Table 2. Telephone Numbers and Addresses of Online Service Providers

America Online (AOL): (800) 227-6364 America Online Inc, Vienna, VA
AT&T Easy Link: (800) 242-6005 AT&T, New York, NY
Colorado SuperNet (Internet): (303) 273-3471 Golden, CO
Community News Services (Internet): (800) 748-1200 Colorado Springs, CO
CompuServe: (800) 848-8199 CompuServe Inc, Columbus, OH
Delphi: (800) 544-4005 Delphi Internet Services Corp, Cambridge, MA
GEnie: (800) 638-9636 General Electric Information Services, Rockville, MD
MCIMail: (800) 444-6245 MCI Inc, Washington, DC
Prodigy: (800) 776-3449 Prodigy Inc, White Plains, NY

Addresses and telephone numbers for the services are listed in Table 2.

Because online services are not yet connected by a true national information highway, they are reminiscent of the train systems of the 19th century. To access specialized services, you may need to "change tracks" to a different system. Fortunately, there is a growing network of bridges connecting various systems.

America Online

America Online (AOL) is a full-spectrum online service including e-mail, reference sources, public bulletin boards (forums), computer file transfers, games, and entertainment, online versions of news magazines and newspapers, a variety of retail areas, and several Internet access tools. AOL emphasizes ease of use, creative services, support for pocket computers (eg, Zoomer personal digital assistant, Tandy Corporation, Fort Worth, Tex), and integration with the Internet. AOL is growing extremely quickly and has a legion of loyal customers.

Using AOL requires a Macintosh, IBM-compatible, or Amiga computer, or a Zoomer, with at least a 2400 baud modem. The Windows, but not the DOS, software will run under OS/2 2.1. The AOL communications software is free and easy to set up. AOL currently costs \$9.95 per month with 5 hours of free online time, and \$3.50 per hour thereafter. Urban areas have local access

numbers; users in rural areas generally are charged additional long distance fees (approximately \$8/hour.).

Connecting with AOL requires their free software package. Anyone familiar with a mouse and icon environment will enjoy using AOL. Clever design allows responsive interactions, even with a relatively slow and antiquated 2400 bps modem. The icon-based "Departments" menu presents multiple main heading options, each of which has numerous subsections, represented as nested folders.

E-mail offerings are extensive. Users can send messages to other AOL members and to any service with an Internet gateway, such as CompuServe, MCIMail, and GENie. Messages can be composed and read offline (prior to making and after terminating the online connection), which saves money. Only the Macintosh version of the AOL access software allows mail to be automatically sent and collected at any time of day without human intervention. The absence of this feature in the DOS/Windows versions is a significant deficit. AOL allows a single household account to have several separate mailboxes.

The AOL communications software supports group mailings, forwarding messages (within AOL only), and sending messages by fax or paper mail. A software address book facilitates addressing, but the interface for adding addresses is relatively weak. There is no way to transfer address information into or out of the AOL format, which is a limitation for users with hundreds of e-mail addresses. There is no added cost for e-mail use, including gateways and Internet mail.

The News and Finance area contains newspaper-like departments, such as news, sports, features, and weather (including the ability to download satellite maps). "White House Forum" provides press releases as well as transcripts of presidential briefs and impromptu remarks. Several magazines, such as *New Republic*, *Your Money*, *Omni*, *Time*, *PC World*, *MacWorld*, and *Consumer Reports*, are available online. Time Online has several bulletin board discussion areas on health care reform and Medicare, with contributions by *Time* magazine staff writers. There is also a financial folder with real estate and stock information, a brokerage service, and a report on the latest mortgage refinancing rates.

Lifestyles and Interests includes bulletin boards on a variety of topic areas ranging from astronomy to the Writer's Club. To serve the health information needs of subscribers, there are bulletin boards, such as DisAbilities (with topic areas from quadriplegia to Ehlers-Danlos syndrome), Senior Net, and the Better Health and Medical Forum.

Travel and Shopping provides access to American Airlines' EASy Sabre for travel reservations and bookings. AutoAdvantage, Online Bookstore, and Compu-

store all allow for a stroll through a computer-based mall. A classified advertisements area is provided for private sales and purchases.

Learning and Reference is an immense area that includes Smithsonian Online (with information on exhibit and publications, and photographs you can download), CNN Newsroom Online, the Electronic University Network (with undergraduate and graduate courses), and Interactive Educational Seminars. The Medical Seminar folder includes a patient education forum, medical information files, and discussions on health care reform and office practice.

Computing and Software has over 34,000 software and text files that users can transfer to their individual computers. File areas for Clinical Care, Office Practice, and Patient Information are of particular interest to practicing physicians. Computing and Software also contains a vast collection of files in the areas of education, computer applications and utilities, and games. The Macintosh Bible Online is a helpful resource for inexperienced Mac computer users. Especially helpful is the Industry Connection, which allows for online connection to almost 100 computer software and hardware corporate forums, including Claris and Microsoft. Users can download software updates and fixes and get help through public message boards. AOL's Download Manager, which allows files to be downloaded as a group rather than individually, is highly recommended.

People Connection allows for real-time conversation in a variety of formats: "public lobbies" and "public rooms" for common interests, and "private rooms" for online private conversations. Entertainment includes Online Gaming, which includes a variety of interactive computer games, and book and movie reviews.

AOL is leading the way in providing easy access to Internet services beyond e-mail, including bulletin board (newsgroup) and text retrieval (Gopher) services. Internet services are a major strategic focus for AOL, and its providers clearly intend to be a major source of Internet services for the public. To our knowledge, AOL is the easiest way to access Internet services.

You can join AOL for free in several ways: through a toll-free number (Table 2); by means of special offers included in computer magazines or accompanying communications hardware and software; or through current subscribers, who earn 5 hours access time credit. The optional AOL manual makes exploring AOL easier. It costs about \$20 and can be mailed to you within a couple of days following your first sign-on. The customer support department has been increased several fold in response to the overwhelming influx of new subscribers. Most urban centers now have higher speed (9600 bps) local access to AOL, but smaller centers may still have

slower speed access. Because there is no toll-free phone line, rural users will incur the considerable expense of a long-distance phone call.

America Online is a comprehensive online service with good e-mail services (especially for Macintosh users), unsurpassed ease of use, innovation, good value, and an enthusiastic customer base. Although it offers only a fraction of CompuServe's specialized forums, the addition of Internet newsgroups has dramatically increased its breadth of resources. For many new users, AOL is an excellent choice among available services.

CompuServe and GENie

CompuServe and GENie are also full-spectrum online service providers. Along with Delphi and Prodigy (which are not reviewed here), these services differ somewhat in their market, depth of services, interface, and cost. Prodigy is aimed at the same market as AOL and costs about the same, but includes intrusive advertising and has poor Macintosh support. Delphi is oriented to a smaller specialized market and emphasizes Internet services.

CompuServe is the largest, most comprehensive, and most complex of all the online service providers. It is also the most costly, with a Byzantine pricing structure that often produces surprisingly large bills. Although CompuServe is adjusting its pricing in the face of competition, it generally costs twice as much as similar usage of AOL.

CompuServe has over 1.3 million members and acts as both a private and public online service for a vast array of organizations and corporations, ranging from the American College of Physicians to the Ziff-Davis publishing empire. Many specialized technical support and corporate services are available only through CompuServe. CompuServe provides sophisticated e-mail services, although their charge structure can make them costly for extensive Internet use.

Unique features of CompuServe include access to the MEDLINE, AIDSLINE, and National Cancer Institute databases. Accessing these services through CompuServe is much more expensive than through the National Library of Medicine using the *Grateful Med* software. In CompuServe, a costly service called IQuest Medical Infocenter provides access to 60 databases covering topics related to medicine, nursing, pharmacology, allied health professions, and more.

There are many software packages from CompuServe and other vendors that can be used to access CompuServe. These packages vary widely in power and complexity. Some save money by automating interactions with CompuServe. Most users will choose the *CompuServe Information Manager* (CIM) package created by CompuServe for Macintosh, DOS, and Windows com-

puters. This software is not as easy to use as AOL's, but it is a big improvement on the older teletype-based interface.

A membership kit can be obtained for \$39.95 by calling CompuServe. Each kit includes CIM software, a user's guide, and a \$25 usage credit. Less expensive promotional offers are often available.

GENie, which is a much smaller service than CompuServe, has been slow to develop graphical interface software, and its teletype interface uses a menu system. GENie costs roughly the same as AOL and offers high-speed toll-free service for rural users for an additional \$6/hour. GENie's less demanding interface is suited to older computers of every make, including Apple IIs.

GENie has an area dedicated to medical topics, including public and physician-only categories. As with AOL and CompuServe, GENie provides an online encyclopedia, which may be a cost-effective alternative to CD-ROM or paper versions. GENie is a good alternative to AOL for families with older computers, and for rural users who will appreciate the high-speed toll-free access.

Electronic Bulletin Board Services

Private bulletin board services (BBSs) are home-grown versions of the national online services. A BBS can be set up on a personal computer using inexpensive software. One or more telephone lines and modems link the BBS to the outside world.

A BBS may be established by a computer hobbyist, by a business, or by a governmental, educational, and other organization for internal communications. Most localities have bulletin board services within a local calling area. Access typically requires registration with the system operator or *sysop*. Many BBSs are free or charge only a small annual fee, which makes them a superb way to learn about computer communications and a good online option for computer and communication hobbyists and users with limited budgets.

A BBS reflects the interests of the *sysop*. Many bulletin boards have a special focus, such as religion or medicine, but most include a generic set of services: discussion areas, file areas, games, and bulletins. Many BBSs subscribe to international discussion networks, such as the Fidonet and Internet discussion groups. These international networks may produce hundreds of messages a day on topics ranging from pet care to computer equipment. Local discussion groups may focus on local issues, gossip, and political debate. Some BBSs allow subscribers to send and receive Internet mail, but connection to the Internet through a BBS may not be as reliable as connection through a major online service.

Using a BBS requires a modem and communications

software. Any computer can connect with a BBS for message services and many games, but the file areas will typically favor one computer system over others. A wide range of software supports offline message management, graphical interfaces, and other features.

Information can be obtained regarding which BBSs are available in a given local dialing area through user groups and local computer vendors. Sign-up can be achieved by calling the board and completing a registration form online. If there are any associated charges, these will be displayed; if not, voluntary donations are usually appreciated. Local bulletin board services are a fun and inexpensive way to explore the concepts of online communications.

E-mail (Electronic Mail)

E-mail is a simple tool of enormous value. The establishment of connections between online services and the Internet has transformed e-mail from a curiosity to a valuable tool that rivals paper mail, fax, and telephone. Unfortunately, e-mail does not always get the attention it deserves from full-spectrum service providers.

MCIMail provides only communications services. AT&T EasyLink is a competing service oriented primarily to corporations. MCIMail allows subscribers to communicate online with just about anyone anywhere and allows fax messages, telex, and same-day delivery paper mail to be sent directly from your computer. Because MCIMail uses an 800-number for all US subscribers, rural users are served as well as their urban peers. It is of special interest to rural users and to persons who travel frequently.

There are no connect-time charges and no charges for receiving messages (an advantage for subscribers to Internet mailing lists). Typical e-mail messages cost \$.50 to \$.80 each to send. The most economical plan includes a \$10 monthly minimum. Charges for sending mail accumulate quickly: a reasonably heavy user can spend over \$90 a month, even with MCIMail's volume discount program (which does not include the \$35 yearly fee). This makes MCI a poor value for persons with local connections to AOL or other e-mail vendors. Some subscribers use MCIMail predominantly to receive messages and while traveling but otherwise use another service to send messages. By subscribing to Internet mailing lists, users can participate in worldwide dialogues in addition to standard e-mail.

Anyone with a modem and communications software can access MCIMail using standard communications software (teletype interface). To actually benefit from any e-mail service, however, a user needs special mail software to support addressing and automated use. Ideally, this software should support at least one address file with

names, e-mail address, and notes. It should be possible to move information into and out of this file from another computer file and to automatically insert addresses from incoming mail. Software should support sorting and searching the address list, group mailings, secondary recipients ("cc" mail), and filtering incoming messages by author or subject. Most important, the sending and receiving of e-mail should be fully automated, triggered either by a single keystroke or by a preset time.

Few e-mail packages support this list of features for any online service. We are not aware of any Macintosh software that meets minimum requirements for use with MCIMail. MCI publishes rather awkward *MCI Express* software for DOS, and there are at least three different packages from various vendors for Windows. *Norton Commander/DOS 4.0* includes a simple MCIMail module that meets most of these needs.

The Internet

The Internet is different from the other online services described in that it is not a service provider like CompuServe; it is the name given to computers around the world connected by wires or radio links. These computers can exchange information because they are interconnected, speak the same language, and have been registered as Internet computers. The shared language, which is called TCP/IP, is necessary to establish a true direct connection to the Internet. Configuring a direct connection through a modem has been exceedingly difficult, but developments currently under way promise to simplify this process. The Internet is not owned by anyone, and although much of the US portion was developed by public money, it is not a public institution. The Internet is a cooperative entity analogous to a collection of private and public roadways that permit traffic to pass for mutual benefit.

The computers that make up the Internet provide a number of online services, such as communications. Many of these computers are available to everyone free of charge; others require billable accounts and special passwords. Access to the Internet is provided most often through an organization or business, such as an educational facility or commercial *access provider*. Some online service providers, such as AOL, now provide a degree of Internet access.

The Internet is enormous, encompassing millions of computers and most of the nations on earth. It serves as a connection between commercial online services and academic institutions; the standard e-mail address is an Internet address even if the host is a commercial service. Major portions of the Internet were developed by public funds that, in theory, are not to be used for commercial

purposes, but in practice, the Internet is becoming much more commercial. It is an open standard for communications, so it has become a major channel through which government and academic institutions can provide information resources to the general public. Once information resources are on computer, it does not cost public institutions much more to make them available on the Internet.

There are disadvantages to the free-form evolution and rapid growth of the Internet. Even expert users may have difficulty locating resources on the Internet, and obtaining a home or office connection may be quite challenging. Ironically, information resources on the Internet are often found through "word of mouth" or printed guide books. Although efforts to create electronic guides to the Internet are under way, paper guides remain essential for most users.

There has been a flurry of books and articles that describe the Internet and its resources,¹⁻⁶ some providing excellent general introductions to the Internet,⁴⁻⁶ and others offering both the directions and software an expert needs to establish a full-fledged direct Internet connection.¹⁻³ These computer-specific kits are currently available for Macintosh, Windows, and DOS computers.

The easiest way for most physicians to access some Internet resources is to subscribe to a commercial service such as AOL, which handles the connection to the Internet. Expert users can get direct and complete access to the Internet through commercial online service providers.¹⁻³ Community News Services and Colorado SuperNet provide toll-free direct access to the Internet.

Internet users can exchange electronic mail and computer files, access vast software repositories, and navigate multimedia hypertext documents that integrate the information resources of hundreds of institutions. Users can participate in an extraordinary variety of discussions, which may have as many as 600 messages daily, or as few as two a month. The discussions come in two forms. One form, called a *list*, can be joined by anyone with an Internet e-mail address, which includes everyone using commercial services described in this paper. Lists are convenient but can overwhelm an e-mail account. The other variety, called a *newsgroup*, is most like an electronic bulletin board. It requires newsgroup software to use and some form of Internet access. There are more than 240 medical discussion groups and mailing lists, including computers in family medicine (Fam-Med) and behavioral aspects of family medicine (Family-L).

The National Institutes of Health and the National Library of Medicine (NLM) are placing many of their clinical and research resources on the Internet. The NLM's *Grateful Med* software is increasingly oriented to use via the Internet. Using the Internet, it is possible to

progress in only seconds from reading a document on a computer in Scotland to viewing clinical guidelines stored in Bethesda, Maryland.

There are many exciting software tools being developed for computers with full Internet access. One of these tools, *Mosaic*, can access and display multimedia content from computers around the world, although to the user, it may feel like a textbook. Unfortunately, *Mosaic* is breathtakingly slow over a modem. As we develop direct (nonmodem) connections to the Internet, the true potential of this new world will begin to unfold.

Beyond the Net: The National Information Infrastructure

In the near future, with or without government assistance, some form of the National Information Infrastructure will evolve. Modems will become obsolete. Computers will continue to take on many new forms and become even more ubiquitous. In time, the network will be the place where labor contracts are posted and bid on, employment credentials certified, and transactions of every sort negotiated and confirmed. New technologies will evolve to manage one of the central challenges of the 21st century: storing, retrieving, and representing information. The "network" will reflect our material world: there will likely be more pornography than artwork, and more commerce than philosophy.

Today, any one of us can participate in the early versions of this network, and in doing so, gain many practical benefits, only one of which is the potential to bore our descendants with tales of "Model T" explorations.

Acknowledgments

The authors gratefully acknowledge the assistance of Paul Kleeberg, MD, of St Peter Clinic, Ltd, in St Peter, Minnesota with sections pertaining to the Internet.

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