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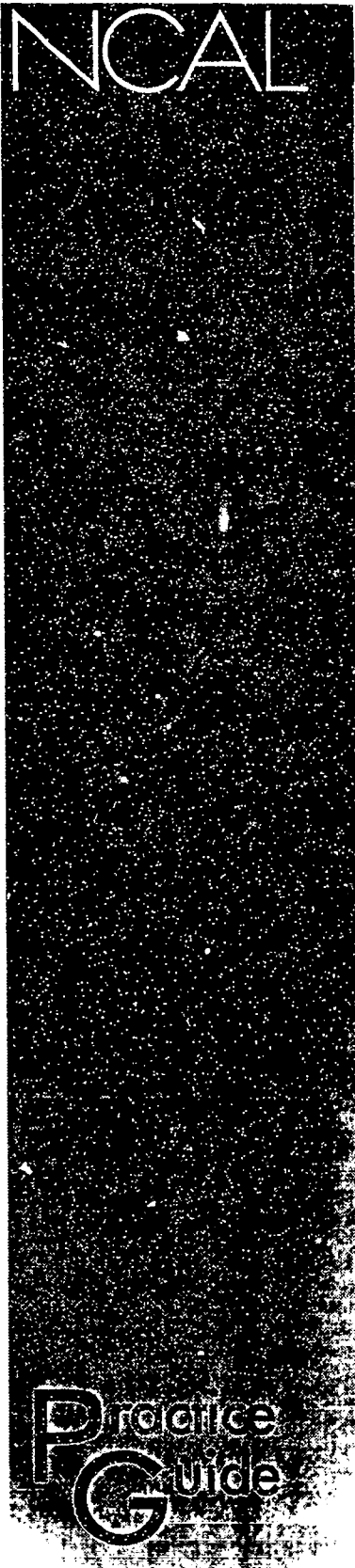PUB TYPE   Guides - Non-Classroom Use (055)

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ABSTRACT
                 This technology guide is intended to introduce adult
literacy providers to the concepts,hardware, and procedures of online
communication. The six-part guide explains the following: (1) what
electronic networks are; (2) why adult literacy practitioners may
want to join the Internet; (3) how adult literacy practitioners are
already using the Internet to improve and enhance practice; (4) what
equipment one needs to connect to the Internet; (5) how to set up a
computer and modem to access the Internet; (6) how to make the first
connection to the Internet through a commercial online service; (7)
what basic tools are used on the Internet and how to use them; and
(8) what is being done to develop the next generation of the
Internet, the National Information Infrastructure. Eight appendixes
include the following: equipment checklists for Apple Macintosh and
IBM-compatible computers; information on using terminal emulation
software; commercial online service providers; country codes;
determining one's Internet address; subscribing to literacy and
literacy-related Listservs; finding and using low-cost computer
software using Gopher and FTP; and finding adult literacy information
servers on the Internet. The guide contains 13 references. (KC)

NCAL

JOINING THE
ON-LINE COMMUNITY
AN INTRODUCTION FOR ADULT LITERACY

R. Karl Rethemeyer
National Center on Adult Literacy
University of Pennsylvania

Practice Guide

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The National Center on Adult Literacy (NCAL) was established in 1990 by the U.S. Department of Education, with co-funding from the Departments of Labor and Health and Human Services. The mission of NCAL addresses three primary challenges: (a) to enhance the knowledge base about adult literacy; (b) to improve the quality of research and development in the field; and (c) to ensure a strong, two-way relationship between research and practice. Through applied research and development and dissemination of the results to researchers, policymakers, and practitioners, NCAL seeks to improve the quality of adult literacy programs and services on a nationwide basis. NCAL serves as a major operating unit of the Literacy Research Center at the University of Pennsylvania.

NCAL publications to date include:

May 1992 *Matching Literacy Testing With Social Policy: What Are the Alternatives?*
Richard L. Venezky (*PB92-01, 7 pages*)

Oct 1992 *Life-Span and Life-Space Literacy: Research and Policy in National and International Perspectives*
Daniel A. Wagner (*OP92-01, 15 pages*)

Oct 1992 *Expanding Theories of Adult Literacy Participation*
Karen Reed Wikelund, Stephen Reder, & Sylvia Hart-Landsberg (*TR92-01, 30 pages*)

Oct 1992 *Invitations to Inquiry: Rethinking Staff Development in Adult Literacy Education*
Susan L. Lytle, Alisa Belzer, & Rebecca Reumann (*TR92-02, 44 pages*)

Dec 1992 *Developing the Professional Workforce for Adult Literacy Education*
Susan L. Lytle, Alisa Belzer, & Rebecca Reumann (*PB92-02, 11 pages*)

Jan 1993 *The Analysis of Adult Literacy: Problems in Factor Analysis Bib-Spiralled Item Administration*
David Kaplan (*OP93-01, 18 pages*)

Mar 1993 *The Impact of Workplace Literacy Programs: A New Model for Evaluation of Workplace Literacy Programs*
Larry Mikulecky & Paul Lloyd (*TR93-02, 180 pages*)

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Terilyn C. Turner (*TR93-03, 86 pages*)

Jun 1993 *Myths and Misconceptions in Adult Literacy: A Research and Development Perspective*
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Jun 1993 *Literacy and Development: Rationales, Assessment, and Innovation*
Daniel A. Wagner (*IP93-01, 50 pages*)

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Apr 1995   *What Works? Literacy Training in the Workplace,* Videoconference Participant Materials
Joyce Harvey-Morgan (Ed.)   *(PR95-01, 38 pages)*

May 1995   *Adult Literacy: The Next Generation*
An NCAL White Paper   *(TR95-01, 29 pages)*

Nov 1995   *Making Sense of Technology Terminology for Adult Literacy: A Glossary and Annotated Bibliography*
Alycia Donohoe, Joseph Campbell, Camille Ciggs, R. Karl Rethemeyer, & Christopher
Hopey   *(PG95-01, 47 pages)*

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Christopher E. Hopey & Joyce Harvey-Morgan   *(PG95-02, 45 pages)*

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Christopher E. Hopey & Joyce Harvey-Morgan   *(PG95-03, 64 pages)*

Nov 1995   *Making the Right Choice: Evaluating Computer Software and Hardware for Adult Literacy Instruction*
Christopher E. Hopey, R. Karl Rethemeyer, & Jennifer A. Elmore   *(PG95-04, 54 pages)*

Nov 1995   *Joining the On-Line Community: An Introduction for Adult Literacy*
R Karl Rethemeyer   *(PG95-05, 146 pages)*

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Nov 1995   *Comparing Applied Literacy and Basic Skills Tests as Measures of Adult Literacy Performance*
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Nov 1995   *What Does "100% Juice" Mean? Exploring Adult Learners' Inform. : owledge of Percent*
Lynda Ginsburg, Iddo Gal, & Alex Schuh   *(TR95-06, 44 pages)*

Nov 1995   *Learning to Read: Literacy Acquisition by Children and Adults*
Charles A. Perfetti & Maureen A. Marron   *(TR95-07, 56 pages)*

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JOINING THE ON-LINE COMMUNITY:
AN INTRODUCTION FOR ADULT LITERACY

R. Karl Rethemeyer
National Center on Adult Literacy
University of Pennsylvania

ABSTRACT

While the most important impediment to using electronic networks in adult literacy is the chronic shortage of funding, experience and research have shown that the lack of training and information about electronic networking is almost as great an issue. This technology guide is intended to help fill the information and training gap for adult literacy practitioners by introducing the concepts, hardware, and procedures of on-line communication while providing numerous examples and appendices specific to adult literacy practitioners. The guide explains (a) what electronic networks are; (b) why adult literacy practitioners may want to join the Internet; (c) how adult literacy practitioners are already using the Internet to improve and enhance practice; (d) what equipment you will need to connect to the Internet; (e) how to set up a computer and modem to access the Internet; (f) how to make your first connection to the Internet through a commercial on-line service; (g) what basic tools are used on the Internet and, to a degree, how to use them; and (h) what is being done to develop the next generation of the Internet, the National Information Infrastructure (NII).

INTRODUCTION

Unless you have been outside the country for an extended period of time or in a three-year coma, it would be practically impossible to have missed the hype surrounding the development of the National Information Infrastructure (NII), more commonly known as the information superhighway. So far, the grandiose dreams of videoconferencing at the beach and video-on-demand in the home are still just that—dreams. However, the lesser services and innovations promised by the information superhighway, like remote access to databases, software retrieval from archives all over the world, and electronic delivery of the morning paper are well beyond the dream stage. In fact, every day millions of people nationally and internationally use these services through the huge electronic network known as the Internet. Once the exclusive province of government and university researchers, the Internet encompasses an ever-widening circle of users, which includes educators, corporations, and individuals who simply want to communicate with one another using computers instead of phones or fax machines.

Despite the widespread use of computers in at least some activities in adult literacy programs, most programs do not have network connections. While the most important impediment to using electronic networks in adult literacy is the chronic shortage of funding, experience and research have shown that the lack of training and information about electronic networking is almost as great an issue.* This guide is intended to help fiil the information and training gap for adult literacy practitioners. If you follow this guide to the end, you will learn

- what electronic networks are;
- why adult literacy practitioners may want to join the Internet;
- how adult literacy practitioners are already using the Internet to improve and enhance practice;
- what equipment you will need to connect to the Internet;
- how to set up a computer and modem to access the Internet;
- how to make your first connection to the Internet through a commercial on-line service;
- what basic tools are used on the Internet and, to a degree, how to use them; and
- what is being done to develop the next generation of the Internet, the NII.

While the examples and resources listed in this guide are drawn from the field of adult literacy, the information should be valuable to other educators or individuals who wish to connect their home computers to the Int·rnet.

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* See Harvey-Morgan, J., Hopey, C. E., & Rethemeyer, R. K. (draft). *Computers, Technology, and Adult Literacy: Results of a National Survey on Computer Technology Use in Adult Literacy Programs* (NCAL Technical Report). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

The document is divided into six parts and several appendices. Part I examines why adult literacy practitioners should be interested in networking and the Internet. This section provides a series of arguments that could be employed to convince program management, funders, or other practitioners to invest in networking. Part II provides an in-depth introduction to electronic networking concepts and explores why networking is thought to be such a powerful tool in all fields of endeavor. Part III provides a brief history of the Internet and answers a number of commonly asked questions about this new community. Part IV examines the "nuts, bolts, and dollars" aspects of joining the on-line community using a modem. Part V examines the set of tools commonly used to retrieve information from sources on the Internet and to communicate with other Internet users. Part VI examines some of the issues surrounding development of the NII (the successor network to the Internet). Following these sections are a series of appendices listing contact information and specialized technical information, and lists of electronic communication forums and information servers dedicated to serving the field of adult literacy.

Networking, like other areas of technology, is rich with terminology and jargon. Throughout this guide, many new terms will be introduced that will probably be unfamiliar and difficult to locate in a dictionary or the glossary included with your computer manuals. To help practitioners overcome the technology language barrier, NCAL has produced a companion document titled *Making Sense of Technology Terminology for Adult Literacy: A Glossary and Annotated Bibliography*. We strongly recommend purchasing the glossary with its annotated bibliography to read in conjunction with this document.

PART I WHY YOU SHOULD JOIN THE INTERNET

For a great many people, the entire rationale for joining the Internet could be summed up in three words: because it's there. For the computer enthusiast or futurist, networking and the Internet are the wave of the future. For most adult literacy practitioners, however, it hasn't been clear whether the Internet is the wave of the future or one more "techno-fad" crashing through their program. Much the same could be said about other types of technology used for adult literacy instruction. However, our experience with practitioners who have decided to take the leap leads us to believe that networking and the Internet are technologies that can enhance and enrich adult literacy programs without breaking the bank. Below are a few examples in the areas of adult literacy staff development, instruction, and administration.

Suffice it to say, these examples all relate to electronic networks like the Internet, so you will need to know a little bit about networks and the Internet to understand what is being described. For now, we'll define an electronic network as a set of wires, cables, and special computers that allows users (i.e., people like you) to exchange information with others who have access to the network or to retrieve information that others have stored on computers connected to the network. The Internet is the largest electronic network ever constructed; it provides a way for people across the United States and in 132 other countries to communicate with one another or to retrieve stored

information. We'll refine these definitions in Parts II and III. For now, keep these more general definitions in mind as you begin to explore how the Internet is being used every day by adult literacy practitioners like yourself.

STAFF DEVELOPMENT

Probably no aspect of adult literacy has benefited more from the Internet than staff development. There are at least a dozen agencies or groups that maintain adult literacy-related servers or facilitate communication on topics in adult literacy using the Internet. The range of resources and opportunities is very rich. NCAL, for instance, maintains an archive of research reports on adult literacy that covers a wide range of topics—from workplace literacy issues to improving staff development. The National Institute for Literacy (NIFL) distributes information developed by the National Adult Literacy and Learning Disabilities Center. California's Outreach and Technical Assistance Network (OTAN) has a collection of resources developed over five years that includes staff development modules and instructional software. Organizations such as Nova University in Canada and the New York State Education and Research Network (NYSERNet) sponsor LISTSERVs on a wide range of instructional and administrative topics in adult literacy. The Educational Resources Information Center (ERIC) system, sponsored by the U.S. Department of Education, supports a searchable database of articles and books on topics in education that may be searched and, in some cases, has an electronic copy of the documents available for retrieval. Most of these resources may be found by following the instructions provided later in this guide and in Appendices F and H.

The Internet may be used both for delivery of staff development and for the creation of staff development materials. Internet delivery of staff development programs is still in its infancy, but beginning to develop. In Delaware, a network of adult literacy centers is experimenting with on-line chatting, a system whereby all of the participants can communicate by sending short, type-written sentences to one another in real time. Once a week at a set time, the instructors all log into the system and discuss an instructional problem one of them is having in his/her classroom or a recent article the participants have all read on a topic in adult literacy instruction.

In some cases, e-mail can be used to provide instruction. Drawing an example from outside the literacy community, more than 25,000 Internet users recently received instruction on using the Internet via e-mail. Each morning they received a message on a new topic; at the end of the lesson, participants were "assigned" experiments that utilized the Internet tool they had just learned about. At the end of each week, an informal quiz was sent out. Using e-mail, the participants could ask their "network assistant" or peers questions as they completed their "homework."

In the very near future, the Internet will be a means by which multimedia staff development materials may be delivered to dispersed sites around a city, state, or country. Already, it is possible to deliver audio and video over the Internet using inexpensive video cameras and computers. Unlike a regular video conference, Internet delivery of audio-video staff development programming offers the opportunity for practitioners to interact with trainers and to view text and graphics concurrently with the video presentations.

There is a longer history of using the Internet to develop staff development material, courses, or workshops. A good example is from a resource teacher for the Oakland Unified School District. Toward the end of a grant cycle, she discovered that her funding for ESL staff development was not exhausted. The only catch was that the remaining funds had to be used before the end of the fiscal year, which was only two weeks away. With only a few days to prepare, she turned to the Internet for help. Her first step was to send e-mail to all of the practitioners she had met on the Internet during her three months on-line and to the LISTSERVs and USENET groups she frequented. A few hours later, one of her e-mail messages bore fruit. A woman in northern California wrote back, saying that she had recently completed a staff development module on ESL issues and would be willing to share her materials—all of which were in digital form. A few minutes later, a second e-mail message arrived carrying the promised materials. Over the next few days, other correspondents replied to her original message with suggestions, information about other servers on the Internet with essentially useful information, and additional offers of materials developed and used for ESL staff development. In less than five days, she was able to pull together all of the materials needed to complete her staff development module. The Internet was the key to her success: "Without e-mail and the Internet, I would not have been able to put together such a rich and successful training experience for my instructors in so short a period of time. The money would simply have been lost."

Maybe most importantly, the Internet offers practitioners a way to interact with their peers that did not exist before. Literacy practitioners have long noted the isolation of working in a field where constrained funding reduces or eliminates the opportunity for interaction with other practitioners. As a prison-based practitioner noted in an e-mail message a few months back, "Before I got connected to the Internet, I rarely spoke with anyone dealing with the same instructional and organizational issues I faced every day. Now, I communicate with a set of prison practitioners all over the country on a daily basis. I finally feel like I have a network of peers that can 'backstop' me when I run into a new problem. It has been a liberating experience."

ADMINISTRATION

According to NCAL's recent survey of adult literacy technology, most programs use computers in their administrative activities, but few seem to use networks for administrative purposes.* Yet, networks like the Internet offer important opportunities to improve the administrative coordination of programs—especially those with multiple sites—and to save money on these activities over the long run. Already, several multi-site literacy organizations are using e-mail as their primary means of communicating with site managers and instructors. E-mail can be used to exchange information on operational issues at distributed sites, to collect enrollment and financial data, and to collaborate on funding proposals. A long-term goal for multi-site programs is to establish centralized registration and management centers. Instead of having separate

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* See Harvey-Morgan, J., Hopey, C. E., & Rethemeyer, R. K. (draft). *Computers, Technology, and Adult Literacy: Results of a National Survey on Computer Technology Use in Adult Literacy Programs.* (NCAL Technical Report). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

enrollment databases at each site, one main computer can be used to store all information. Each site can then enter information about new enrollees into that central computer, which is located at the organization's main location. By using the network to create a centralized registration point, larger literacy organizations can save thousands of dollars through economies of scale.[*]

Program managers are not the only ones who have discovered the advantages of network communications and information retrieval. Increasingly, private, state, and federal funding agencies are using the Internet to disseminate information about grant funding opportunities and to communicate with the programs that receive funding. It is becoming common for program officers at the U.S. Department of Education or large private foundations to conduct all of their communications with funded programs through e-mail. In the not too distant future, it will be possible to file for a grant or funding source electronically.

Programs are also using the network to discover new sources of funding. The same LISTSERVs that support discussions of instructional issues in adult literacy are also used to spread the word about new grants. A participant in an NCAL-sponsored research project got an electronic tip about funding for adult literacy technology from a private foundation that she parlayed into more than $100,000 of computer equipment. California's Outreach and Technical Assistance Network (OTAN) and other information providers maintain archives of adult literacy grant announcements that anyone may access. In the very near future, those without access to the Internet and its timely information sources will fall farther and farther behind in the grant funding game; networked programs will always have an edge.

INSTRUCTION

When we mention using the Internet to change or improve instruction, the first reaction of many program managers is, "How could we possibly put all of our students on the Internet? It's simply too expensive." While for many programs it is too expensive to give every student an account on the Internet, this does not mean the Internet cannot have an impact on instruction. Quite the contrary, instructors with access to the Internet have found a wide variety of uses that improve, enhance, or even transform instruction. Probably the most common instruction-related use of the Internet is the recovery of instructional software. There are literally hundreds of sites on the Internet where one can download (i.e., transfer a copy of a document or piece of software from a server to the user's hard drive) free or very low cost instructional software packages. Many are originally intended for use with children, though NCAL has an archive of programs that are appropriate for use with adults. Most of the software was created by amateur programmers who are seeking fame and a little fortune from their efforts. Many programs can be bought for $5, and most programmers offer very inexpensive site licenses or free copies to literacy programs.

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[*] For an in-depth discussion of electronic management information systems see Kutner, M.,Webb, L., & Herman, R. (1993). *Management Information Systems in Adult Education: Perspectives From the States and From Local Programs* (Tech. Rep. No. TR93-04). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

The Internet, above all, is a tremendous source of information. Many programs use the information resources at their disposal to enhance their instructional programs. For instance, one might enliven a unit on science by downloading satellite weather photos or by retrieving information about a recent experiment conducted on a Space Shuttle flight. Some programs use news stories culled from Associated Press news feeds available on the Internet servers to practice reading, teach a lesson on critical thinking, or generate a discussion about social studies or politics. With millions of photos, graphics, and texts available through the Internet, there are unlimited possibilities for curriculum enhancement and enrichment.

In recent years, a number of information providers have begun to post curriculum frameworks and lesson plans that cover a variety of subjects. The largest adult literacy collection is found on the OTAN information service. More than a dozen large literacy programs have posted lesson plans on the OTAN system covering topics from GED math to parenting skills to topics in ESL.

Those adult literacy programs that are fortunate enough to have the resources necessary to provide some or all of their students access to the Internet have begun to experiment with e-mail and other types of communication as part of their instructional programs. Some of the experiments have included writing partnerships that are carried out via e-mail, pen pal relationships between ESL students and college English majors, and job skills counseling by retired seniors via e-mail. In locations where communities are being networked as part of the NII testbeds, telecommunications companies are working with software developers to deploy instructional software packages that will be available at the program site and in the home (with the aid of a computer or special set-top box). Drexel University and the Philadelphia Mayor's Commission on Literacy demonstrated through the PowerLearning Project that impressive learning gains and increases in time on task are possible when learning is moved from the classroom to the home. As the Internet evolv,.s into the NII, more innovative instructional applications like the PowerLearning Project will be possible.

In our experience, good uses of networking are not found in a book. but are collaboratively dreamed up by students, instructors, and administrators working together. Each organization must find the best way to incorporate the Internet into existing activities and methods. When properly designed and planned, the Internet can be an immensely useful resource. However . . . you can't take advantage of these opportunities if you aren't connected. Our next task is to help you take your first trip on the Internet. If you are still interested in joining the on-line world, turn to Part II of this guide to begin a more thorough exploration of what electronic networks are, what the Internet is, and how you can get connected.

PART II NETWORKING CONCEPTS

WHAT IS AN ELECTRONIC NETWORK?

The term "electronic network" is misused with such regularity that it is necessary to define it carefully before we begin.

Electronic network: a system of network media and communications devices that allows two or more computers to exchange information.

What does this "careful" definition really mean? To get a better appreciation of what an electronic network is, we'll break down these concepts. The network media mentioned in the definition can be comprised of all sorts of things: phone wires, fiber optic cables, coaxial cables (i.e., the kind of cable used to send a picture from a VCR to a television), satellites, microwave transmitters/receivers, and cellular phones. All of these are ways of conveying electronic signals from one place to another.

Media are only one part of the network, however. There must be some way to interconnect all of these types of media so that communication is possible. On an electronic network, this key communications device is usually called a hub. A networking hub (sometimes also called a concentrator) is a device that manages information flows between all of the computers that are connected to it. Below is a simple diagram of an electronic network.
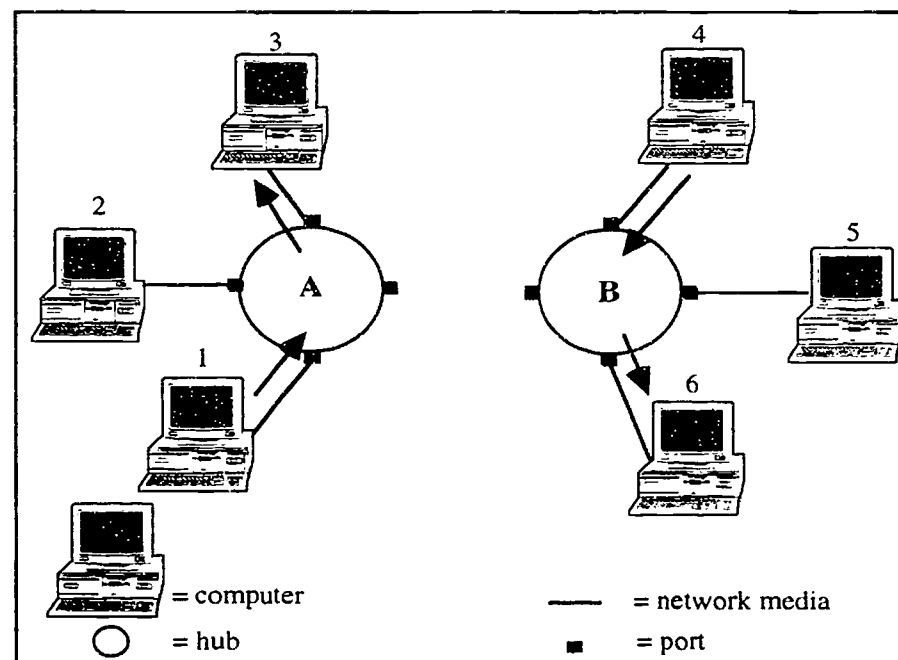
Figure 1. Electronic networks are created by connecting computers to electronic hubs. Here, two small networks have been created by connecting computers to Hubs A & B, thus making information exchange possible between computers 1, 2, & 3 and computers 4, 5, & 6

Each computer is connected via some sort of network media to a port (i.e., a point on the hub where the network media is connected) on Hub A or B. Hubs play a role similar to that of a telephone operator in the first part of this century, when the operator had to physically plug a wire into the proper connector to make a phone call go through. In the diagram, every computer connected to Hub A can exchange information with any other computer connected to Hub A. Technically, Hub A and the computers connected to it comprise a small network. As the arrows indicate, computers 1 and 3 can exchange information with one another, as can computers 4 and 6. However, these networks are very limited in nature. As the diagram shows, it is not possible for computers connected to Hub A to send messages to computers connected to Hub B, because there is no network media to create a data pathway between the two hubs.

However, computers are not the only devices that can be connected to a hub; hubs can also connect to each other. By interconnecting hubs, it becomes possible to communicate more widely. In Figure 2, Hubs A and B have been connected using a fiber optic cable, thus making it possible to transmit information from computer 1 to computer 6.
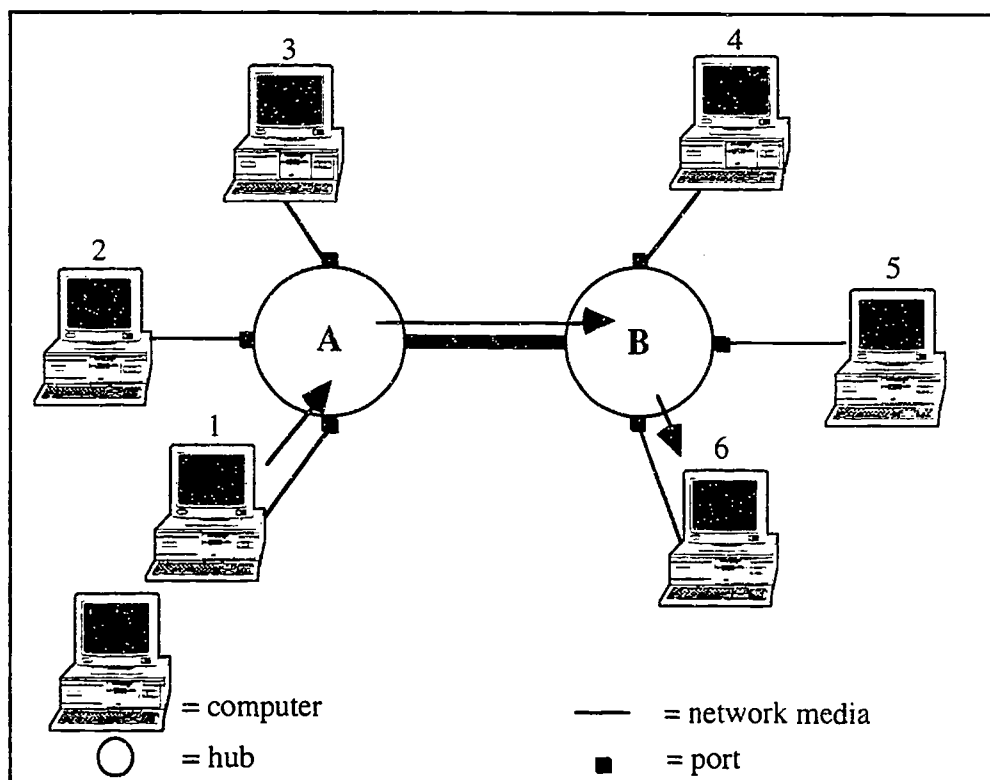
Figure 2. Larger networks are created by linking hubs together, usually with high-capacity network media like fiber optic cables.

Note also that it is not necessary for the information flow to go directly from computer to hub to hub to computer. There could be more than two hubs between the sender and receiver—the only requirement is that there be at least one pathway from sender to receiver. In essence, this is how the Internet works. Thousands of hubs are interconnected, creating information pathways across institutions, states, and countries. The Internet is a more complex

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network, so additional communication devices are also used to help keep the information flowing, like routers and bridges, but the network hub is the one device necessary to create a network.

However, interconnections are not enough. To allow an exchange of information, there must be a common language, just as humans must find a common language in order to exchange information. As anyone who has tried to work in an organization that has both IBM-compatible[†] and Apple Macintosh™ computers will tell you, different kinds of computer do not speak the same language. Fortunately, the U.S. Department of Defense, which funded development of the Internet beginning in the late 1960s, developed a common language called TCP/IP (Transmission Control Protocol/Internet Protocol) that has survived as the *lingua franca* of the Internet to this day. Almost every type of computer and every operating system ever produced has a translator that can convert information from its "native" language into TCP/IP and vice versa, so almost any computer can participate in the Internet.[*]

Throughout this section, we have consciously used the word "information" rather than "software," "data," "books," and so forth when referring to the "stuff" being transferred from one computer to another. There is a reason for this. All of the "stuff" being transferred over the network is in digital format. In other words, the letters, words, graphics, sounds, moving pictures, and so forth are represented by 1s and 0s (the only symbols any computer knows). As computers have become more powerful, new opportunities have emerged to "digitize" things. We can already digitize images, sounds, and text; there is no reason why it would not be possible to digitize tactile inputs, smells, and tastes (once the hardware is developed to deliver the sensation, that is!). Moreover, the most innovative uses of the network are not those that simply transfer documents that are *only* text or *only* pictures. Far more interesting are uses that integrate multiple media—documents that include text, graphics, sounds, and (in some cases already) moving pictures. So what does one call documents, software, or network applications that provide multiple sensory inputs? We call it "information." The key is to remember that electronic networks can transmit far more complex things than word processor documents. They can be used to send information, as we have defined it above, to users all over the world.

SORTING OUT LANs, MANs, WANs, AND OTHER TYPES OF NETWORKS

If you've ever discussed networking with a computer professional, you've probably heard some of the terms listed above. LANs, MANs, and WANs are

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[†] Throughout this paper "IBM-compatible" is used to refer to computers made by IBM or by other manufacturers that run Microsoft or IBM DOS™. This would also include computers running Microsoft Windows™ or IBM OS/2™.

[*] Many large networks actually use two or more data transmission protocols. This is done to accomodate the needs of different groups who use the same physical infrastructure. For instance, Macintosh users often prefer to use the AppleTalk protocol, while PC users often prefer Novel's IPX protocol. TCP/IP is not the only network protocol that has ever been developed. Smaller networks may use other protocols. like AppleTalk™. DECnet™, or Novell NetWare™. Any network, however, will use at least one of these protocols as the common language of data transmission.

networks of different geographic sizes. Not everyone agrees on the definitions of these terms, but most definitions do focus on the geographic reach of the network. LAN stands for local area network. A LAN is usually a network that is housed in one building. In many cases, a LAN consists of one network hub and the computers and other network devices (like printers) connected to the hub. However, a larger LAN (for a large corporation's headquarters, for instance) could have a hub for each floor in the building; the hubs would then be interconnected with a network medium like a fiber optic cable, creating a data pathway between all floors in the building.

The next level up is a metropolitan area network, or MAN. There are few examples of MANs; a generic type of MAN would be a network that connects all the school buildings in a large city. Such a network would link schools across a widely dispersed area, but within one metropolitan area. MANs usually have a second characteristic: They connect multiple network hubs or multiple LANs. A school district MAN, for instance, would connect the LANs in each of the schools, creating data pathways from any computer in any school building to any other computer in any other school building throughout the district.

The next level is the wide area network, or WAN. WANs usually connect LANs and/or MANs that are in separate states or separate countries. There are actually more WANs than MANs. A number of corporations have set up WANs to connect LANs in their various sites around the world. The ultimate WAN, of course, is the Internet, which connects thousands of LANs and MANs.

In recent years a few other terms have come into use. One is the idea of an institutional network. This term usually refers to networks run by organizations that have multiple buildings grouped together like a college campus. The Educational Testing Service (ETS), for instance, has multiple buildings on a single site in Princeton, NJ. Their network does not span the entire city of Princeton, but it is certainly larger than a traditional LAN. Colleges sometimes refer to their networks as campus area networks (CANs). The definition for CAN and institutional network are virtually identical.

Now that you have a sense of how electronic networks are connected and how they arc classified, we are ready to look at the largest electronic network of them all: the Internet.

PART III THE INTERNET: AN INTRODUCTION

Given the huge amount of press the Internet has received over the last couple years, it still amazes Internet "regulars" how often people misunderstand what the Internet is and how it works. All too often people confuse e-mail with the Internet or think the Internet is only national in scope. To use the full potential of the Internet, you will need to appreciate some of its quirks and peculiarities. After a number of Internet training sessions over the last year or so, we've found a set of common questions that practitioners ask when trying to understand the Internet. The answers to these questions, we think, are the basis to understanding this burgeoning community.

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WHAT IS THE INTERNET?

The Internet is nothing more than an electronic network—a system of network media and communications devices that allows two or more computers to exchange information with one another. The Internet developed out of the research efforts of the Department of Defense (DOD) and National Science Foundation (NSF). The DOD started working on a prototype computer network in the late sixties, when it was trying to design a way to maintain control of U.S. military forces after a nuclear attack. Its prototype was designed to survive the attack and allow computers and military personnel to communicate afterward. This initial effort created the TCP/IP networking protocol (the network's *lingua franca*) and several communications devices, including hubs and routers.

The nascent Internet remained primarily a DOD project until the early 1980s, when NSF took over development. NSF was interested in the Internet (then known as ARPANet) because it wanted to create a way for researchers to share five hugely expensive supercomputers it had bought. The DOD infrastructure and protocols were ideally suited to this task, though NSF began a rather ambitious project to improve network throughput and increase access. Once the basic infrastructure was in place, however, professors and students found a variety of other uses for the network, beginning with electronic mail. As new uses developed, more and more universities and corporations joined, first in the United States and then worldwide. At last count, more than five million computers in 132 countries were connected to the Internet. Since the late 1980s, the amount of information passed around the world using the Internet has grown by between 15 and 20% per month. Estimates vary widely, but there are thought to be between 15 and 20 million people with access to the Internet in the United States alone.

The latest stage in the Internet's development has been the gradual surrendering of NSF leadership in favor of private corporations and university consortia. By late 1995, the NSF will only act as a coordinator for the Internet instead of being the backbone service provider. As management of the Internet was privatized in 1994-95, the number of private companies operating on the Internet grew substantially. The next step in the Internet's development will depend, to a degree, on Congress and its efforts to roll back telecommunications laws that are impeding development of the Internet's successors, the National Research and Educational Network (NREN) and NII. Nevertheless, the Internet has become an immense technological, sociological, economic, and political experiment that is still underway.

ISN'T E-MAIL THE SAME AS THE INTERNET?

This question is probably one of the most commonly asked about the Internet. Even some experienced Internet users seem to think that the Internet is used only for e-mail, FTP (File Transfer Protocol), Telnet, or whatever tool they most commonly use. It is important to remember that the Internet is not one tool; the Internet is a means of transferring information from one place to another, in much the same way that a pipeline carries liquids from one place to another. To extend the metaphor, Internet tools are nothing more than different

types of pumps that push different kinds of liquids through the same pipeline. So the "data pipeline" that connects a computer to the Internet might be used in one instance to send e-mail to a correspondent overseas, the next minute to recover data from a computer somewhere in the United States, and little later to search a database at a university across the street. All of these transactions use the Internet, but different tools are used to "pump" the information to and/or from the user. So e-mail is not the Internet. In fact, most Internet "gurus" would not consider an individual with access only to e-mail "on the Internet." New tools will develop over the next few years, but these will not be the Internet, either. The Internet is the infrastructure through which the information is "pumped."

WHAT CAN BE DONE WITH THE INTERNET?

There are really only two things that can be done with any electronic network, though both are very powerful. Networks can be used for interactive communication and they have the ability to retrieve stored information from remote locations.

INTERACTIVE COMMUNICATION

For the most part, human communication via electronic networks does not happen in real-time (i.e., communication where information is received at the instant it is sent), like a telephone conversation or videoconference. Currently, most Internet communication happens through "store and forward" systems, much like your telephone answering machine. Someone sends a message to your computer via the network; your computer receives the message and stores it until you are ready to read it. As we will discuss later, this is how electronic mail (or e-mail), the most commonly used communications tool on the Internet, operates. There are experiments underway using the Internet for real-time communication like telephone calls and videoconferences. However, it will be several years before the Internet and personal computers are powerful enough to support live telephone calls or videoconferences.

Internet communications can have two different forms: one-to-one communication and one-to-many communication. The more familiar form is one-to-one communication. Someone sends a message that is addressed to you and only to you. It arrives in an electronic "box" to which you are the only one who has the key (in this case a password). E-mail is the most common form of one-to-one communication on the Internet, though there are others.

It is also possible to have one-to-many communications on the Internet. This is accomplished by one of two methods: bulletin boards and LISTSERVs. The first is like a school or company bulletin board. Users can electronically "tack up" a message on a computer that is running software designed to accept such postings. The Internet's bulletin board, USENET, is publicly available to anyone with a computer, access to the Internet, and the proper software, so literally millions of people can see and respond to postings put on the USENET bulletin board.

The other method, known as a LISTSERV, also allows interactive communication with people dispersed around the country. LISTSERVs are a little like a newspaper: you "subscribe" to a LISTSERV and then receive all the

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messages that are sent to the LISTSERV. The major difference is that anyone who subscribes to a LISTSERV is both a reader and a contributor. Anyone who is subscribed to a given LISTSERV may pose questions or initiate discussions in which the entire group participates. LISTSERVs are usually themed, so the audience to which you post a message is known to be interested in and knowledgeable about that topic.

What are the advantages of Internet communications over telephone or postal communication? The most obvious is speed. E-mail messages are usually delivered to their destination, regardless of where that might be, in less than a minute. Another is geographic and temporal independence. It is possible to dial into most Internet service providers' networks from anywhere in the world to retrieve information or communicate with other users. Electronic communications go through regardless of whether the recipients are at their computers or not. The computer will patiently store an e-mail message until the user is ready to retrieve it. Most computer communication is textual, and textual communications tend to be more thoughtful and less "off the cuff" than communications by phone. E-mail gives you a chance to reflect before dashing off a reply, whereas a phone conversation requires immediate feedback. Finally, electronic communication has the advantage of economy. Many on-line services allow you to send an unlimited number of messages for a flat monthly fee. If we compare surface mail (sometimes derisively known as "snail mail" in the electronic networking community), electronic mail, and telephone costs (assuming that an on-line service charges $10 per month), the advantages become clear:

Table 1

Comparison of communication costs

Communications Tool	Price Per Message	Messages for $10
E-mail	N/A	hundreds
Telephone	1.30	7-8
U.S. Mail	.32	31

Many users find that they can replace costly phone calls or mailings once they and a critical mass of their correspondents join the Internet. Finally, some forms of communication are simply not possible via surface mail or telephone. It is not possible to create a paper message with audio annotations, for instance. Electronic communications can be richer than anything possible on paper.

INFORMATION RETRIEVAL

The second capability of electronic networks is the ability to retrieve stored information from remote locations. This information could be anything from a research report to a scanned image of a photo taken during the Civil War to a piece of software used to teach adult basic math skills. For instance, if you wanted to create a writing/social sciences unit on the Civil War, you could rapidly gather a large number of resources related to the Civil War from the Internet. The Library of Congress (LoC) server offers several thousand pictures that may be downloaded, with accompanying text by the photographers and historians in addition to several electronic texts on the Civil War, including a concise timeline and collection of comments by participants. Since 1992, a

group of Civil War historians and re-enactors have maintained a discussion of issues arising out of the Civil War; their messages are stored in an archive and may be searched by keywords. In this archive you could find contemporary comments on the Civil War that could be read and discussed. You could use the Internet to recover the page layout software necessary to integrate the Civil War texts and photos into a student workbook. This is a fairly common example that could be replicated in many areas of instruction.

As stated before, there are important advantages to using the Internet instead of libraries or paper archives for information retrieval. Perhaps the most important is the ability to search for and retrieve information during the same session. An example from a library illustrates this point. It is common to search a library's electronic card catalog, find the perfect book for a research paper, and then discover that the book is either checked out or "missing in action." Electronic libraries never have this problem. A "master" copy of the book, paper, manuscript, monograph, or other work is always maintained on a computer that "serves" a complete, electronic copy to anyone who requests one (hence the name *server* for the computer that principally fulfills this function). This electronic copy resides on the computer's hard drive and may be accessed and used like any other document on your computer. It is possible to make an unlimited number of copies of the original, each identical in every way to the master. Unfortunately, the process of digitizing older works is quite slow. For the foreseeable future, the Internet will primarily be used to recover documents and news articles generated from about 1990. Even for this period, the electronic offerings are far from complete, but the choices are rapidly expanding.

Another advantage is that electronic information resources can be made available 24 hours a day, 7 days a week, at virtually no additional cost. Computers on the Internet are routinely left on night and day (in fact, the Internet could not function if this were not so). So it is possible to retrieve information whenever it is convenient. Compare this with the cost of keeping a library open 24 hours a day. The additional labor alone makes 24-hour service nearly impossible.

Additionally, electronic information is much less location-dependent than books or other paper documents. To read a book, for instance, you must be in close physical proximity to it. If the book is not available in your home town, you must wait several days while it is transported from another library or bookstore tens or hundreds of miles away. Electronic documents may be retrieved just as easily and rapidly from a distant country as from the library next door. If an electronic copy of the book is available on the Internet, it does not matter whether you are 10 feet or 10,000 miles away from the server where it is located; it can be retrieved in a few minutes electronically.

Finally, dissemination of information via the Internet or other electronic networks is much, much cheaper than disseminating information in paper form. Currently, because the costs are so low and the technology for on-line payment is still less than perfect, almost all the information disseminated through the Internet is free. NCAL, for instance, charges for paper copies of its technical reports but disseminates the electronic copies for free. However, even when "cost-recovery" becomes feasible, electronic versions of books and materials will be much cheaper than paper copies, simply because the publisher saves the cost of printing, binding, and shipping paper. Our own experience indicates that

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electronic publications could be sold for half the price of paper versions. In the long run, this enormous cost savings will drive more and more publishers to offer their materials electronically.

Ultimately, of course, communication and information retrieval go hand in hand. As will be discussed later, to find a friend's e-mail address, you must often use an Internet information server, and the best information servers on the Internet are often discovered by communicating with peers through e-mail, LISTSERVs, and the USENET bulletin board. To use the Internet effectively, both the communication and information retrieval tools must be mastered.

ISN'T THE INTERNET DIFFERENT FROM AN ON-LINE SERVICE?

In the past, the Internet and on-line services were competing entities. Each of the on-line services was a kingdom unto itself; each provided internal e-mail service for its users and a set of proprietary information resources that could only be accessed by subscribers to a particular service. However, the explosive growth of Internet e-mail began to change this. As more and more people joined the Internet, subscribers to America Online, CompuServe®, GEnie®, and Prodigy® (Delphi Internet Services came a bit later) began to demand a way to send e-mail from their service to people with e-mail accounts on the Internet and vice versa. Once the on-line services provided this functionality, users began to demand access to the full range of Internet communication and information retrieval resources. As a result, the Internet and on-line services have begun to merge. The state of the Internet-on-line service relationship would look something like this (see Figure 3):

On-Line Services   **Internet**

Proprietary
databases   E-mail   Telnet
                   USENET
                   LISTSERV
                   GOPHER
Newspapers   WWW
magazines   FTP
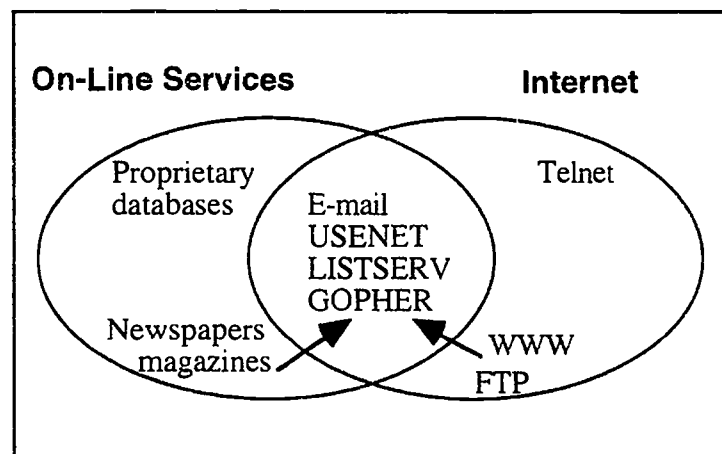
Figure 3. The Internet and on-line services are not synonymous, but they are increasingly offering the same services and information resources.

Most major Internet tools are already available from at least one major on-line service provider, and others are progressing toward the area of union. Similarly, some of the features that were only available from on-line services, like newspapers, magazines, Associated Press newsfeeds, and so forth, are now available (often for a fee) to Internet users. There are still some tools and information resources that are not available from both systems, such as Telnet (though America Online and CompuServe® will offer Telnet service in 1995)

and some proprietary databases and news sources found on the on-line services. As time passes, the two circles will probably merge into one.

HOW IS THE INTERNET ORGANIZED AND WHO OWNS IT?

This question is exceedingly difficult to answer because the Internet is a hierarchy with owners and partnerships at various levels. Each level is owned by a different set of organizations or corporations. To get a better handle on this, take a look at Figure 4. As before, the circles represent network hubs and lines represent network media.

ANSnet = Advanced Network & Service, Inc. Network
CERFnet = California Education and Research Federation Network
LCCC = Lehigh County Community College
PSINet = PSI Network Service, Inc.
JvNCnet = Johann von Neumann Center Network

AOL = America Online, Inc.
CMU = Carnegie-Mellon University
CICnet = Committee on Insitutional Cooperation Network
Prepnet = Pennsylvania Research and Education Partnership Network
Penn = University of Pennsylvania

Figure 4[†]. The Internet is not owned by one organization. It is a confederation of organizations, each with different roles and responsibilities but all dependent on one another to make the Internet function.

At the top level, the National Science Foundation (NSF) provides overall leadership and policy direction for the Internet. A few years ago, the NSF actually owned the network connections at the top of the tree. The connection at the top of the tree, once known as the Internet "backbone" r⁻ ·.ded a way for regional networks to exchange information with one another. However, in

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[†] This is only a general schematic. The actual Internet connection scheme is more like a web. In addition, there are other companies that serve as both network service providers and midlevel service providers.

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1994-95, the NSF shed the last of its ownership of the Internet, as directed by Congress. Now, several companies, known as network service providers (NSPs), work cooperatively to maintain national level connections. They are under contract to provide a transcontinental transmission of information in accordance with rules established by NSF. However, they do not define how the Internet functions independent of the NSF or networks below their level. The NSPs are connected to each other by a series of NSF-sponsored hubs (for simplicity's sake, we have shown this as one network connection at the top; in reality, the hub scheme is more complicated).

At the next level down, midlevel service providers are responsible for hooking up large institutions and businesses. Midlevel service providers offer technical support to these businesses and institutions and a data pathway to the network service providers (who, in turn, provide data pathways to the other network access providers and, by extension, to everyone else connected to the Internet). The midlevel service providers are owned and operated by all sorts of organizations. In the above illustration, PrepNet is owned and operated cooperatively by the State of Pennsylvania and several major educational institutions. CICnet is operated by a consortia of Big Ten universities and the University of Chicago. PSINet is a private company that offers institutional connections nationally. Other midlevel providers are owned by university consortia.

Attached to the midlevel service providers are the institutional or corporate networks. The member networks rely on their midlevel provider's data pathway to exchange information with other computers outside their location. Each of these member networks maintains hardware and databases that are essential for the entire system. For instance, Penn maintains a database that lists all the computers connected to Penn's institutional network (the domain name system). This database is used by computers outside Penn each time they try to send a message or retrieve information from a Penn source. Without this service, Penn's part of the Internet would not function. The entire system is interdependent.

The NSF enforces a set of very basic regulations and technical standards that help this process along, but the Internet is, in the main, self-policing and self-sustaining. Standards and regulations are formulated by a committee of "interested users" drawn from major Internet-using institutions. Each standard is then voted upon by the Internet community. If accepted, the member institutions are asked (but not required) to adhere to the standard. Collectively the organizations at each level in the chart above "own" and "operate" the Internet, but there is no single authority or enforcement agent. The Internet is more a confederation of networks than a single network.

HOW ARE ALL THESE COMPUTERS CONNECTED TO EACH OTHER?

Internet hubs are connected to each other using a number of different media. At NCAL, for instance, we use an underground fiber optic cable to connect the network hub in our building to the "master" hub for the University of Pennsylvania. Some large universities have begun using microwave transmitters to connect remote buildings (e.g., an agricultural research site outside a city) to the campus network. Penn's master hub is connected to

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PrepNet (see Figure 4) via a dedicated copper phone line that runs underground from Penn's site in the western part of the city to an office downtown. Many member networks use fiber optic cables to connect to their midlevel network. PrepNet is connected to ANSNet using copper wires that run underground from a site in Philadelphia to New York. Network service providers are connected to one another using transcontinental fiber optic cables or satellite links. International sites connect to the U.S. portion of the Internet via satellite links and/or transoceanic fiber optic cables. As you can see, the Internet is connected using a crazy quilt of wires, cables, microwave transmitters, and satellites.

PART IV GETTING ON-LINE USING A MODEM

Now that you have a clearer conceptual understanding of what electronic networks are, what the Internet is, and how it might be used to improve your adult literacy program, it's time to get down to nuts and bolts—quite literally. By the end of this section, you will understand

- how an on-line service works, in principle;
- why a modem is needed to connect to the Internet;
- how a modem works, in principle;
- how a modem interacts with the telephone system in your office or home;
- how to hook up a modem to a computer;
- how to interpret the lights and controls on the modem; and
- how to choose an Internet service provider.

Before we begin, though, it's time to put some of our knowledge about networking concepts to work.

HOW AN ON-LINE SERVICE WORKS

Investigating specific types of technology and their possible application to sIn the earlier discussion of networking, we demonstrated how a network is created by first connecting computers to a hub and then connecting hubs to one another. It's relatively inexpensive to connect computers to hubs. It's not, however, inexpensive to connect hubs. Internet hubs are usually connected with high-speed, dedicated phone lines (i.e., copper wires or fiber optic cables that run from point A to point B and are not connected to the main telephone system), which cost thousands of dollars to install and hundreds of dollars per month to maintain. Corporations, universities, community colleges, and other large institutions can afford to have their network hubs directly and continuously connected to the Internet. Most individuals and adult literacy programs cannot.

So how do you gain access to the Internet if you are not affiliated with a large organization? Through an on-line service. On-line services are private companies or public agencies that provide information electronically to

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individuals and small businesses. Originally, on-line services were self-contained entities. They collected information from multiple sources and made it available to their users, but they did not allow their users to gain access to other information on other services or the Internet. However, the growth of the Internet has forced older on-line services to offer access to Internet information resources and has prompted the founding of new on-line services that do nothing but provide low-cost access to the Internet.

To provide low-cost access, on-line services exploit two characteristics of how people use the Internet. First, most people do not need to have continuous access to the network. In the model that we discussed in Part I, almost all the computers remain attached to the Internet 24 hours a day, 7 days a week. However, most users do not need to be connected to the network constantly—they only need to be connected when they read their e-mail or recover a piece of information. Additionally, most users do not need a high-speed connection to the Internet—a plain telephone line will suffice, rather than the expensive dedicated lines needed to interconnect hubs. The marketing key is to use plain telephone lines to offer users episodic, rather than continuous, access to the Internet.

To provide this type of access, the on-line services rely on a different type of network hub. Rather than using a conventional hub, on-line services use a modem server. A modem server, instead of having ports, has numerous modems attached to it. Modems are devices that allow computers to exchange information with one another over plain phone lines (we'll say more about modems in the next section). Each modem can be used to create a data pathway between the Internet and a user via a telephone line.
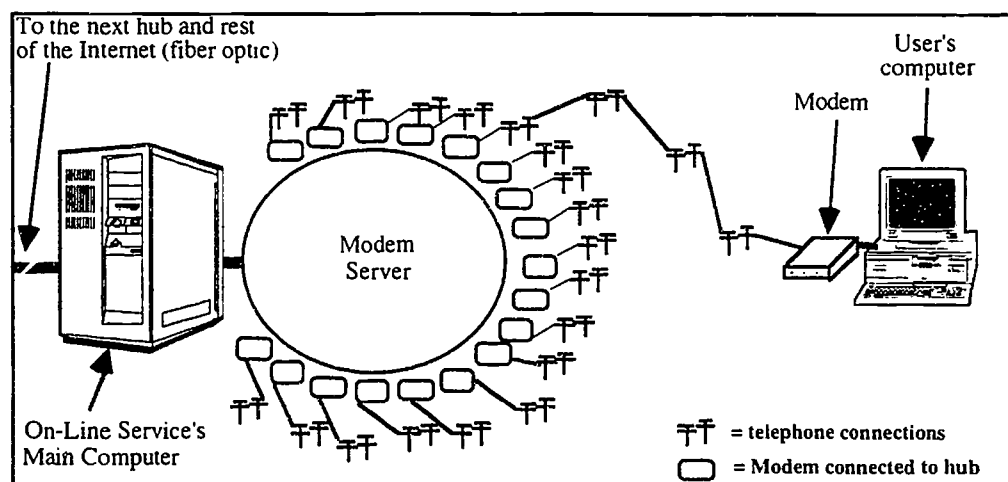
Figure 5. By using a modem server and large computer to manage access to the Internet, on-line services can provide a cost-effective way for individuals and adult literacy programs to connect to the Internet.

However, modem servers do not have enough "brains" to manage all of these connections on their own. On-line services are like a club: Only members may enter the system and gain access to the Internet. Accordingly, the services limit access to their systems by establishing a computer database that "vettes" every call that comes into the system, making sure the caller knows a user ID and password that corresponds to a member's ID and password. An on-line service's "main" computer plays this "gatekeeper" role. It also plays other roles,

like storing proprietary information resources that the service has developed for its members, such as electronic versions of newspapers, on-line discussion groups that are sponsored by the service, and so forth. The service's main computer is also instrumental in managing the flow of information between computers on the Internet and members dialing in through the service's modem server.

To gain access to the Internet, on-line service members call a special telephone number using their computer and modem. Once the modem server answers, the member logs into the on-line service. Logging in is the process of providing the service's main computer a valid user ID (usually a series of numbers and/or letters) and a password. If the service's computer recognizes the ID and password, the user may begin to recover resources from the service's main computer and the Internet. When the user is finished, she/he logs off, freeing up the modem for another user.

On-line services can provide low-cost access (i.e., $120 per year for Internet access through an on-line service versus $4,000 or more for Internet access through a direct connection) because a modem server can provide access to the Internet for a larger number of people than a conventional network hub. Most network hubs have 12 or 24 ports, thus only 12 or 24 computers may use the hub to gain access to the Internet. A modem server may also have only 12 or 24 modems, but those 12 or 24 modems can be used by many more than 12 or 24 computers, depending on how long each user stays on line. If a modem server supports 12 modems and each user stays on-line for 30 minutes during the day and doesn't call again, such a server can provide access for 576 users a day. By spreading the cost of the hub and high-speed wiring over 300 or more users, the per user cost drops dramatically.[†]

TAKING STOCK BEFORE BEGINNING

As you prepare to set up your computer and telephone system to use the Internet through a commercial on-line service, you may want to consult the Macintosh™ or IBM-compatible versions of the worksheet titled "Equipment Check-Off List" found in Appendix A. This list will help you inventory the computer equipment and telephone resources that you already have and decide what items you will still need to buy. Also, this sheet will help you determine how much you will have to spend up-front in order to join the on-line community.

COMPUTER CAPABILITIES

To begin, you will need to determine the capabilities of the computer that you intend to use. It is a good idea to review the documentation that came with your computer as you work through this section. The answers to the questions that follow may be buried in these documents. Almost any computer built since 1985 will be able to connect to the Internet. The more powerful the computer,

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[†] Up to a point. As the number of users increases, it eventually becomes cheaper to set up a regular network hub and Internet connection. The break-even point is hard to calculate, but it is roughly between 100 and 300 users.

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the easier it will be to connect. Since Apple Macintosh™ and IBM-compatible computers have slightly different equipment and software requirements, this section will be split into two parts. The first part will cover Macs; the second will cover IBM-compatibles.

APPLE MACINTOSH™

Every Macintosh™ made since 1986 (i.e., any Mac Plus, SE, II, LC, Performa, Quadra, or PowerMac series Macintosh™) can be connected to the Internet. If you have a Mac 128K, Mac 512K, or Mac 512e, you will probably need to purchase a new computer to access most on-line services. Your Mac must have a hard drive with at least two megabytes (but preferably four megabytes) of open space. The computer must have at least 1 megabyte of memory, though four megabytes is preferable (so preferable, that we strongly recommend upgrading to at least four megabytes if you plan to be on-line very much). Though not required, a color monitor will enhance the usefulness of the service. Most commercial on-line systems use software that is only compatible with System 7.0 or higher. If you are using a version of System 6, you can request a free upgrade to System 7.0.1 from Apple, though many universities, computer stores, or local computer user groups also make the upgrade available for free. Or you may purchase the latest version of the Macintosh™ operating system, from most computer stores.

IBM-COMPATIBLES

Though it is possible to make IBM XTs and ATs Internet-capable by upgrading their memory, hard drive, and so forth, it is preferable to use an IBM-compatible with an Intel 80386, 80486, or Pentium microprocessor. The computer should have at least 1 megabyte of memory and a hard drive with 2 megabytes of open disk space, though it is preferable to have at least 4 megabytes of memory and 4 megabytes of hard disk space. In most cases, you will need an SVGA color monitor, though a VGA system will often suffice. While not essential, most users have also found a mouse (i.e., a small input device that is used to position the cursor on the screen, select menus and commands, and activate icons) to be very helpful. Access providers that offer Microsoft DOS™-compatible software (for example, America Online) usually require DOS™ version 3.3 or higher. However, we recommend upgrading to DOS™ version 6.0 or higher to assure compatibility with newer software and to gain access to several new features that make DOS™ somewhat easier to use. Similarly, if you are using Microsoft Windows™ version 3.0 or earlier, you probably should upgrade to Windows™ version 3.1. Windows™ 3.1 is less crash prone and has a greater degree of compatibility with commercial software. Many on-line systems use software that is only compatible with Microsoft Windows™ 3.1. Finally, because most IBM-compatibles are sold without built-in sound capabilities, you may want to consider purchasing a sound card (i.e., an expansion card that provides the circuitry necessary to play sounds and digital audio). Most computers and software packages are compatible with Creative Technology's Sound Blaster™ series of cards, but a number of other manufacturers also offer high-quality, compatible sound cards.

Once you've determined whether your computer is ready to access the Internet, you will need to purchase a modem (unless you already own one). The word *modem* is derived from the words "modulation/de-modulation." Modulation/de-modulation is the process of taking computer information, which is digital (i.e., a string of 1s and 0s), and turning it into analog signals, which look like radio waves displayed on an oscilloscope (see Figure 6).
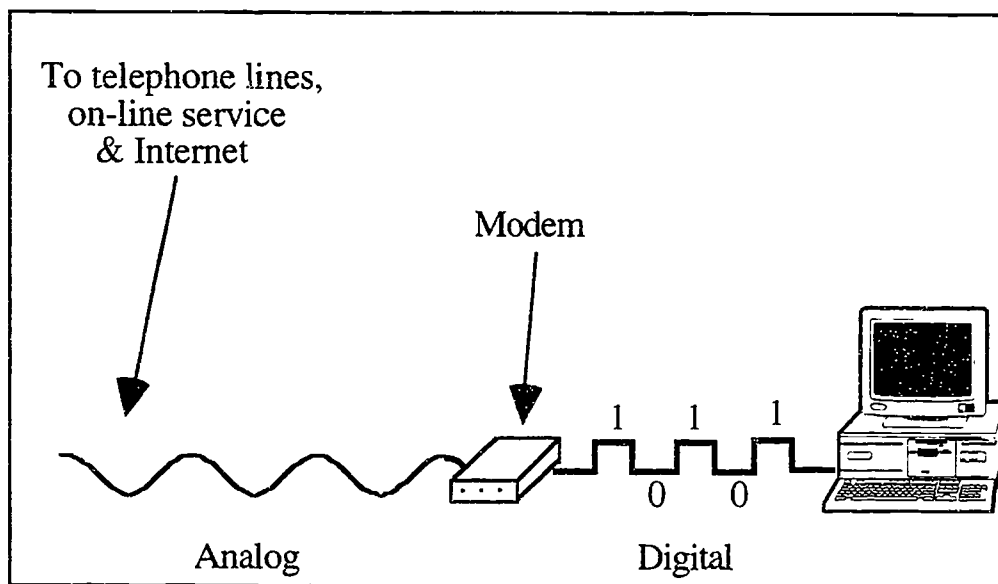
Figure 6. Modems convert information from the digital format used by computers to the analog format used by the telephone system, making communication between computers via phone lines possible.

This conversion is necessary because most phone lines in the United States cannot process digital information, only analog information. To send information from one computer to another via a regular phone line, the computer sends a stream of digital information to the modem, which converts it to an analog signal and sends it to the recipient's modem through a phone line. The recipient's modem receives the analog signal, converts it back to digital information, and passes it on to the recipient's computer for processing. This interaction takes place every time you dial into the Internet.

Modems have become a commodity item, so name brands will not tell much about their quality or features. Modems are distinguished by a few important features. Each modem is rated for the amount of information it can process per second. These ratings are stated in bits per second (bps) or bauds per second. Though slightly different in their meaning, modem manufacturers use these terms interchangeably. Generically, this rating is known as the modem's speed or throughput. Modems can be bought in speeds ranging from 300 bps to 56,000 bps. The most common speeds are 2,400, 9,600, 14,400, 19,200, and 28,800 bps. Faster is better—much better. Though the "raw speed" differences between modem speeds is relatively small, the effective difference is quite large because most modems use compression techniques to increase their effective speed (see Table 3).

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Table 3

Raw speed, effective speed, and cost of modems

Raw modem speed	Effective modem speed	Average price (Jan. 1995)
2,400	9,600	$40-50
9,600	38,400	$60-80
14,400	57,600	$80-100
19,200	76,800	$100-200
28,800	115,200	$150-500

As you can see, there is a significant price difference between 14,400 and 19,200 or 28,800 bps modems. In general, we suggest purchasing a 14,400 bps modem because of the excellent price/performance ratio and because most Internet service providers do not offer access at higher speeds. A computer can only send data to the service provider at the highest speed the provider supports. It is not unusual for service providers to support only 9,600 bps service right now (though most are upgrading to 14,400 bps). If you dial into a 9,600 bps service with a 14,400 bps modem, you will only get 9,600 bps throughput.

If you can spend an extra $50-$100, consider buying a 28,800 bps modem. Several on-line services are beginning to offer 28,800 bps service. If you buy a 28,800 bps modem, make sure that it is compatible with the "V.34" standard. The V.34 standard is the internationally recognized format for transmission of information at a raw speed of 28,800 bps. Several manufacturers offer modems that are compatible with the "V.FC" or "V.Fast" standards. These are not internationally sanctioned and may not work with V.34 modems used by on-line services.

Another feature of any modem is the type of commands that the modem will accept. Modems have a modicum of electronic intelligence; the computer can send commands to the modem to order it to do things like dial a phone number, hang up the phone line, or increase the data throughput. These commands must be stated in the right "language," or command set, for the computer to control the modem. Most modem makers have standardized their products to recognize the Hayes AT™ command set. Why does this matter? Many on-line services provide special software necessary to access their service using a modem. With few exceptions, Internet service providers program their software to send Hayes AT™ commands. If the modem does not understand the lingo, you will not be able to use the service's software or, consequently, the service. Most modem makers advertise that their products are "100% Hayes AT™ compatible," or something to that effect. If there is any doubt as to whether your modem is "Hayes compatible," ask the vendor before buying.

A final consideration is whether to buy a modem that is mounted inside the computer (an internal modem) or one that connects to a port on the back of the computer (an external modem). There are pros and cons to both approaches, depending on what type of computer is being used. Owners of IBM-compatible portable or laptop computers have a third choice: modems mounted on PC cards (also known as PCMCIA cards). PC cards are credit card-sized expansion cards that fit into a special slot on the computer. Unlike regular expansion slots, PC cards may be inserted and removed while the computer is on (in most, though

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not all, cases). All sorts of expansion options are mounted on PC cards, including additional memory, sound boards, and hard drive controllers. Most portable computer owners should choose either a PC card modem or an internal modem, because portables often have fewer ports (or no ports at all) than desktop computers. Having an internal or PC card modem on a portable also assures that the Internet can be accessed from anywhere—a decided advantage for practitioners who rotate between instructional sites during the course of a day. Internal modems for portables usually need to be installed by a professional computer service person.

For those who have desktop machines, there are trade-offs between internal and external modems. For IBM-compatible users, internal modems tend to be cheaper—as much as $20-40 cheaper. Internal modems for Macintoshes™ are generally more expensive than external modems. Internal modems save scarce input-output ports on machines that have few of these and may be installed by an experienced user who is already accustomed to working with jumpers and (on IBM-compatible computers) the config.sys and autoexec.bat files. External modems increase the clutter in one's computer workspace and add one more power cable that must be run to your computer's surge protector, but they are easier to set up. There is no clear preference here. However, for first time users who are still learning to use their computers, we generally recommend external modems. If you are not comfortable mucking around with the guts of your computer, stick with an external.

No matter what type of modem you decide to purchase, make sure to order one that is compatible with the type of computer you own. Internal modems for IBM-compatibles will not work with Macintosh™ computers and vice versa. In fact, an internal modem for Macs will not fit into an IBM's expansion slots and vice versa. External modems are a bit trickier. Any external modem can be used with any computer if you have the right cable and software. However, new external modems are bundled with the software and cable that are appropriate for either an IBM-compatible computer or a Macintosh™.

One final thought before we move on to other topics. For an additional $15-30, it is possible to buy a modem with fax capability. While we will not discuss setting up a modem to send or receive faxes, the additional cost is so small and the potential benefits so large that it is foolhardy to buy anything but a fax/modem. Even if you can't envision a use for the fax capability today, you probably will someday soon.

TELEPHONE CONSIDERATIONS

The hardest part about getting onto the Internet is usually not getting the computer and modem to work, but getting the phone line issues resolved.

First and foremost, modems and multi-line telephone systems (sometimes called PBXs) do not mix. It is not possible, without altering your phone system, to connect a modem to a multi-line phone system. How do you know if your program is using a multi-line phone system? If, to dial a number outside your organization, you must choose a phone line by pressing a button on your telephone, you are using a multi-line phone system. If you connect the telephone wire that leads to your multi-line telephone to your modem, you can damage the modem, the computer, and potentially the phone system. Why is

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this so? There are two reasons. First, modems have a limited degree of intelligence; they can produce the tones necessary to dial a phone number, but they do not have the circuitry necessary to choose between multiple phone lines. Second, multi-line phone systems send a small current down the telephone wire to power the circuitry in a multi-line telephone. Modems pipe this current directly into chips and circuits that are not supposed to receive power, so they burn out. If you are at all unclear whether your telephone system is a multi-line system, contact the person who maintains your telephones or your local telephone company.

If you are in a building that has only multi-line telephones, you have two choices. The first is to have the telephone company (or whoever installed the multi-line system) install what is known as a line splitter or modem adapter. A line splitter creates a pathway around the multi-line system that the modem can safely use. In some cases, this is an effective solution. However, while you and your modem are using one of the five or ten lines normally available to your multi-line phone system, that line will not be available for use by others in your office. In many cases, line splitters are not the most inexpensive solution. For example, a participant in NCAL's networking research project found that it would cost $685 to install a line splitter on the system but only $150 to have a new line installed (plus monthly maintenance fee). If you choose to have an additional line installed, remember to factor in the cost of running wires from wherever the telephone company installs the wire from the outside world to wherever the computer is located.

Another popular solution to the phone line conundrum is to let the modem share a telephone line used by a fax machine (if you have one). Fax machines have a similar aversion to multi-line phone systems (fax machines are nothing more than a modem attached to a copier), so any line that a fax machine can safely use, a modem can safely use. The most obvious problem with this solution is that two different machines will be contending for use of the same telephone line. If the fax is in use, you will not be able to dial out to the Internet. If you have dialed out to the Internet, no one will be able to send a fax, and those trying to dial your fax machine will get a busy signal. However, if your organization receives relatively few faxes or if you intend to access the Internet primarily during nonworking hours, this may be an ideal solution.

There are a couple other phone line issues to consider. First, if you want to allow more than one staff member to be connected to the Internet simultaneously, you will need to have additional phone lines installed, because you must have one phone line for each simultaneous connection. Second, if the organization has only one or two phone li 's, DO NOT connect your modem to the main phone line. If you are on-line, no one else will be able to contact your organization. Finally, if the phone problems are too daunting within your organization or place of business, consider using your home computer to access the Internet. Connecting from home is usually less complicated (at least from the telephone perspective) than connecting from your organization.

THE MECHANICS OF HOOKING UP

Once you've acquired all of the equipment necessary to go on-line, the last step is actually to connect the modem to the computer and telephone system. Because most people will opt for an external modem, we will only address

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connecting external modems. If you want to use an internal modem but feel something akin to terror every time you look inside the computer, have a local computer professional do the work.

Before you begin, familiarize yourself with the ports on your modem (see Figure 7). In general, every modem has four ports on the back: one for the power cable (which often has a designation like "9VAC" or the symbol --- over or under it); a large rectangular multi-pin port (an RS232 port) that is used to connect the modem to the computer; and two telephone connector ports (known as RJ11 ports), one of which is usually marked "line" and the other "phone." Don't be alarmed if your modem does not designate which RJ11 port is "line" and which is "phone"; on some modems, the ports may be used for either function.
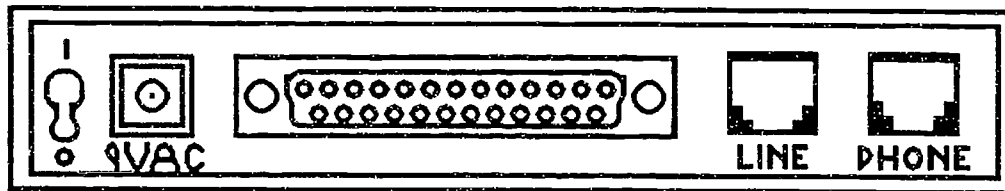
Figure 7. Ports typically found on the back of a modem. Sometimes there is also a switch on the back of the modem to turn it on and off, though this could also be located on the front of the modem.

You are now ready to begin set-up. The first step is to connect the power pack to the modem. This is usually straightforward. However, be sure to use only the power pack that came with the modem originally. Modems often use strange current and voltage combinations. Do not risk damaging the modem by using a power pack from a game, toy, or appliance.

Next, connect the modem to the telephone line. Usually, the telephone company places a box or plate on the wall to which you will connect the modem. Normally, this box or plate has a single RJ11 port built into it (i.e., a port that looks like the "Phone" or "Line" ports in Figure 7). However, some older buildings have plates with four holes in a trapezoidal pattern. If you have a wall plate like this, you will need to buy an adapter before proceeding. One end of the adapter has four prongs; the other end has an RJ11 port. Most telephone and electronics stores have such adapters. Once you have found the wall plate and installed the adapter (if necessary), you are ready to begin. If this is a new phone line, simply use the telephore cable provided with the modem to connect the modem's "line" port to the wall box or plate. (By the way, there is nothing special about the telephone wire that comes with the modem. If the wire provided is not long enough, you can buy a longer extension from almost any telephone or electronics shop.)

If, however, you plan to have the modem share a telephone or fax line that is already in place, you will need to take a few additional steps. First, disconnect the existing phone or fax from the wall box or plate. Once this is done, connect the modem's "line" port to the wall box or plate with the wire provided with the modem or with a longer extension bought separately. Next, connect the phone or fax machine to the port labeled "phone." Once you've completed these steps, you should be able to use the fax or phone just as before. Remember, if the modem is in use, the phone or fax cannot be used; if the phone or fax is in use, the modem cannot be used.

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At this point, you are ready to connect the modem to the computer itself. The modem is connected to a serial port on the computer ("serial" here refers to the way the data is transmitted to the modem). Since the procedure is different for Macs and IBM-compatibles, we have provided separate instructions for both.

APPLE MACINTOSH™

The modem cable provided with a Macintosh™-compatible modem has two very different connectors—one is rectangular and the other is round—so it is impossible to connect the cable improperly. To connect the modem to the computer, start by joining the large, rectangular connector to the modem (this connector has 25 pins in two rows). Note that this connector can be joined to the modem in only one way—the shape is such that it cannot be connected upside down. Once the connector is firmly seated on the modem, tighten the screws on either side of the connector to make sure that the cable cannot be pulled out accidentally. As with other computer cables, if the modem cable is disconnected while the computer and/or modem is on, it is possible to damage the computer, the modem, or both.

Now look at the back of the Macintosh™. There are several different round ports on the back. The serial port for the modem has an icon above or below it that looks like this: . Turn the round connector so that the flat part of it is facing up and insert it. The modem is now ready to use.

IBM-COMPATIBLE

The cable provided by the modem manufacturer may be one of two types. One type has a rectangular 25-pin connector on one end and a smaller 9-pin rectangular connector on the other end. The second variant is a cable that has two rectangular 25-pin connectors that are exactly the same. If you were provided with a cable that has two 25-pin connectors, you should also have received an adapter that has a 25-pin rectangular plug on one end and a 9-pin rectangular plug on the other. If you did not receive this adapter with your modem, you'll need to get one from a computer dealer. Tell the dealer that you need a 25- to 9-pin adapter. In any event, the resulting cable should have a 25-pin rectangular connector on one end and a 9-pin rectangular connector on the other.

You are now ready to begin. First, insert the 25-pin rectangular connector into the port on the modem. Note that this connector can also only be joined to the modem in one way—the shape is such that it cannot be connected upside down. Once the connector is firmly seated on the modem, tighten the screws on either side of the connector to make sure that it will not be pulled out accidentally. As with other computer cables, it is possible to damage the computer, the modem, or both if the modem cable is disconnected while the computer and/or modem is on.

Next, look at the back of the computer. There are usually two or three rectangular ports on an IBM-compatible. One port is usually reserved for the

monitor and will have a symbol something like this: ▢ . Do not connect the modem to this port; you could damage your computer, modem, or both. The serial ports are labeled in a variety of ways. Some are labeled as "COM 1" and "COM 2" or "COM A" and "COM B." Others are simply labeled "A" and "B" or "1" and "2." In recent years, IBM has labeled serial ports with a symbol like

this one: ⊐⌐⊐ . If you cannot find an appropriate 9-pin port, check the computer's manual under "serial port" for more information. A few manufacturers do not use a 9-pin port for a modem; instead they use a 25-pin port just like the one on the modem. However, you cannot assume that a 25-pin port is a serial port. Always consult your owner's manual before connecting a modem to any port that has more than 9 pins or that is not labeled as discussed above. Connecting the modem to the wrong port can damage your computer, modem, or both.

Once you've found the correct port, insert the 9-pin end of the modem cable into the port. If the 9-pin end has screws to secure the plug, make sure to tighten them. The modem is now ready to use.

OTHER MODEM HINTS

Before leaving the topic of modems, we will conclude with a short discussion of the LED indicator lights found on the front of most external modems. The LEDs on most modems provide information about what the modem is doing at any given moment. There are normally eight lights on the front of a modem. Each light is labeled with an industry standard acronym. Below is a representation of a typical modem's LED layout.

HS	AA	CD	OH	RD	SD	TH	MR
•	•	•	•	•	•	•	•
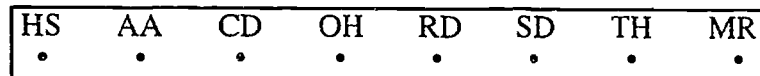
Figure 8. Arrangement of LED indicator lights on most modems. Some cheaper modems do not have all of these LEDs (for instance, some companies use one light instead of two for RD and SD). Here is a guide to what each light indicates:

HS: High speed. When illuminated, indicates that the modem is operating at the highest speed supported.

AA: Automatic answering. When illuminated, indicates that the modem is ready to answer incoming calls (usually not illuminated unless the computer is set up to receive faxes).

CD: Call detect. Illuminated whenever a call is being processed.

OH: Off hook. When illuminated, indicates that the modem has taken the phone line "off the hook." This light stays illuminated from the beginning of a call to the end of a call. If OH is illuminated when the modem is not in use, it is an indication that the modem has malfunctioned (normally, turning the modem off and then on again will fix this problem). If someone attempts to call the modem's phone line while OH is illuminated, there will be a busy signal.

RD: Receive data. This light will flash on and off as the computer receives data from the on-line service's computer.

SD: Send data. This light will flash on and off as the computer sends data to the on-line service's computer.

TR: Terminal ready. Indicates that the cable between the modem and computer is in good working order and that the computer is ready to communicate with the modem.

MR: Modem ready. Indicates that the modem is in working order and is ready to communicate data between the user's computer and the on-line service's computer.

The most useful lights are those labeled OH, RD, and SD. As long as OH is lit and RD and SD flash on and off at regular intervals, you can be sure that the modem connection is working properly.

CHOOSING AN ON-LINE SERVICE

Having a functioning and properly configured modem is rather pointless unless you have an account with an Internet access provider. There are literally hundreds of companies and organizations that provide access to the Internet. The competitors range from Fortune 500 corporations like CompuServe® to garage operations like Philadelphia's FishNet to small (but growing) community-based organizations (CBOs) like Cleveland FreeNet. Network access providers are primarily differentiated, however, by the type of user interface they offer, the level of Internet access they provide, and cost.

USER INTERFACES

A user interface is the set of controls, both physical (e.g., the mouse and keyboard) and graphical (e.g., cursors, buttons, input boxes, etc.), that allow the user to dictate the actions of the computer and other devices connected to the computer, like the modem. User interfaces are not unique to the Internet. Every time you turn on a computer, you interact with a user interface.

There are generally two types of user interfaces: command-line interfaces and graphical user interfaces (GUIs). The most obvious example of a command line interface is Microsoft DOS™. To control the co..puter, commands (strings of numbers and letters, often in the form of English words, that cause the computer to take some action) must be typed into the computer. Most Internet command-line interfaces look something like the one displayed in Figure 9. Each item is represented by a title; the item's type (i.e., file, directory, searchable database, etc.) is denoted by a symbol or abbreviation at the end of the title (here a period or "/"; in other cases, two or three letter abbreviations). To manipulate a file or directory, you move the arrow and/or cursor (the black box next to the arrow in Figure 9) up and down the screen using the keyboard. All commands are entered using the keyboard (in this example, pressing "?" brings up the "help" menu).

```
┌─────────────────────────────────────────────────────────┐
│        Internet Gopher Information Client 2.0 p18        │
│                                                         │
│         National Center on Adult Literacy (NCAL)        │
│                                                         │
│  --> █ 1.  A.  Intro For First Time Users.             │
│        2.  B.  Info - NCAL & LRC Programs/               │
│        3.  C.  NCAL Newsletter/                          │
│        4.  D.  NCAL Research Documents/                  │
│        5.  E.  Research Project Abstracts/               │
│        6.  F.  Adult Literacy Commercial Software Database/ │
│        7.  G.  Adult Literacy Free/Shareware/           │
│        8.  H.  NCAL/PBS-Videoconference/                 │
│        9.  I.  Upcoming Adult Literacy Events/           │
│       10.  J.  Literacy LISTSERVs and USENET Groups/     │
│       11.  K.  Federal Literacy Legislation/             │
│       12.  L.  State Literacy Agencies and Information/  │
│       13.  M.  Links to Other Literacy Resources/        │
│       14.  N.  Links to Other Gophers/                   │
│       15.  O.  More Info on Using Gopher.                │
│                                                         │
│                                                         │
│                                                         │
│ Press █ for Help, █ to Quit, █ to go up a menu          │
└─────────────────────────────────────────────────────────┘
```

Figure 9. Most command-line interfaces for on-line services will look similar to this example.

Because command line interfaces do not require color monitors or much computing power (because they do not display graphics, which is one of the most computationally intensive tasks a computer does), they are often preferable for older IBM-compatible computers, like XTs/ATs and those using Intel 80286 processors. There is no real advantage to using a command-line interface on an Apple Macintosh™, no matter how old. Macs were optimized for display of GUIs from the very beginning. However, learning to use a command-line interface often requires the time, dedication, and perseverance required to learn a foreign language. And, as was mentioned earlier, the truly interesting uses of the Internet and electronic networks in general require color and graphics. Command-line interfaces cannot deliver multimedia information—only text. For these reasons, we generally do not suggest using an on-line service that relies on a command line interface.

As computers have become both more ubiquitous and more powerful, GUIS have become the norm in computing and on the Internet. GUIs are popular because, when well designed, they can be used intuitively. Most GUIs incorporate windows, buttons, text fields, and icons to indicate what the user can do at a given point in a program and where information should be entered. Each icon, when consistently used in a program, has a specific meaning or will consistently cause the computer to take the same action. For instance, in Figure 10, the folder icon represents a level in the hierarchical filing system on this Internet server.

4~2

```
 File   Edit   Gopher   Setup   Recent
≣▣≣▬▬▬▬▬ Home Gopher Server 1 ▬▬▬▬▬≣▣≣
▼   Internet Gopher ©1991–1994 University of Minnesota.

🗂📁Information About Gopher                                          ⇧
   📁Computer Information
🗂📁Discussion Groups
   📁Fun & Games
🗂📁Internet file server (ftp) sites
🗂📁Libraries
🗂📁News
🗂📁Other Gopher and Information Servers
🗂📁Phone Books
   ❓Search Gopher Titles at the University of Minnesota
   ❓Search lots of places at the University of Minnesota
🗂📁University of Minnesota Campus Information               ⇩
⬅▥▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒➡▣
```

Figure 10. Graphical user interfaces (GUIs) for most on-line services include components such as those displayed above: icons, windows, menus (i.e., "File" at the top), and pointers (i.e., the black arrow at the top).

Whenever the folder icon is visible, it is safe to assume that by double clicking on it, a new window will be displayed containing more folders, information files, or special search icons (like the squares with question marks in them seen above). Using a GUI, you do not need to remember arcane commands in order to navigate the Internet. You only need to remember what certain icons mean, and the icons themselves will help you remember because they associate complex things (like data filing hierarchies) with more familiar things (like file folders and filing cabinets).

Four of the five large, commercial on-line services (America Online, CompuServe®, GEnie®, and Prodigy) use GUIs. The major exception is Delphi Internet Services, which at the date of this writing offered only a command-line interface. All of these companies offer their interface software for free or for a small charge. Smaller service providers and FreeNets (see below for more details on FreeNets) also tend to offer only command-line interfaces.

Please Note: If you decide to use a service that offers a command-line interface instead of a GUI, make sure to read Appendix B, because you will need to configure and use terminal emulation software.

ACCESS OPTIONS

On-line services can also be classified by the type of access they offer to the Internet. Broadly speaking, there are three types of services: dial-up e-mail, dial-up IP (Internet Protocol), and dial-up Internet. Services that offer dial-up e-mail, as the name suggests, provide only e-mail access to the Internet. While one may access a growing number of databases via e-mail, dial-up e-mail

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accounts do not offer access to the most powerful Internet tools—especially those used for information search and retrieval.

Dial-up IP accounts offer full access to all the Internet's tools and data sources, but add a level of complexity having to do with the TCP/IP networking protocol (i.e., the networking language used on the Internet) and the software one needs to make such a connection work. One may graduate to dial-up IP services after using the Internet for a while, but we would not suggest starting at this level.

Dial-up Internet accounts are a hybrid; they offer full Internet access without adding the additional headache of dealing with TCP/IP or finicky serial IP software. Dial-up Internet providers reduce the level of complexity by developing special interface software that "hides" some of the complexity found in a dial-up IP account. Expert users may find dial-up Internet accounts frustrating because they do not offer access to more sophisticated tools. For a beginner, however, a dial-up Internet account is ideal. The most prominent examples of this type of account are America Online, Prodigy, and Delphi Internet Services.

The type of interface and type of Internet service are the most important criteria for selecting an on-line service. Table 4 illustrates the interface and type of Internet service offered by the major access providers. For first-time network users, the ideal services are those that fall into the upper lefthand box. Services in the upper lefthand box provide a wide range of Internet services and content via an easy-to-use GUI.

Table 4

On-line provider interface and service options

	Dial-Up Internet	Dial-Up E-Mail	Dial-Up IP
Graphical Interface	America Online CompuServe® Prodigy	Some CBO Systems	For experts only
Command-line Interface	Delphi Internet Services GEnie® Most FreeNets	Some FreeNets Small providers	For experts only

America Online is in the upper left hand box because it offers access to more Internet tools than any other national service provider (as of this writing) through a graphical user interface and dial-up Internet services. Prodigy also offers a GUI and access to one of the newest and most exciting Internet tools, World-Wide Web (see Part V). Delphi Internet Services offers the most comprehensive set of Internet tools, but only through a command-line interface not a GUI.

If you have a Macintosh™, you should be able to use any on-line service that fits into the upper left hand box, though you may need to increase the computer's memory and/or upgrade to System 7.

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If you have an IBM-compatible that cannot run Microsoft Windows™, your best option is to seek a service in the lower left hand box, though we would strongly recommend upgrading your computer to Windows™ if at all possible. Anyone with Windows™ will be able to use any on-line service that fits into the upper lefthand box.

The final consideration is cost. There are two components to cost. The first is obvious; each service charges users a flat fee per month for three to five on-line hours during that month. Delphi Internet Services, for instance, charges $10 per month for four hours of service during the month. Additional hours of service may be purchased, but at a significantly increased cost. Delphi charges $4 for each additional hour over the first four. Most services start metering on-line time the second the user establishes a link to the service's computer and only turns off the meter when the computer hangs up the phone. On top of this fee, there may also be surcharges levied for "premium" services, which may include Internet options. (Delphi, for instance, levies a $3 per month surcharge for using their Internet services.) Before choosing a service, be sure to find out if it levies surcharges for Internet access. Until recently, several services charged the user for each Internet e-mail message received, so be sure to read the fine print.

The second component of cost is less obvious: telephone costs. Most on-line services have local access numbers—local telephone numbers that may be called to gain access to the on-line service without incurring long-distance charges. If you live in a major metropolitan area (i.e., one of the 200 largest cities in the United States), there will almost certainly be a local access number, thus making telephone costs an insignificant part of total cost. If you live in a smaller city, rural area, or U.S. territory, there probably is not a local access number and you may incur significant long-distance charges. So far, none of the major on-line services offers an 800 number for users in small towns or rural areas, though America Online has announced its intention to offer such a service in 1995 (there will be a surcharge for using the 800 number, however). If none of the "ideal" services offer local access numbers in your area, try searching through Appendix C for a smaller access provider in your area.

If the ideal service does not offer a local access number, there are other strategies to pursue. First, see if there are other on-line users in your area. Some services will install a local access number if you can show that there is enough interest. Another tactic is to approach the local telephone company or your long distance carrier to find out if they would provide an in-kind donation of long distance time to help you get on-line. This approach may be especially successful if the phone company or long distance carrier is itself in the Internet business (as MCI and Sprint are now). Finally, most universities, a growing number of community colleges, and some large corporations have access to the Internet. Many of these institutions provide their affiliates dial-up access to the Internet. In some cases, it is possible to negotiate with these organizations for a free or low cost connection. Most of these "second-best" solutions will not provide you, but they will allow you to get connected to the Internet at a reasonable cost.

One final word regarding on-line services. NCAL is often asked to recommend an on-line service for use in adult literacy programs. We have established several criteria for our recommendations, including the amount of proprietary content related to adult literacy, ease of use, number of Internet

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features offered by the service, generosity of introductory offers, and cost. As of this writing, NCAL recommends America Online (AOL), because it offers 10 free hours of service to new users, has an easy-to-install and easy-to-use interface, and has several proprietary information resources and communication groups devoted to adult literacy. Delphi Internet Services offers a full range of Internet services, but uses a command-line interface, offers only five free hours of use during the introductory period, and is slightly more expensive than AOL. However, Delphi is the best service by far for users of older IBM-compatible computers that cannot run Microsoft Windows™.

The National Center on Adult Literacy (NCAL) does not receive funding or in-kind support from the organizations listed above. NCAL's recommendation of these products does not constitute an endorsement of the products or services.

PART V AN INTRODUCTION TO INTERNET COMMUNICATION AND INFORMATION RECOVERY TOOLS

Now that you have the "big picture" about the Internet, it is time to begin exploring the "Net." Though modems and telephone lines are essential, the software "tools" that help you communicate with other Internet users and recover information from servers around the Net make the wires and hardware come to life. This section will introduce the following Internet communication and information discovery tools:

- E-Mail,

- LISTSERVs and USENET Groups,

- Telnet and FTP,

- Internet Gopher Servers, and

- World-Wide Web.

Each tool has a slightly different use, and each is more effective when used in concert with others. So, even if you are really only interested in e-mail, read on. You will be able to use e-mail more effectively if you are familiar with the other tools as well.

Unfortunately, it is not possible for us to provide comprehensive, step-by-step guides to using each of these information tools. Each on-line service provider uses a slightly different interface with slightly different features and commands. We will provide an overview of how each tool works and what can be done with a given tool once you become familiar with it.

For the following discussions to be useful, you will first need to become familiar with your on-line service. Make sure that you can dial into the system successfully and can find a few resources on-line—for example, the on-line help desk, if your service offers one. Get a feel for the commands or icons that

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are common to all parts of the service. Also be sure to review any Internet-related documentation provided by the service, as these documents will help you translate the general instructions provided here into specific commands for the service being used.

INTERNET TOOL MODELS

Two Internet tool models, the mainframe-terminal model and the client-server model, provide the organizing concepts for the way all Internet tools work. The older of the two, the mainframe-terminal model, was based on the assumption that data processors (the predecessors of today's microprocessors) were and would remain very expensive to build and maintain. From the 1940s to the 1970s, this was true. Computers (often referred to as mainframes) required elaborate electrical and cooling systems to keep them running. People interacted with the mainframe using a terminal instead of a personal computer. Terminals look somewhat like today's personal computers but had no processing power. Terminals can do only two things: They can send information entered on the keyboard by a user to the mainframe for processing, and they can display information sent from the mainframe to the user on the screen (hence the term "dumb terminal"). Dumb terminals were used because it would have been prohibitively expensive to provide each terminal (and thus each user) a data processor. As a result, the mainframe was responsible for all computer functions—processing data, storing information, coordinating movement of information from the hard disk to the user over the network, and so forth.

This model was fairly efficient when the terminals were connected directly to the mainframe. But when networks came into the picture, this model became less efficacious. Every time a user in California, for instance, tapped a key on her/his terminal while logged into a computer in Europe, the European computer had to send many, many instructions to the California user's terminal—to re-draw the user interface, request more information from the user, and so forth. Instead of moving data from computer to computer, the network was moving instructions and commands. These flows of commands and instructions are sometimes known as network overhead. Network overhead tended to clog up the Internet, slowing the speed at which all users were able to retrieve information or communicate with one another. However, this was the only cost-effective networking model while data processors remained expensive.

When inexpensive microprocessors became available in the late 70s and early 80s, it become economically feasible to use microcomputers as terminals. Since personal computers have data processing capabilities, it soon became apparent that a division of labor between the terminal and mainframe would be a more efficient way to transmit information over a network. This division of labor became known as the client-server model. The client-server model dramatically reduces network overhead, speeding up transmission of data from repository to user.

In the client-server model, information providers like NCAL, the federal government, the Associated Press, and so forth, store their information on special computers known as servers. Servers use computer hardware and software that is specially designed and "optimized" for transmission of data across networks. Servers are responsible for fielding requests for information,

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recovering that information from their hard drives, and coordinating delivery of the requested information to the user.

People seeking to recover information from a server use client software. Client software has two roles. First, the client software creates a user interface for the system, usually consisting of icons, text fields, and buttons. The client translates user actions (like clicking on a document icon, for instance) into commands to the server ("send a copy of document X to this computer"). The client's second role is to manage incoming information flows from the server, directing them to the proper part of the user's computer. For instance, if the server sends an alert that a requested document is not available, the client must display the proper message on the screen. If the server sends a document, the client must ask the user where the document should be stored on the hard drive. Since both the server and client are designed to do very specific tasks, they can do those tasks very rapidly and accurately. The network overhead between client and server is very small, because the client sends only terse requests for information and the server replies by either sending a short "not available" message or the requested information. As a result, information can be transferred more rapidly across the network than in the mainframe-terminal model with less "waste" of throughput on network overhead.

Of the Internet tools to be covered in this document, Gopher, most e-mail systems, the USENET bulletin board system, and FTP are built on the client-server model. Telnet is built on the mainframe-terminal model.

SOFTWARE TOOLS FOR COMMUNICATION AND RETRIEVAL

E-MAIL

E-mail is the godfather of all Internet tools. When the DOD was developing strategies for communication during and after a nuclear war, e-mail was expected to be one of the principle means of communication. As we have discussed before, e-mail is primarily a form of one-to-one communication on the Internet.

E-mail and postal mail are actually quite similar. E-mail is used to deliver text to other correspondents, just like postal mail. Instead of writing the letter by hand or typing it on a typewriter, the letter is composed on a computer using a text editor (i.e., software that allows one to enter and edit text) built into the user's e-mail client software. E-mail messages, like regular letters, must be addressed properly to arrive at their destination (see below for more information on e-mail addressing). When an e-mail message is sent over the Internet, it goes to the recipient's e-mail box (also known as an e-mail account) on a large server. Most servers maintain hundreds or even thousands of e-mail accounts for users, just as post offices in major cities house thousands of post office boxes. Also like a big-city post office, e-mail servers are open 24 hours a day. Day or night, the e-mail server is waiting to process incoming or outgoing messages.

There are, of course, some significant differences between postal mail and e-mail. Unlike the post office, the e-mail server will let you know when a new message has arrived in your box. When a server receives a new message, it reads the address and stores the message on its hard drive in a special location

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reserved only for that recipient's e-mail. When the recipient logs into her or his e-mail account, the server notifies the user that a new message has arrived. Many e-mail accounts will immediately tell the user that a new message has arrived by flashing a message across the screen or making a sound.

Creating a new e-mail message is very easy. On most GUI clients, you will only need to find the menu or button marked "Mail" or "E-mail." Normally, GUI clients will then offer a set of buttons that allow you to read e-mail or create new e-mail messages. To compose a new message, click on the button labeled "New," "Compose Mail," or something similar.

On command-line clients, you must usually first ask the computer to start the mail software by typing in a command, which might simply be "mail," or it could be "elm," "pine," or some other command ("elm" and "pine" are the names of popular e-mail programs used on UNIX™ computer systems; most command-line services use computers running the UNIX™ operating system). Once the e-mail program is running, you will then need to enter a second command to compose a message. This command may be "mail" or "compose," depending on your service.

The next step is addressing the message. Addressing an e-mail message is relatively simply: You type in a string of letters, numbers, and symbols in a field (GUI) or next to a cursor (command-line) marked "TO:". Most e-mail programs allow you to enter multiple addresses in the "TO:" field, usually by placing a comma between addresses. In most cases, you should not add a space after the comma and before the next address. Most e-mail programs also allow you to send "carbon copies" (i.e., CCs) to any number of additional address by entering the "CC'ed" individuals' e-mail addresses in the field or next to the cursor marked "CC:".

At this point, we will discuss the parts of an e-mail address and how they may help you find information about people with whom you communicate. E-mail addresses have two parts divided by an "at" sign (@). For instance, if John Doe worked for NCAL, his e-mail address would be

<div align="center">doe@literacy.upenn.edu</div>

Information to the left of the "at" sign is known as the user name. In many cases, the user name is an abbreviated form of the person's real first and last name. Information to the right of the "at" sign identifies the computer on the Internet where this message should go. This is usually known as the e-mail server's domain name.

Why are there two parts to an e-mail address? First, because an e-mail server can maintain hundreds or thousands of e-mail accounts. If the message were simply addressed to literacy.upenn.edu, the computer would not know which of its many accounts should receive the message. It would be like sending a regular letter to "World Trade Center, New York, NY", the postal workers at the World Trade Center would not know which office should receive the letter. Second, there are millions of people sending and receiving e-mail on the Internet. Since there could be hundreds of John Does on the Net, the address must include information about where this particular John Doe has his e-mail account. This is analogous to the way phone books solve the problem of telling all the John Smiths apart. The phone company includes an address to

<div align="center">49</div>

indicate where a particular John Smith lives, thus providing readers enough information to choose the right number.

The domain name portion of an e-mail address also carries some useful, nontechnical information. The term farthest to the right in a domain name indicates the type of organization that provides this person's e-mail account. For instance, edu indicates that John Doe's e-mail account is located on a computer owned by a U.S. educational institution. Other common right-most terms in e-mail addresses for people in the United States are com for companies and corporations; gov for local, state, regional, or federal government departments or agencies; mil for U.S. military forces and agencies; and org for any other organization that does not fit these descriptions (primarily non-profit organizations). The term farthest to the right in non-U.S. e-mail addresses does not indicate the type of organization; instead, it indicates the country where the e-mail account is located. For instance, the fr in an address like degaulle@elysee.fr would indicate that this e-mail account is located in France. Mx is the term for Mexico, de for Germany, uk for Great Britain, and so forth. See Appendix D for a list of international e-mail country code .

The term second from the right indicates the person's institutional affiliation. In our example, this was upenn. Upenn is the Internet abbreviation for computers at the University of Pennsylvania. In most cases, the institutional affiliation portion of a domain name is a shorthand used for the institution's real name—ed is the U.S. Department of Education, usaf is for the U.S. Air Force, and so forth.

Terms that fall third, fourth, fifth, or more from the right tell something about the person's affiliation within the organization (though not every address has three or more terms). In our example, the third term from the left was literacy, which is shorthand at Penn for the building where NCAL and the International Literacy Institute are located. In many universities and corporations, the third term indicates the person's department. Thus if you know a person's e-mail address, you can infer a great deal about their institutional affiliation and even their field of work or specialization.

How will you know what your e-mail address is if the service didn't tell you already? Contact your on-line service provider. Many services also provide, as part of their on-line help facility, a technical assistance person who can provide the address. In some cases, it is possible to ask the on-line service's computer directly. In Appendix E, information is provided on how to determine what your e-mail address is if you use America Online, CompuServe®, Delphi Internet Service, GEnie®, or Prodigy.

How do you find e-mail addresses of people you already know or of people who are interested in the same topic but may not know you personally? Other Internet tools become very useful for this type of information discovery, especially LISTSERVs, USENET groups, and Gopher information servers. The following sections will discuss how these resources can be used to discover e-mail addresses. However, the Internet community has yet to develop any resource comparable in scope or comprehensiveness to the White or Yellow Pages, though a number of organizations are working on this problem. In any event, the best way to find a person's e-mail address is to contact the person directly. Old-fashioned technologies, like the telephone, still have uses in the Information Age!!

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Once the message is addressed, the next step is to enter text in the body of the message. If you are using a GUI client, you normally need only place the cursor in the field labeled "Body" (if there is no field labeled "Body," the largest box should be the field for body text). Most e-mail packages limit the size of your message to less than 32 kilobytes of information (about 5 pages of unformatted text), though some impose no limits whatsoever. As a rule, when sending e-mail, you should not add any formatting to your messages (i.e., do not use tabs, bolds, italics, etc.), because you never know if the person receiving the message will have software that understands the special symbols used to indicate formatting. A completed message will look something like those shown in Figure 11.1 and Figure 11.2 below.
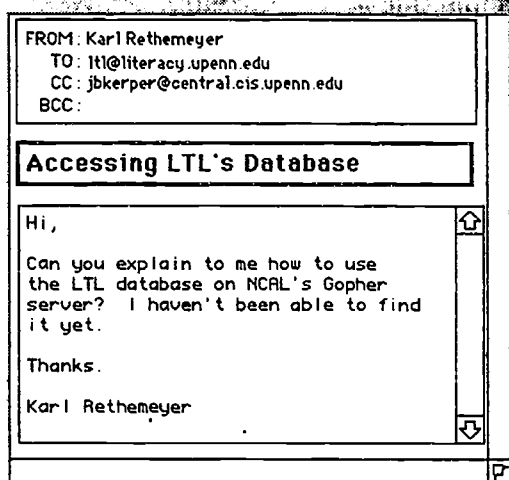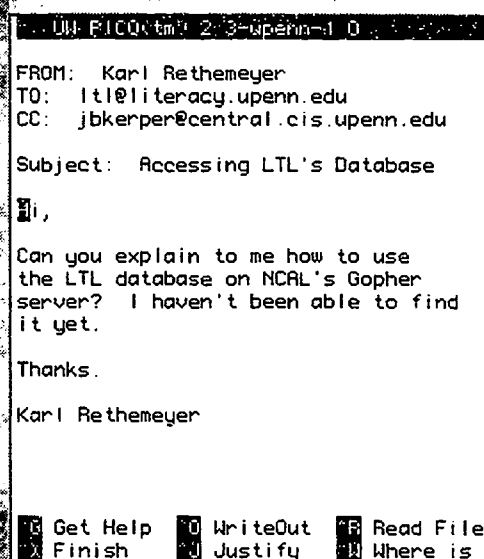
Figure 11.1   Figure 11.2

Example of a GUI e-mail form (left) and a text editor used to compose e-mail messages on a command-line service (right).

Once the body is complete, you are ready to send the message. In GUI clients, this is done by clicking on a button marked "Send"; in command-line clients, this is accomplished by entering a command, usually "send." Depending on what type of service you use, the message should arrive at its destination within no more than hour, though most systems will deliver the message almost instantaneously.

Reading e-mail is even easier. In GUI clients, this is usually done by opening the e-mail software, clicking on a button labeled "Read" or "Read Mail," and then selecting a message from a list presented by clicking on the message's title. In command-line clients, the software will normally list all the new messages once you open the client. There are two common ways to ask the software to display the contents of a message. One is to enter the "read" command followed by a space and the line number of the message. Another is use the arrow keys to move the cursor or highlight bar until it points to the message you want to read and then enter the "read" command or simply hit the return key. Once you've read a message, it is possible to leave it in your "mailbox," store it on your hard drive or floppy disk, print it out, or delete it.

5 1

Finally, there is an additional use of e-mail besides sending messages back and forth: transferring formatted documents or software from one user to another. Though FTP (see below) is the tool of choice for transferring software and formatted documents, not everyone has access to FTP. As a result, many e-mail packages include the ability to attach "enclosures" to a message. Almost any type of electronic information may be sent as an enclosure. However, sending enclosures is tricky because you or your e-mail package must first encode the enclosure using special software like BinHex or UUEncode and you must know whether the person to receive the enclosure has the ability, either through her or his e-mail package or through a separate piece of software, to decode the enclosure. Check your service's documentation for more information about using the enclosures feature; encoding and decoding is discussed in greater depth in Appendix G.

LISTSERVS

LISTSERVs are one of the most heavily used forms of one-to-many communication on the Internet. LISTSERVs (sometimes called simply "lists") are e-mail-based systems that allow interactive communication among a group of individuals who have elected to join the list by "subscribing" to it. LISTSERVs generally have a theme or a topic—anything from issues in adult literacy or educational technology to skiing, video games, or TV shows. Most LISTSERVs have a moderator who screens out messages unrelated to the LISTSERV's topic. As with e-mail addresses, the most vexing problem with LISTSERVs is that there is no central registry where you might search for a LISTSERV relevant to the area in which you are interested. To help you find relevant lists, we have compiled a directory of adult literacy-related LISTSERVs, which you will find in Appendix F of this document.

To join a LISTSERV discussion, you must first subscribe to it. In almost all cases, you do not need to pay for a subscription to a LISTSERV. All but a tiny fraction of LISTSERVs are free (the exceptions being lists that distribute proprietary information like stock quotes or wire service newsfeeds). Thus, subscribing to a LISTSERV is primarily the process of telling the computer that manages the LISTSERV that you want to receive all of the messages that are sent to that list. Most LISTSERVs handle the subscription process in the same way.

To help clarify the subscription process, we'll step through an example. We will subscribe to the LITERACY LISTSERV, maintained on a computer run by the New York State Education and Research Network (NYSERNet). Like all LISTSERVs, LITERACY maintains a special e-mail address that handles all of the administrative messages. Normally, these administrative e-mail addresses have a user name like listserv, majordomo, or listproc. In this case, the administrative address for the LITERACY list is listserv@nysernet.org. The first step in the subscription process is to open your e-mail software and request to send a new message. When the form or screen appears, address the message to listserv@nysernet.org by putting this address in the "To:" line/field. Normally, you should leave the "Subject" line/field empty. However, some on-line services require you to make an entry in the subject line or field. (America Online is especially notorious in this regard.) If your service requires you to make an entry, try putting in several blank spaces. If this fails, enter a single period as the subject. On the first line

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of the message's body, enter the subscription command. The LISTSERV list in Appendix F provides a precise subscription command for each list. In general, the command is "subscribe <name of the LISTSERV> <your full name OR your e-mail address>." Appendix F indicates whether you should use your full name or e-mail address, but be sure to include one or the other in the subscribe statement. In our example, the subscription command is: subscribe LITERACY Karl Rethemeyer. Below is a sample e-mail message used to subscribe to LITERACY:

```
FROM: Karl Rethemeyer
  TO: listserv@nysernet.org
  CC:
 BCC:

  ┌─────────────────────────────────────┐
  │                                     │
  └─────────────────────────────────────┘

subscribe LITERACY Karl Rethemeyer
```

Figure 12. Most subscription messages to LISTSERVs use a command similar to the one shown above.

Unless the LISTSERV's subscription instructions tell you to do otherwise, you should not put anything else in the body of the message. Once you've completed this step, tell the computer to send the message. Usually the server that manages the LISTSERV (the administrative server) will send back a message either welcoming you to the list or telling you that it did not understand your message. Don't be concerned if this message does not arrive for a while; some services can take 12 to 24 hours to respond.

Once subscribed, users can hold interactive discussions by sending e-mail messages to the list's incoming e-mail address. This address is usually different from the administrative address. (Incoming addresses also appear in Appendix F.) In our example, the incoming mail address is literacy@nysernet.org. Whenever LITERACY's administrative server receives a message addressed to this e-mail account, it sends a copy of the message to all list subscribers.

A LISTSERV discussion proceeds in a series of iterations. In the first iteration, a member initiates a discussion by sending a message to the incoming address. This "initiating" message might be a question, a provocative statement, or simply a plea for opinions on an issue. The list members all receive a copy of the initiating message. In the second iteration, users respond to the initiating message by sending replies to the incoming mail address. These replies are also sent to all list members. In the third iteration, more replies are sent to the incoming address. In this iteration, the replies may be directly related to the initiating message or to replies made in the second iteration (i.e., replies to replies). Depending on how stimulating the issue is, there could be many additional iterations where participants discuss the initiating message and replies

5.3

thereto. Most list moderators will allow a discussion (called a *thread*) to go on indefinitely.

In Figure 13, we will assume that LITERACY has five members, Anne, Joe, Pam, Tom, and Mary (in reality, LITERACY has hundreds of subscribers). Anne decides to initiate a discussion on adult literacy software by sending a message to literacy@nysernet.org, asking other members for information about the adult literacy software that they use in their adult basic education (ABE) classes. This message travels from Anne's computer through the Internet (1) to the administrative server for LITERACY (2).
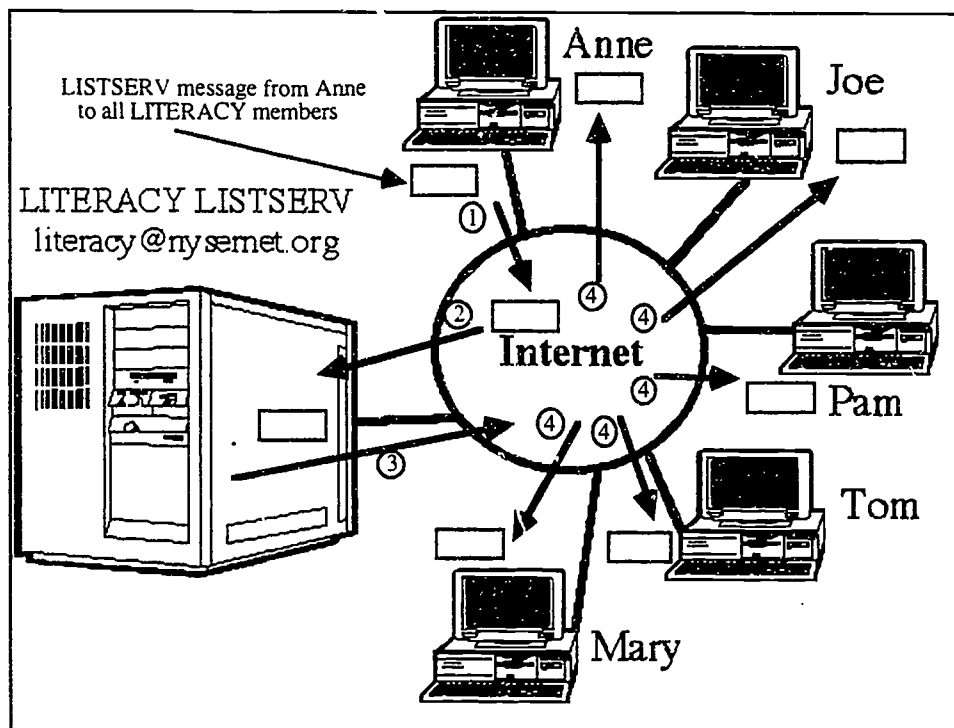
Figure 13. Typically, a LISTSERV message follows the path shown above: from the message's author to the computer managing the list; then from the managing computer to all list members

When the LITERACY LISTSERV's administrative server receives the message, it makes five copies (3) and sends one to each list member (4). In the second iteration, Mary replies to this original message by sending a reply to literacy@nysernet.org, saying that she has found The Roach Organization's (TRO) Plato to be very useful. Again, this message is copied and sent to the list members. In the third iteration, Tom decides to respond, saying that he prefers to use word processors and spreadsheets, not integrated learning systems. Again, his message is sent to literacy@nysernet.org for delivery to the list members. This progression can continue until the issue is exhausted. In each case, everyone on the LISTSERV receives the message.

The number of LISTSERVs related to literacy topics has grown very rapidly in the last year. In Appendix F, you will find lists that are focused on numeracy, ESL issues, educational technology, and adult education in general. Since LISTSERVs and USENET groups are quite similar, we will save a

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discussion of the pros and cons of LISTSERVs for a comparative discussion at the end of the next section.

USENET

The second form of one-to-many communications is the USENET bulletin board system. USENET was developed during the late 1970s and early 1980s and has grown into a mammoth system for sharing information and holding discussions. The USENET bulletin board is analogous to a large bulletin board in a school or company. It is a place where people can post messages for other people to read. Anyone with the proper software and an Internet connection can leave messages on USENET, just as anyone can tack up a message on a school or company bulletin board. Also, like a company or school bulletin board, because almost anyone can post to USENET, the wheat and the chaff are thoroughly intermingled. It often takes some time and research to find the parts of the bulletin board that house useful information.

Unlike corporate or school bulletin boards, USENET is so large that the postings need to be organized in some fashion. The original idea was to set up seven basic discussion topics, each represented by a three or four letter abbreviation: Recreation (rec), Computers and Networking (comp), the USENET system (news), Science (sci), Social (soc), Discussion (talk), Miscellaneous (misc), and Alternative Views (alt). However, USENET soon outgrew this scheme. So, for example, when the miscellaneous area grew too large, it was subdivided into misc.education (a group on general education issues), misc.entrepreneur, misc.forsale, and so forth. When one of the new subdivisions became too large, it, too, was subdivided. Misc.education was joined by misc.education.adult, misc.education.home-school, misc.education.language.english, and several others. Over time, the other basic discussion topics were similarly subdivided. These individual discussion areas became known as newsgroups. The title of a newsgroup is created by adding descriptive words or abbreviations to the right of the basic topic's name.

Eventually, even the original seven topics (sometimes called the "top level" topics) have been   ided to include additional abbreviations for special USENET discussions groups. For instance, some countries have carved out space in USENET for discussions in the country's native language (groups beginning with "de" are from Germany, for instance). Some cities have set up areas for local discussions (e.g., "phl" for groups on Philadelphia), as have some states (e.g., NY for New York state groups). Biologists and environmental scientists have prevailed upon the USENET community to set up a top level topic on these issues (known as bionet). Finally, a group of older LISTSERVs (those that were available through BitNet, a predecessor of the Internet) are cross-posted (i.e., the incoming messages are put into a USENET newsgroup) in the "bit" top level topic area. Creation of new top level groups is becoming more common as USENET continues to grow. However, the vast majority of newsgroups still belong to one of the seven major discussion topics.

Unlike LISTSERVs, USENET messages are not sent directly to an e-mail box.[†] Instead, the messages are stored on a server, from which they may be

retrieved using a USENET client (sometimes also called a "newsgroups client" or a "news client"). USENET clients have three functions: selecting, reading, and posting to newsgroups. First, they allow users to select the newsgroups that they wish to read. Clients accomplish this using three different methods. One method is for the client to display the entire list of USENET groups when the user first logs on, as seen in Figure 14.
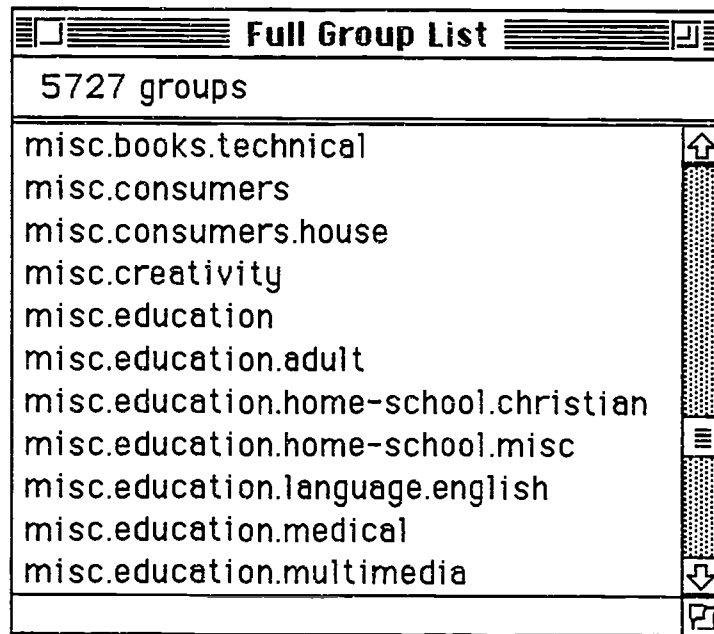
Figure 14. This is just a small sample of the 5,700 newsgroups available on the USENET bulletin board.

Given that there are (as of January 1995) more than 5,700 newsgroups, few clients use this method any longer. Another method is to search the newsgroups list for those entries that match a keyword. Most USENET clients supplement this feature by allowing a selection of newsgroups to be displayed every time the USENET client is opened. This is known as "subscribing" a USENET client to a set of newsgroups. Check the service's documentation to find out more about the features that are available on your client.

The second USENET client function allows users to read messages from the newsgroups. Once the client displays a list of newsgroups, the user can request from the server a list of all the messages posted to a particular newsgroup. For instance, once the client displays the list in Figure 14, clicking on misc.education.adult would display the most recent postings, as shown in Figure 15.

[†] This is true in general; however, some on-line services use software that allows incoming USENET messages to be sent directly to an e-mail box. Check your service's documentation to see if this is possible.   56

34 articles, 34 unread

		Ron "Asbestos" Dip...	CFV: misc.business.facilit...
-		Norma Reichline	A good picture dictionary??
-		Norma Reichline	Picture Dictionaries for A...
▷	2	Norma Reichline	Picture Dictionaries
-		April Barry	Non-traditional Master's d...
▷	7	brennan@mala.bc.ca	Re: What prevents adults f...
-		Karl Rethemeyer	Adult Literacy and Tech C...
-		Brian Rattenbury	Need advice on correspond...

Figure 15. A sample of messages sent to the newsgroup MISC.EDUCATION.ADULT in January 1995.

To read a message, one either clicks on the desired message's title (GUI) or highlights the desired message's name/title line and then clicks return (command-line). The retrieved message will look exactly like an e-mail message. Because USENET is so immense, the server discards messages after two to six days, so newsgroups need to be checked regularly in order to catch all of the messages.

The third and final client function is posting new messages to the proper USENET newsgroup. In most cases, you must already be viewing the contents of a newsgroup (i.e., the list of message titles and authors as shown in Figure 15) for the client to allow you to post a new message. The process for composing a USENET message is virtually identical to creating an e-mail message. GUIs normally have a button or menu item titled "Post New Message." Command-line clients normally use the command "post" to initiate a new message. The only major difference is how the message is addressed. Normally, the USENET client will automatically include the proper address when you ask to compose a new message, so you don't need to know the e-mail address. Once sent, the new message usually takes a few minutes before it appears in the newsgroup. Because there are many different USENET readers in use, be sure to review your documentation before venturing into the newsgroups.

USENET can be a very wild place. The newsgroups mentioned in this section are very tame compared to what can be found in the alternative views hierarchy. Anything from discussions of Shakespeare to pornography can be found in USENET, so be sure to control who has access to your Internet account—especially if your students bring children to your program. USENET's culture, even in the more reputable areas, is also a little rough. New users who bring up old, worn-out discussion topics are likely to be flamed, a term for the textual haranguing some users apply to those who have violated the culture, upset the normal order, or simply made a beginner's mistake. When you first join a USENET newsgroup, it is best to lurk for a while (i.e., read the messages without replying). This will give you a chance to find out which topics have been covered and which have not. Another useful way to learn about a newsgroup is to read the Frequently Asked Questions or FAQ document for the group. FAQs are posted repeatedly, so you should be able to find them in well-established groups despite the USENET server's relentless removal of older postings. If you can't find the FAQ, almost no one will flame you for

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requesting a recent one—leave a short message stating that you are interested in the group and want to see the FAQ.

Before ending this discussion of LISTSERVs and USENET groups, a few of the advantages and disadvantages of each will be mentioned. As with any Internet tool, the primary problem with LISTSERVs and USENET groups is that they tend to generate an overwhelming amount of information. Chris Dede, a researcher on education and technology, likened joining a LISTSERV to being hit full force by an information fire hose. Some LISTSERVs can generate 50 or more messages a day. Since each message arrives in your e-mail box, you will need to process each and every message, even if that processing amounts to nothing more than deleting the message without reading it. We would recommend subscribing to only one or two LISTSERVs at first to avoid information overload. However, LISTSERVs tend to promote more focused, substantive discussion of issues than USENET groups. This is probably because one must make an effort to subscribe to a list and because lists tend to have a smaller audience than newsgroups. Also, most LISTSERVs have vigilant moderators who make sure the discussion does not stray too far from the topic.

USENET groups cause fewer problems with information overload, but do not foster discussions of equal quality. One of the nicest features of USENET is the ability to pick and choose which messages you will process. All the messages are waiting for you on the server; you choose which ones to open and read. USENET does not clog up your e-mail box with electronic junk mail, as can happen with LISTSERVs. However, because USENET is a more open system, individuals can make "hit and run" posts to a newsgroup that disrupt communication, side-track ongoing discussions, or cause the group to descend into the reciprocated nastiness known as flame wars. For literacy practitioners in their official capacity, LISTSERVs are probably more effective. For those "surfing the net" in an unofficial capacity, USENET is probably more fun, interesting, and exciting. So maybe it is possible to have your cake and eat it too—if you have an Internet connection!

TELNET AND FILE TRANSFER PROTOCOL (FTP)
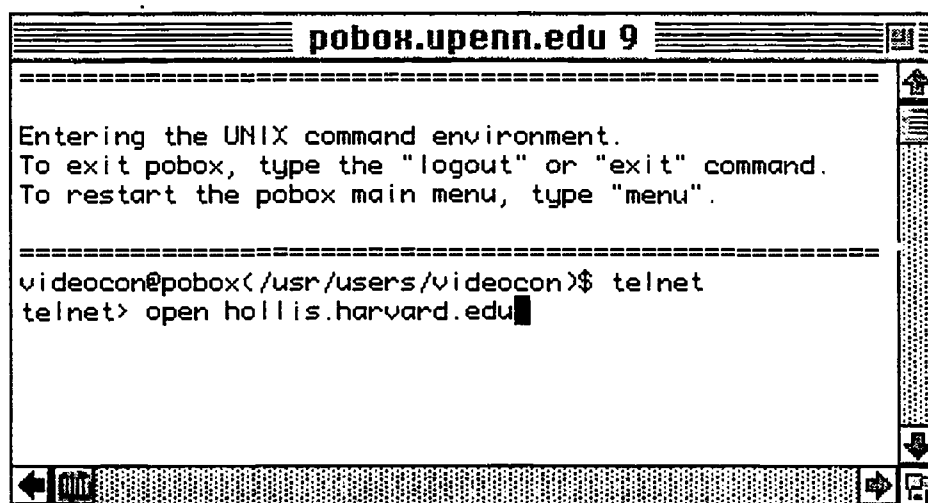
Telnet and FTP, like e-mail, trace their own development back to the days when networking was exclusively the domain of computer and military professionals. For this reason, Telnet and FTP are also two of the most difficult tools to understand. Telnet and FTP solved two problems for pioneering Internet users: remote log-in and file transfer. As electronic networks began to develop in the mid-70s, users began to seek a way to use a terminal connected to mainframe A (in California) to access information on mainframe B (in Massachusetts), or to transfer files from mainframe A to mainframe B. There were several different efforts to create such a system, the most successful of which was AT&T's UNIX™ operating system. UNIX™'s Telnet software solved the remote log-in problem, and UNIX™'s FTP solved the file transfer problem. Because UNIX™ incorporated both the TCP/IP networking protocol and these log-in and file transfer capabilities, it soon became the operating system of choice for computers connected to the Internet. As time passed, the Telnet and FTP software was adapted to run on other types of mainframes and then personal computers. Both tools are still widely used, although Gopher and World-Wide Web (the next topics in this section) are superseding FTP.

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Telnet

What exactly is Telnet? It is a program used to open a connection (known generically as a session) to a computer running UNIX™ or another operating system (e.g., VMS) that is compatible with UNIX™'s Telnet system (for simplicity's sake, we'll refer to the computer with which you wish to open a Telnet session as the "mainframe" from now on). Once the connection is open, Telnet can be used to operate software that is installed on the mainframe, such as a program to retrieve information from a database stored on the mainframe or a piece of software used to search for information on the Internet (e.g., Gopher or Lynx). In most cases, the software you wish to operate will start running the moment you open the connection; in others, you may have to type in a command to start the software, much as you must type in a command to start a software program in Microsoft DOS™. Once the software on the mainframe is running, the mainframe controls the session and does everything from drawing the screens to responding to keystrokes or mouse clicks.

If you are using an on-line service with a command-line interface, Telnet is the tool you use to access all Internet communication and information systems. Using Telnet, it is possible to access e-mail, the USENET bulletin board, Gopher, and World-Wide Web. However, most people use Telnet strictly to gain access to databases on mainframes. At about the time UNIX™ became available, library systems and information collection agencies began to convert their card catalogs and databases into electronic form. Naturally, they turned to mainframes running UNIX™ or operating systems like UNIX™ (e.g., Digital Equipment's VMS system) to "host" their databases, because UNIX™ and VMS were adept at managing multiple connections to a database. Millions of dollars were invested in creating these databases, and millions more are needed to convert them to client-server systems, a process that is underway but far from complete. Therefore most major libraries and many large database maintainers like the Educational Resources Information Center (ERIC) are still dependent on Telnet. In most cases, you will use Telnet to search one of these databases.

To demonstrate how Telnet works, we'll step through the process of logging into a large "telnetable" database on the Internet, Harvard University's electronic card catalog system (see Figure 17).

```
================ pobox.upenn.edu 9 ================

=========================================================
Entering the UNIX command environment.
To exit pobox, type the "logout" or "exit" command.
To restart the pobox main menu, type "menu".

=========================================================
videocon@pobox(/usr/users/videocon)$ telnet
telnet> open hollis.harvard.edu
```

Figure 17. On a command-line client, you normally must enter a command like "open hollis.harvard.edu" in order to begin searching a "telnetable" database like a library card catalog.

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The first step is to determine the domain name of the mainframe you want to log into. You are probably thinking that we want to log into Harvard's card catalog mainframe. Unfortunately, Telnet is not nearly smart enough to figure out how to interpret this "natural language" command. So now what? To access any Telnet (or FTP, for that matter) resource, you must know the computer's domain name. To recap, a domain name is a computer's unique Internet identification. Domain names are usually a series of words and/or abbreviations that indicate who owns the computer (see the section on e-mail for more details). As with e-mail addresses, there is no easy way to discover what the domain name for Harvard's card catalog might be. Luckily, the University of Pennsylvania publishes a list of telnetable databases. According to Penn's list, Harvard's catalog is located on a mainframe known as hollis.harvard.edu. Other sources of information on telnetable databases would be friends, colleagues, LISTSERVs, USENET groups, and Gopher information servers.

Once you know the computer's domain name, you are ready to start the Telnet session. The starting point for a Telnet session is slightly different depending on whether you are using a service with a GUI or a command-line interface. If a command-line interface is being used, you must begin by telling the service to start the Telnet program. This is normally done by typing "telnet" at the appropriate command entry point. In Figure 17, this would be at the end of the text entry "videocon@pobox(/usr/users/videocon)$". Many command-line interfaces denote the command entry point with a "$" or a "%," but you will need to check your documentation to be sure. Once the "telnet>" prompt appears, you are ready to begin the session. This is usually accomplished by entering the command "open" followed by a space and the mainframe's domain name. In our example, the proper command is "open hollis.harvard.edu." The final step is to hit the return key.

The process for GUI users is a little simpler. Normally, you start a Telnet session by clicking on some sort of Telnet icon. Instead of beginning with "open," most GUI-based Telnet clients simply ask you to put in the domain name of the mainframe with which you wish to open a session (Figure 18).

```
┌──────────────────────────────────────────────────┐
│                                                  │
│   Session name    │hollis.haruard.edu│           │
│                                                  │
│                                                  │
│  (Configure)    ( OK )      ( Cancel )           │
│                                                  │
└──────────────────────────────────────────────────┘
```
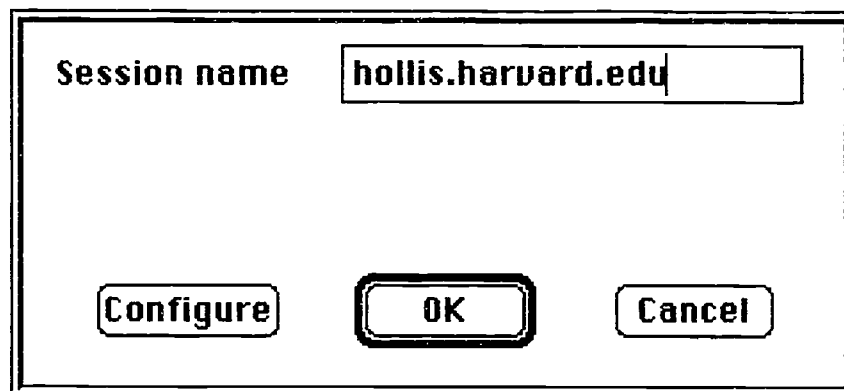
Figure 18. Most GUIs use a dialog box like this to establish a telnet session with a "telnetable" database or Internet client.

In this example, when you click OK, the client sends the command "open hollis.harvard.edu." From this point on, the Telnet session looks and acts exactly the same for GUI and command-line clients.

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Once a Telnet connection is established, some additional information must be transmitted to the mainframe. In some cases, the first step is to "log-in"—that is, provide the computer with a valid user ID and password to prove your identity. Most public access databases no longer require formal log-in. If a prompt is received that says "login," try entering "guest" or "anonymous" and leave the password space blank.

Normally the first step is to identify what type of terminal your computer is emulating (Figure 19).

```
════════════════════ hollis.harvard.edu 10 ════════════════════
 Harvard University -- TELNET server - M2030-256, V3.5.46          ⇧

  - Hit return to begin TELNET session.  Terminal type will be VT100.

       To select a different terminal type, overkey !vt100,3278 below
       with "show".  Then enter ! followed by terminal type at the TS>
       prompt.

  - To obtain help at this screen, overkey !vt100,3278 below with
  "help".

  - To exit TELNET server from this screen, overkey !vt100,3278 below
  with "bye".

  - To terminate TELNET session, enter "ESCxx".  To obtain help during
  TELNET session, enter "ESCh".


 vt100,3278█                                                       ⇩
 ◀                              ▥                                 ▶ ▦
```

Figure 19. Most "telnetable" databases or Internet clients require users to specify what type of terminal they are using or what type of terminal their personal computer is emulating.

This step is necessary because different terminal manufacturers use different keys for certain commands, like backing up a space or erasing previously entered text.* Luckily, almost all Telnet software has been standardized around the key sets and commands used by Digital Equipment's VT100 terminal. In Figure 19, you'll notice the line "vt100,3278" at the bottom, with the cursor (the black rectangle) at the end of the line. As the instructions in the graphic state, hitting the return key automatically sets the terminal type to VT100. In other Telnet systems, you will have to type in "VT100" and hit return or choose the VT100 entry from a list. If, after doing this, Telnet starts showing all sorts of bizarre characters on the screen, your service may not be using a VT100 type terminal emulation; consult your service's documentation for more information.

Once you've specified the type of terminal you are using, the mainframe takes over. The next screen that appears is generated by Harvard's card catalog computer (Figure 20).

---

* By now you're saying, "Terminal?? I'm not using a terminal!! I'm using a personal computer. How would I know what type of terminal I am using?" You are, of course, correct. The on-line service's computer is only emulating a terminal for you (normally this is known as terminal emulation). What you really need to tell the computer is what type of terminal your service is emulating.

```
================ hollis.harvard.edu 12 ================

*******************        H A R V A R D    U N I V E R S I T Y
*******************           OFFICE FOR INFORMATION TECHNOLOGY
***     ***     ***
*** VE *** RI ***        HOLLIS    (Harvard OnLine Library Information System)
***     ***     ***
*****       *****        HUBS      (Harvard University Basic Services)
  **** TAS ****
    ***     ***          IU        (Information Utility)
      *****
      ***                CMS       (VM/CMS Timesharing Service)


          ** HOLLIS IS AVAILABLE WITHOUT ACCESS RESTRICTIONS **
      Access to other applications is limited to individuals who have been
      granted specific permission by an authorized person.

      To select one of the applications above, type its name on the command
      line followed by your user ID, and press RETURN.
                  ** HOLLIS DOES NOT REQUIRE A USERID **

      EXAMPLES:    HOLLIS (press RETURN)  or  HUBS userid (press RETURN)
      >hollis█
```

Figure 20. Once a connection is established, most "telnetable" databases and Internet clients provide instructions on how to complete the log-on process.

From here on, the mainframe will tell you how to use the system. Each database computer uses a different set of commands. In this case, to reach the card catalog, you must enter "hollis" and then hit the return key. One piece of handy advice—if you become totally lost in a Telnet database, most systems will end the Telnet session if you simultaneously hit the "CTRL" (control) and "C" keys or the "CTRL" and "Z" keys. These are fairly widespread "quit" commands on Telnet systems.

In time, Telnet will be replaced with much more user-friendly database interfaces. Major database vendors are already shipping new products that replace the text interfaces shown above. However, the process of conversion is very slow and will probably not be complete until the end of the decade.

File Transfer Protocol (FTP)

FTP's growth was not driven by large database providers but by the hundreds of programmers who began developing software for personal computers in the 1980s. The spread of personal computers and development of easy-to-use programming languages helped foster an explosion in software development by amateurs and small businesses. The problem was, how could an individual or small firm distribute its products if it did not have the marketing savvy and/or capital of Microsoft? The solution came from the commercial on-line services and the Internet. It is possible for amateur developers to put copies of their software on the Internet or on commercial on-line services in special repositories known as software archives. Software archivists retain a copy of the software almost indefinitely. Anyone can download the software and try it. Most developers request payment for their wares, though they rely on the honor system. This has become known as shareware. Other developers make their software available free of charge; this has become known as freeware. FTP is still used overwhelmingly for managing archives of freeware and shareware. However, over time, other FTP sites that distribute graphics and documents (both formatted and unformatted) have come into being.

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FTP is designed to allow Internet users to download (i.e., copy a file from a server on the network to the user's computer) and upload (i.e., copy the file from the user's computer to a server) files from/to software archives. FTP can be used to upload and download all types of files—documents, graphics, pieces of software, and so forth. Many people refer to "uploading" or downloading as "transferring" a file. Actually, when a file is downloaded from a server, the server first makes an electronic copy of the file that the user has requested and then transmits that copy to the user's computer. The user's computer then saves the copy to its hard drive. At the end of a download, there are identical copies of the file on both the server and the user's computer. Uploading works the same way, except that the copy is being transmitted from the user to the server.

Like Telnet, to use FTP, you must know the domain name of the computer you wish to access. The process for logging onto an FTP server using either a command-line interface or a GUI is almost exactly the same as that described for logging into a Telnet database. The major difference is that most FTP sites do require a user ID. For public access FTP sites, the user ID is almost always "anonymous." For this reason, public access FTP sites are sometimes referred to as anonymous FTP sites. Most anonymous FTP sites do not require you to specify a password; however, as a courtesy, most sites ask that you enter your e-mail address as the password (this allows them to get a sense of who is logging on and from what institutions).

FTP servers, unlike the other Internet services we have discussed so far, are used for information retrieval instead of communication. To find relevant information on any information server, you will need to be familiar with the filing hierarchy used on most servers to organize information resources. Each information server has a hierarchy of folders (GUI) or directories (command-line). Functionally, folders and directories do the same thing: They group together files and other folders/directories. However, it is probably easier to grasp what a folder/directory is by concentrating on the idea of a folder. In a filing system, folders are simply ways to subdivide a drawer or cabinet; each folder contains a set of related information. A folder marked "Budget," for instance, will probably contain documents about spending money and items like checkbooks and ledgers. Folders/directories have the same function on an FTP server (which is analogous to a filing cabinet).

Once you've logged onto an anonymous FTP site, you can begin to explore the offerings. In this case, there are significant differences between navigation techniques used with GUI clients and command-line clients. Most command-line interfaces use a common set of commands drawn from the UNIX™ operating system, so we've included a list of those commands and their English equivalents. It's best to memorize these commands before venturing into FTP.

Table 5

Common FTP commands.

Command	What it does
cd <directory name>	Opens the directory specified in <directory name>
cd ..	Opens the directory that encloses the directory the user is current examining
dir	Lists the contents of the current directory; also specifies whether an entry in the list is a directory or a file

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Common FTP commands. (continued)

Command	What it does
get <file name>	Downloads the file specified in <file name>
ls	Lists the contents of the current directory
put	Uploads the file specified in <file name> to the server
user	Instructs the server to request a user ID and password

One of the most confusing things about using a command-line FTP interface is that once you give the "open" command to establish a session on an FTP server, in many cases nothing else happens. The client displays nothing on the screen to indicate that you have opened the connection. So the first thing you need to do is request the list of files and directories available from the FTP server, using the command "dir" (you'll need to hit return after entering every command when using FTP). In some cases, FTP servers are so dumb that they forget to ask for your user ID after you use the "open" command. If an FTP server responds to the "dir" or "ls" command by sending the message "530 USER and PASS required," remind the server to get this information by typing in the command "user." The FTP server should respond by putting up a prompt like "User:" or "Username:". Type in "anonymous" and hit the return key. You should then be able to navigate through the FTP server.

To get a feel for using FTP, we'll work through the process of logging onto NCAL's FTP server to recover a copy of NCAL's newsletter, *NCAL Connections*, using a command-line interface. In Figure 21.1, we've already logged onto NCAL's FTP server and tried to list the contents. As you can see, NCAL's server is too dumb to request the user ID automatically, so we entered the command "user" and then the user name "anonymous." NCAL's server then sent a message about using the server and the access restrictions that apply (anonymous users are only allowed to view some areas on this server and may not upload files). The next step is to see what the server has to offer. In Figure 21.2, we've entered the "dir" command to get a list of the offerings. While the commands "ls" and "dir" do basically the same thing, "dir" includes the string of characters on the left hand side of Figure 21.2. Unintelligible as they seem, these strings tell us whether the entry is a file or a directory. If the left-most character is a "-", then the entry is a file; if the left-most entry is a "d", then the entry is a directory that contains other directories or files.

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```
litserver.literacy.upenn.edu 2

220 Peter's Macintosh FTP daemon v2.2.0 awaits your command.
ls
530 USER and PASS required.
530 USER and PASS required.
user
Username: anonymous
331 Guest log in, send Email address (user@host) as password.
230-Welcome to the National Center on Adult Literacy
    and Literacy Research Center's FTP server.  If
    you have problems with this server, please contact
    Karl Rethemeyer at (215) 898-2100 or at the
    e-mail address Rethemeyer@literacy.upenn.edu.

    Thank you for your interest in the Center.
230 Anonymous login to 2 volumes.  Access restrictions apply.  "/NCAL
```

Figure 21.1. This is an example of the information that an FTP server usually passes on to a command-line client when the user begins a session.

```
litserver.literacy.upenn.edu 11

dir
200 PORT command successful.
150 ASCII transfer started.
226 Transfer complete.
--------r--      0     2832     2832 Jun 23 12:09 A.Intro.For.Fi
drwx---r-x            folder      7 Jan 13 17:13 B.Info-NCAL.LR
drwx---r-x            folder     11 Jan 13 17:15 C.NCAL.Newslet
drwx---r-x            folder      4 Jan 13 17:23 D.NCAL.Researc
drwx---r-x            folder      2 Jun 23 17:13 E.Research.Pro
drwx---r-x            folder      3 Nov  8 11:42 F.LTL.Software
drwx---r-x            folder      4 Jan 13 17:04 G.Adult.Litera
drwx---r-x            folder      2 Nov 30 10:25 H.NCAL-PBS.Vid
drwx---r-x            folder      3 Jun 23 17:13 I.Lit.LISTSERV
drwx---r-x            folder      2 Jan  6 15:53 J.Upcoming.Adu
drwx---r-x            folder      2 Nov 14 10:07 K. Federal Lit
drwx---r-x            folder     52 Jun 23 17:13 L.State.by.Sta
```

Figure 21.2. The "dir" command causes the FTP server to display the contents of the current directory. The characters at the left tell you whether each item is a file or a directory.

If you look at the third entry in Figure 21.2, you'll see a directory titled "C.NCAL.Newslet." Or at least that's what it seems to be titled. One drawback of the "dir" command is that it partially cuts off title names. If we tried to look in this directory by using the "cd" command, we would not be successful, because for "cd" to work, you must enter the directory's name exactly. An abbreviation won't do. What to do? Use the "ls" command, which displays the file and directory titles only. Using "ls," we find that the full title of the directory is "C.NCAL.Newsletter." Now enter "cd C.NCAL Newsletter" to enter the newsletter directory. To view the titles, use the "ls" command.

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```
 litserver.literacy.upenn.edu 1
cd C.NCAL.Newsletter
250 "/NCAL/C.NCAL.Newsletter" cd successful
ls
200 PORT command successful.
150 ASCII transfer started.
226 Transfer complete.
A.Intro-NCAL Newsletter
B.NCAL.Connections.Sept.1994
C.NCAL.Connections.Summer
D.NCAL.Connections.Feb.1994
E.NCAL.Connections.Oct.1993
F.NCAL.Connections.Summer.1993
G.NCAL.Connections.Spring.1993
H.NCAL.Connections.Fall.1992
```

Figure 21.3. The "ls" command also causes the server to display the current directory's contents, but without specifying whether an entry is a file or a directory.

In this case, we used the "ls" command because it was safe to assume that all of the entries in this directory would be files, not directories.

The last step is to download a newsletter. If you want to retrieve the September 1994 edition, use the command "get" followed by a space and the file name ("B.NCAL.Connections.Sept.1994"). Remember, the file name must be spelled, capitalized, and punctuated just as it is displayed on the screen. FTP will then deposit the newsletter file in a folder/directory on your computer or possibly in a folder/directory on the on-line service's computer. You'll have to check your service's documentation to find out where downloaded files will be stored initially. Once a copy is safely on your hard drive, the newsletter can be read using any word-processing package.

To continue the example, if you want to go back to the original list of offerings on the NCAL server (i.e., the list displayed in Figure 21.2), you would use the "cd .." command (that is, "cd" a space and then two periods). The "cd .." command is used to move up one level in the FTP server's file hierarchy. What does that mean? Let's look at the way data on NCAL's FTP server is organized (Figure 22). When you first log on, the contents of the top level or root directory are displayed. Within the root directory are all of the directories (sometimes also known as subdirectories) that contain information on a given theme or topic. Each subdirectory can contain additional subdirectories and files. Figure 22 (see below) shows the first few entries in NCAL's server. Thus, if you were looking at, for example, the contents of the "C.NCAL.Newsletter" subdirectory and entered the "cd .." command, you would see the contents of the root directory. If, however, you were looking at the document directories in "D.Documents," you would see the contents of "D.NCAL.Research.Documents." Each time you use "cd ..", you move one level up in the server's file hierarchy.

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```
Root Directory
        A.Intro.For.First.Time.Users (text file)
        B.Info-NCAL.LRC.Programs (sub-directory)
                A.Nat'l.Center.on.Adult.Lit (text file)
                B.Literacy.Research.Center (text file)
                C.Literacy.Technology.Lab (text file)
                ...
        C.NCAL.Newsletter(sub-directory)
                A.Intro-NCAL Newsletter (text file)
                B.NCAL.Connections.Sept.1994 (text file)
                C.NCAL.Connections.Summer (text file)
                D.NCAL.Connections.Feb.1994 (text file)
                ...
        D.NCAL.Research.Documents(sub-directory)
                A.Intro-NCAL's.Researc'ı.Docs (text file)
                B.List.of.Research.Documents (text file)
                C.Abstracts (sub-directory)
                D.Documents (sub-directory)
                        Baydar-Child//Adolesc.Lit. (sub-directory)
                        Berryman-Lit in Wealth (sub-directory)
                        Cohen-Literacy & Welfare Reform (sub-directory)
```

Figure 22. The directory structure of NCAL's FTP server in outline form.

GUI-based FTP clients are much easier to use but harder to describe in a document like this because the commands and icons are not standardized across services. Most GUI-based FTP clients use a folder icon to represent a directory and a diskette icon to represent a file that may be downloaded. Clicking on a folder icon displays the contents of the folder. Clicking on a diskette icon causes the file to be downloaded to the client. To move back up the directory tree, either choose the appropriate level from a "pop-up" menu, or close windows until the correct level is at the top of the stack of windows.
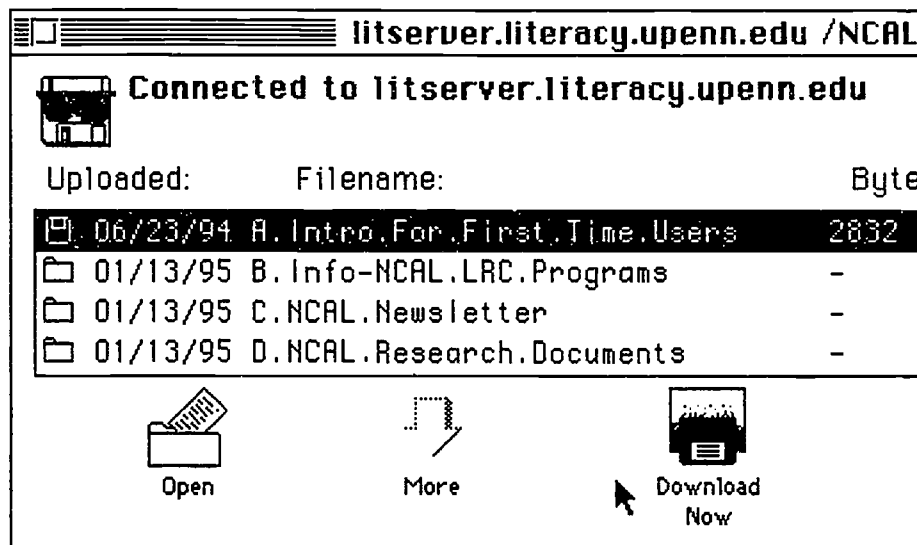

Figure 23. GUI FTP clients usually display directories using a folder icon and automate certain commands usirg buttons or mouse click sequences.

Throughout this discussion of FTP, we have purposely demonstrated how to download documents instead of software. Downloading plain text documents is a fairly straightforward procedure. Downloading software is complicated by two additional issues—file encoding/decoding and file compression. Because these are advanced uses of FTP and because FTP is not available on many services, we have not addressed these issues here. For information on using FTP to download software, see Appendix G.

The next part of this section will be devoted to the system that is replacing FTP and has incorporated Telnet, namely the Internet Gopher.

GOPHER

One of our favorite NCAL Internet training stories comes from the 1994 Pennsylvania Adult and Continuing Education Conference (PAACE). As we began our presentation on Gopher, we could clearly hear someone in the back row whisper to the women next to him, "What the Hell does a furry rodent have to do with the Internet?" Though it has a funny name, Gopher is one of the largest and most important information resources on the Internet. Unlike e-mail, LISTSERVs, and USENET groups, Gopher servers are not used for communication. They are information servers only. Organizations that wish to distribute their information to others on the Internet establish and maintain these "Gophers" (the entire set of Gophers in the world is known as Gopherspace). Gopher servers are capable of distributing anything that can be rendered into electronic form—plain text, formatted text, graphics, photos, sound files, and even video clips. Almost all Gopher servers are set up as public access points, meaning that all of the information is made available free of charge to anyone who wants to download it.

The original Gopher software was developed at the University of Minnesota (UMN) in the early 1990s. The name is a play on words: UMN's athletic teams are the "Golden Gophers," and the software helps people "go for" information on the Internet network. UMN originally created Gopher to provide an information system for their campus that would provide students with a free, round-the-clock "answer machine" for all sorts of questions—where does my class meet, where do I go for my GSL check, what do I do if I get sick, and so forth (generically, these systems are known as Campus Wide Information Servers, or CWIS). They also wanted to integrate some of the existing campus information services into this new system, including the library's Telnet-based card catalog and related databases. The client software was designed to run on any type of computer—Mac, Windows™, DOS, NeXT, UNIX™, VMS, mainframes, and so forth. Finally, the developers wanted to create an easy-to use interface. This would mean eliminating the use of domain names by mapping a real name—Department of Computer Sciences, for instance—to a domain name—boombox.micro.umn.edu. Within this scheme, they also wanted to be able to organize information by creating flexible ways of moving through the server's folder/directory structure.

To achieve these goals, they created both server software and client software. At first, Gopher was only used at UMN. As other Internet users experimented with Gopher, they found it useful and requested copies. UMN, as a non-profit institution, decided to give away both the client and server software to other non-profit organizations, so a number of universities adopted Gopher

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as the client-server system for their CWIS. By 1992-93 Gopher was the primary information discovery and retrieval tool on the Internet, with more than 5,000 servers running worldwide.

What can you do with Gopher servers? Because the capabilities of a client determine whether some or all of the services listed below can be used, we will begin by reviewing the features that all Gopher users can access and then discuss those features that are not as widely available. We will use Figures 24.1 and 24.2 as references for the rest of this section. Figure 24.1 is taken from a typical GUI Gopher client, while Figure 24.2 is drawn from a widely used command-line Gopher client.
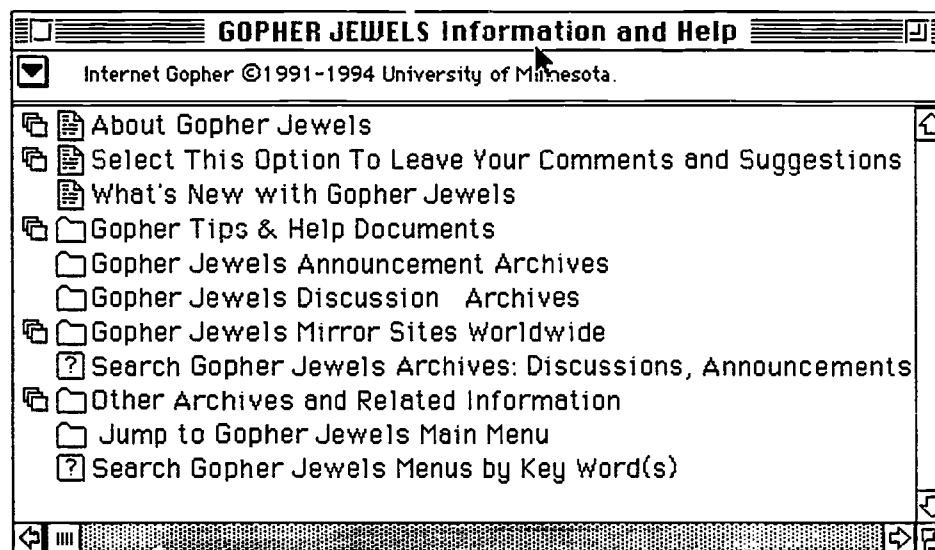
Figure 24.1. An example of a GUI Gopher client interface: Directories are denoted by folder icons, files by document icons, and databases by square icons with a "?".
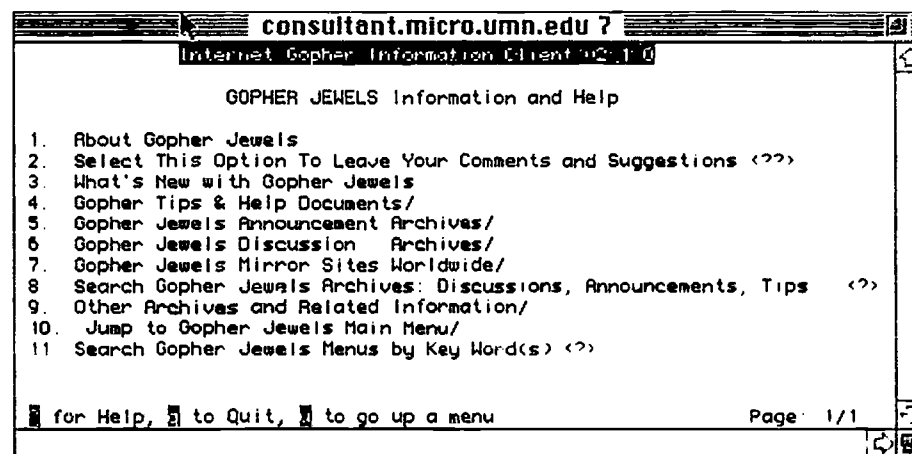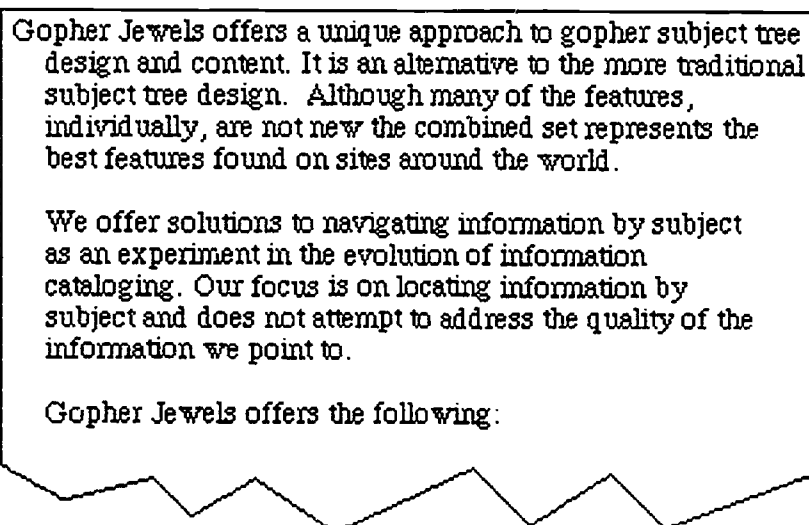
Figure 24.2. An example of a command-line Gopher client interface: Directories are denoted by "/", files by titles without punctuation at the end, and databases by question marks.

Gopher servers organize information in folders and directories like FTP servers do. Graphical Gopher clients use a folder icon to represent a folder/directory. Most command-line clients put a "/" at the end of the item's title to show that it is a folder/directory. For instance, the entry "4. Gopher Tips and Help Documents/" in Figure 24.2 is a directory. The commands to open or

close a directory are different from client to client, though on most GUIs you open a folder by clicking on the folder icon. In most command-line interfaces, a directory is opened either by entering the directory's number and then hitting the return key or by moving a pointer or highlighter bar using the arrow keys until it points to the desired directory and then hitting the return key.

Once you've gotten comfortable moving around in Gopherspace, you're ready to begin reading and collecting information. The most basic way to collect information from a Gopher is to read it directly on-line. In Figures 24.1 and 24.2, you will see an entry title "About Gopher Jewels." This is a plain text file that may be read on-line. GUI Gopher clients use a "page" icon similar to this one ▤ to denote a text document. In command-line interfaces, a period at the end of the description line or the absence of any symbol indicates a text document. If you click on the icon (or choose the document's number), the following appears on the computer's screen (see Figure 25):

Gopher Jewels offers a unique approach to gopher subject tree
    design and content. It is an alternative to the more traditional
    subject tree design. Although many of the features,
    individually, are not new the combined set represents the
    best features found on sites around the world.

We offer solutions to navigating information by subject
    as an experiment in the evolution of information
    cataloging. Our focus is on locating information by
    subject and does not attempt to address the quality of the
    information we point to.

Gopher Jewels offers the following:

Figure 25. An example of a text file recovered using a Gopher client.

Anything that can be viewed on screen can also be saved to your hard disk. Here the mechanics are quite different between the GUI Gopher client and the command-line client. On a GUI client, one need only find the "Save . . ." or "Save As . . ." command, usually located in the "File" menu. By choosing this command, you should be able to give the file a name and tell the computer where you want the document stored on your hard drive.

As with Telnet databases, command-line Gophers do not offer the option of saving text on the screen directly to a file. The best option in Gopher is to use the Gopher mail feature. Gopher mail allows the user to have any text document sent to his or her e-mail account. Normally, this feature is accessed by choosing the "m" (for "mail") or "p" (for "print") command. The client will then ask you to enter your e-mail address. When finished, hit the return key. A few minutes later, your document will arrive at your mail box.

What we've described in the above paragraphs is "browsing" through text files. However, Gopher also allows you to search through databases of text files. There are literally thousands of searchable databases on the Internet that

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may be accessed through Gopher. GUI Gopher clients use a square with a question mark to denote a searchable database; command-line clients put "<?>" at the end of entries that represent searchable databases. In Figures 24.1 and 24.2, see the entry "Search Gopher Jewels Menus by Key Word(s)" as an example. Another type of searchable database found in Gopher are so-called "CSO" servers, which are used primarily for e-mail and telephone databases.

GUI clients denote CSO databases with this icon: 📖 ; command-line clients append "<CSO>" to the end of entries that are CSO databases.

Most searchable databases on Gopher can do Boolean searches. Boolean searches allow users to connect search criteria (sometimes called the search term or search criteria) using logical operators like AND, OR, and NOT. For instance, if you are interested in documents on adult literacy AND technology, you would enter "adult literacy AND technology." The search engine (i.e., the software that interprets the search terms, finds documents in the database that match the terms, and then lists these documents so that you may choose ones to read) would return only those documents that include the words "adult literacy" and the word "technology" in the text, but not those documents that include only "adult literacy" or only "technology." Most Gopher databases recognize logical ANDs, ORs, and NOTs, and combinations thereof (for instance, "adult literacy AND NOT technology").

There are several different types of searchable databases in Gopher. One of the most common types of databases is Wide Area Information Servers (WAIS). WAIS used to be a stand-alone Internet system, but as Gopher developed, almost all of the WAIS databases were incorporated into the Gopher system. WAIS databases are full text databases—they search the entire text of every document included in the database file for words or phrases that match the search term. One of the most useful features of WAIS is that, unlike most Telnet databases, searchable databases in Gopher return not only the reference to a document but the text itself. For instance, if we were to search the entry "Search Gopher Jewels Archives: Discussions, Announcements, Tips . . ." on the word "education," the search engine would return the following:

```
═▣═════════════════ education ════════════════▣═
▼   Internet Gopher ©1991-1994 University of Minnesota.
   📄 Introduction to the Teacher Education Internet Ser▲
   📄 david.rigg Re: Education collection
   📄 Project GeoSim is a joint research project of the
   📄 The TENET Gopher is a K-12 resource out of Texas.
   📄 david.rigg Re: Higher education
   📄 david.rigg Re: EDUCATION COLLECTION
   📄 speyer@mcc Re: Re: Higher education in Germany
   📄 speyer@mcc Re: Forum: Education About the Enviro
   📄 david.rigg Re: EDUCATION GOPHER
   📄 david.rigg Re: Enviro. software            ▼
◀                                                ▶
```
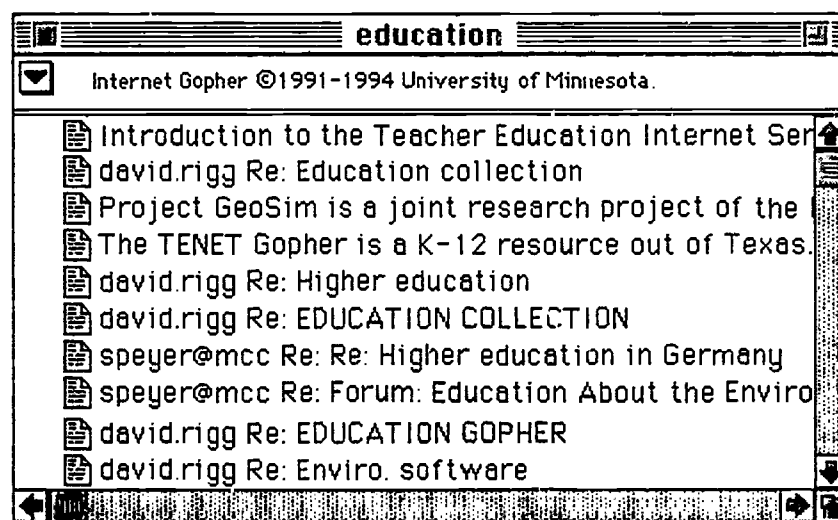
Figure 26. These are documents returned by a search of the "Search Gopher Jewels Archives. Discussion, Announcements, Tips   " WAIS database (see Figures 24.1 and 24.2).

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All of these entries are text documents that contain the word "education" somewhere in the file. You can read any of the documents by double clicking (or entering the document's number). About five hundred information providers maintain WAIS databases, including NCAL (NCAL's database of commercial adult literacy software), AskERIC (the ERIC digests), and the Outreach and Technical Assistance Network (OTAN) (legislative archives, curricula resources, etc.), to name a few.

Another type of database on the Internet is VERONICA. VERONICA stands for "very easy rodent-oriented net-wide index to computerized archives." The rodent in this case is Gopher and the archives are all the Gopher servers in the world. VERONICA is a Gopherspace-wide system for locating information. With more than 5,000 sites, it can be very difficult to find the server or piece of information that you are seeking by browsing alone. To solve this problem, a group at the University of Nevada-Reno developed software that creates a searchable master file for Gopher. Each night, their software logs onto one-thirtieth of those 5,000 servers, noting the name and location of each file, folder/directory, searchable database, and Telnet log-in (which will be discussed below). Gopher users can then search this master file using Boolean search terms.

For example, assume that we want to find more information about adult literacy. The National Center on Adult Literacy is one place to find such information, but there are others as well. Rather than wasting time looking through hundreds of servers, we could use VERONICA to find other information providers. The first step is to find the VERONICA search icon (this tool is so popular that most on-line services make sure that its folder/directory appears when you start using their Gopher client) and enter "adult literacy." A few minutes later, VERONICA will return the following list (this example is from the GUI client; the command-line client works exactly the same way):
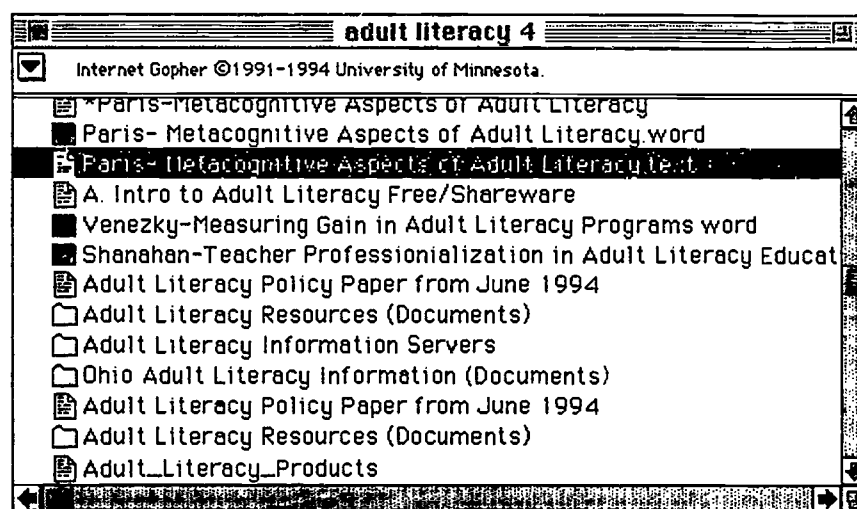

Figure 27. Gopher documents found by searching the VERONICA system using the keyword "adult literacy."

Unlike our WAIS search, this VERONICA search did not produce only text documents; it also returned a number of folders/directories and several formatted documents (formatted documents and pieces of software are represented by an icon that looks like a floppy disk —we'll address this

below). This Gopher menu works like any other Gopher menu; clicking on a text document causes the client to display the text, clicking on a folder/directory causes the client to display the contents, and so forth. However, unlike our other examples, not all of these files, formatted documents, and folders/directories come from the same server. In fact, some are from NCAL's Gopher, others are from the Ohio State Literacy Resource Center's server, and still others are from a server in Kentucky. The only link between these items is that they all have the words "adult literacy" in their titles.

Though VERONICA can be a very powerful tool, it also has limitations. Unlike WAIS, VERONICA does not search the text of the documents discovered, only the titles, which sometimes bear no resemblance to the content. VERONICA is a very overworked system. All too often, VERONICA does not send you a list of resources but rather a message saying it is too busy to process your search at the moment (the sample search took twelve tries before it went through). However, it is the only comprehensive search tool currently available in Gopher.

In the beginning, there was VERONICA; soon afterward came Jughead. Jughead is another type of searchable database found in Gopher. In fact, the only difference between VERONICA and Jughead is that Jughead searches on a specific server rather than on the whole Gopherspace. Jughead search engines are not always clearly labeled as such. In Figures 24.1 and 24.2, the entry "Search Gopher Jewels Menus by Key Word(s)" is actually a Jughead in disguise. "Gopher Jewels" is the name of this server, so this Jughead will only search the file and folder/directory names in "Gopher Jewels" server for items that match the search term.

The final type of searchable databases are CSO (Central Services Organization) databases. As mentioned before, CSO databases are used primarily to search telephone or e-mail databases. Unfortunately, the CSO system is not a "White Pages" for the Internet. Each institution can decide whether it wants to create a CSO database and what members of the staff to include therein. Thus, to find the e-mail address of someone you know, you'll need to start by figuring out what institution provides her or him with her/his e-mail account. Once you've figured this out, you'll need to find the institution's Gopher (if it has one) using VERONICA. Finally, once you've found the Gopher, you'll need to search the server with Jughead or scan through the folders/directories until you've found the proper search icon. Hopefully, one of the commercial information providers will create an e-mail directory in the near future to speed up this process.

Reading and recovering text files and searching databases are features available to almost everyone who has access to the Gopher system. There are a few other services that more sophisticated clients can also provide. The first is downloading formatted documents, software, graphics, and other forms of non-text information. Telling the client to download a document is relatively easy; in a GUI, you simply double click on the icon of the software or document you wish to download. In a command-line client, you need only enter the item's number and hit the return key. After a command is given, processing the incoming file is more difficult. For a variety of reasons, downloading text is easy, but downloading non-text files—often called binary data—is difficult. For a more in-depth discussion of downloading software and other forms of binary data, see Appendix G of this document. As of this writing, many of the

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command-line services offer binary data downloading, but America Online, the only major company offering a GUI Gopher client, does not. AOL has promised this capability by spring/summer 1995.

A second feature of Gopher is its ability to start a Telnet session. As we mentioned in the section on Telnet, one of the really frustrating things about this tool is that you have to remember or to write down the relevant server's domain name in order to use it. Gopher takes care of this problem by storing the information in a small file. In GUI Gopher clients, the Telnet icon usually looks something like this: ▣; in command-line interfaces, "<TEL>" is appended to the end of the entry to indicate a Telnet log-in. By clicking on a Telnet icon (GUI) or selecting the line item and hitting return (command-line), the computer automatically starts the Telnet session by sending the domain name (which the Gopher server always remembers) and log-on ID to the Telnet host computer. From there, the Telnet session progresses like any other. The command-line services usually offer Telnet through their Gopher clients. The GUI providers do not (though, as we mentioned before, America Online is promising to have this capability by spring 1995).

Gopher is an extremely powerful tool that on-line services are only beginning to bring to those relying on modems to connect to the Internet. As more features are added to the GUI and command-line services, Gopher's usefulness to the literacy community will only grow.

THE WORLD-WIDE WEB

While Gopher provides an acceptable interface and method for organizing information, the quest for the perfect user interface and information retrieval system on the Internet is far from complete. Even before Gopher became a cornerstone of the Internet, a group of software developers at the European Laboratory for Particle Physics in Switzerland (the French acronym is CERN) began work on a new interface that would overcome these limitations. The team at CERN was seeking to create a network information retrieval tool that could display text and graphics, play sounds, and (eventually) integrate live or stored video. Ideally, the same piece of software would be able to access FTP servers, "telnetable" databases, and the USENET bulletin board (and any other information system that came along, like Gopher). They called their scheme the World-Wide Web (WWW).

CERN'S new information system incorporated three innovations: immediate viewing of multimedia information, hyperlinks, and URLs. The first innovation was to create a system that eliminated the need to download a document or graphical image before it could be viewed. Gopher took a step in this direction by allowing the user to view plain text documents without first downloading the file. World-Wide Web extended this capability substantially. Web client software is designed to display text and graphics simultaneously. If Gopher is like a paperback book—all text with no special formatting or graphics—World-Wide Web is like a page in *Newsweek* or *Life*—text surrounded by color graphics and photos. Newer Web browsers (a generic term for the client software used to view Web-based information) also incorporate graphical forms and the ability to play audio clips and display digitized video. Information on the Web is divided into "pages"; each Web page includes text and one or more graphics, electronic forms, audio clips, or digitized video.

These capabilities make the Web the first Internet tool to exploit the potential of multimedia.

The second innovation, hyperlinks, provided a more efficient way to navigate from one Web resource to another. Hyperlinks are key words or phrases in a Web page that are "linked" electronically to other Web pages or to other information systems like Telnet log-ins, Gopher servers, FTP servers, or USENET bulletin board sites. Hyperlinks may be used to connect Web pages on the same server or on a server many miles away. When you click on a hyperlink (GUI) or select it using the arrow keys and return key (command-line), the WWW browser immediately displays the linked Web page. Most browsers denote a hyperlink by either showing the text in a different color than non-linked text (GUI) or by bolding and underlining the hyperlinked text (command-line; black and white GUI).

To illustrate a hyperlink, let's assume this document is available through a WWW server and that hyperlinks are denoted in this Web page by text that is bold and underlined. If you click on such an entry—like this word, Gopher— the WWW browser you are using would take you to more information on Gopher—for instance, it might bring up the section that preceded this one. Or it could retrieve a Web page from the University of Minnesota about Gopher. Or it might lead to a Web page on the mating habits of gophers (yes, the furry rodents, not the Internet information system). Only the context of the link will tell you what type of additional information will be displayed by a hyperlink. Each Web page author has complete control over the creation of hyperlinks between pages.

Hyperlinks may be used in several different ways to organize information. One way is rather like a table of contents. One Web page acts as the table of contents and primarily contains links to other Web pages. Table of contents pages may be organized geographically, by subject, or by some other system the author devises. Another way to organize hyperlinks is to use them as footnotes are used in academic papers: to provide additional information or to cite information quoted or paraphrased from another work. NCAL's home page includes an electronic version of the U.S. Congress, Office of Technology Assessment's report *Adult Literacy and Technology: New Tools for a Lifetime.* In this Web page, the footnotes are hyperlinked to a separate Web page that contains the actual footnote text. In the future, it will be possible to create a hyperlink to the paragraph and page of a cited work. Finally, many hyperlinks are established to provide readers with a way to look at electronic information provided by an organization mentioned in the text. Again using NCAL as an example, our "home page" (i.e., the Web page that is displayed whenever someone logs into NCAL's WWW server that has hyperlinks to all other Web pages created by NCAL) mentions that we are a U.S. Department of Education-sponsored research center. We created a hyperlink between the words "U.S. Department of Education" and the Department's home page for this reason.

The final innovation was the creation of a system for referencing information around the Internet. One of the inherent problems for a system like WWW, which sought to retrieve information not only from many different WWW servers, but also from many different information systems (like Gopher, FTP, USENET, etc.), is that there needed to be some way to reference these resources. As we noted with Telnet, you can't simply type in "I want to search the Harvard library card catalog database." Moreover, each information system uses different commands. How would the WWW browser know whether to

send WWW commands, Gopher commands, or FTP commands? The answer was to create a specific notation for recording what type of information server a file is mounted on, what the domain name of that server is, and where the file can be found on the server. These notations are known as Universal Resource Locators (URLs). Here is the URL needed to find NCAL's WWW server:

`http://ncal.literacy.upenn.edu/default.html`

The first part of any URL indicates the type of information server on which the information is located. HTTP (hypertext transport protocol) indicates that this resource is on a WWW server, so the client should send WWW commands. Table 6 lists the other valid information server identifiers.

Table 6

WWW identifiers for information servers

Identifier	Information system
http	World-Wide Web
gopher	Internet Gopher
ftp	File Transfer Protocol (FTP)
telnet	Telnet
news	USENET

After the colon and two forward slashes (which are a part of every URL) is the domain name of the server. Simple URLs may end after the domain name; more complex ones— those that refer to one Web page out of many on the same server—may include forward slashes and additional text. In the example, the URL refers to NCAL's default page, one of about fifty on NCAL's server. URL's have proven to be a very important innovation, because they make it possible to access many information systems using one piece of client software.

When WWW was first launched, use grew slowly because most of the WWW browsers were designed for use on UNIX™-based computers. However, when NCSA created versions of Mosaic for use with Windows™ and Macintosh™ computers, growth exploded. Because of the popularity of Mosaic, the World-Wide Web will become the most heavily used Internet information retrieval tool during 1995. Mosaic caught the imagination of educators, business people, and the media as nothing on the Internet has before. Mosaic has become so popular that several major software developers have taken the original public domain software, enhanced it, and are now selling "souped up" Mosaic clients, the most popular of which is Netscape from SpyGlass software. Most people agree that an enhanced version of Mosaic will become the primary interface for the NII, when it is deployed.

Until very recently, there were very few on-line services that provided access to the World-Wide Web. In January 1995 Prodigy announced that it was offering access to the WWW through its existing GUI. In May 1995 America Online followed suit. Additionally, a number of command-line services now offer access to Lynx, a text-only WWW browser. As you can imagine, however, a text-only reader is much less exciting than a graphical one, for WWW's biggest advantage over Gopher is its ability to display graphics. We will briefly describe how both types of clients work, though in the main,

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WWW browsers are functionally similar to Gopher browsers. For this discussion, refer to Figures 28.1 and 28.2.

The University of Pennsylvania
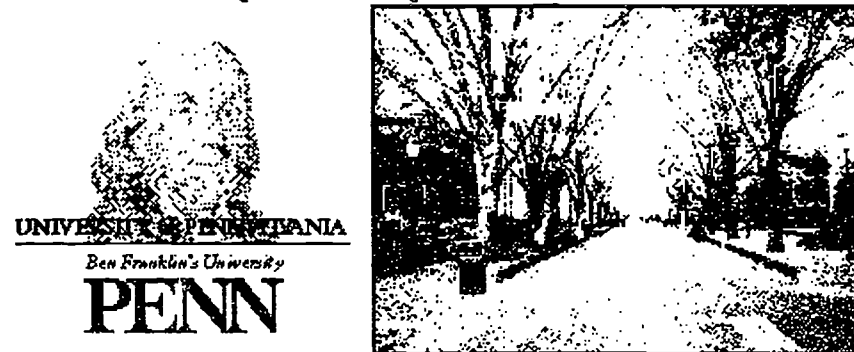
University Information Services

- **Schools** -Information from Penn's Schools
- **Departments** - Academic & Administrative; Centers & Institutes
- **PennLIN** - Gateway to Penn's Library resources
- **Student Life** -Undergraduate and Graduate Student Organizations
- **Almanac** - Official weekly of the University
- **PennExpertise** - Faculty research interests and expertise
- **PennInfo** - Penn's Campus Wide Information System
- **PennNet Passport 94-95** - Penn's guide to networking
- **Penn Printout** - Penn's computing newsletter
- **PENN E-Mail Directory**
- **Interactive Campus Map** - And Other Campus Attractions
- **Personal Home Pages** - Faculty, Students, & Staff

Do you have any ideas or comments for the PENN Home Page? Send us your feedback!

Figure 28.1. The University of Pennsylvania's home page. as viewed using a graphical World-Wide Web client. (URL: http://www.upenn.edu/)


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                    THE UNIVERSITY OF PENNSYLVANIA

   Penn's Founder, Benjamin Franklin  Locust Walk


University Information Services

      * Schools -Information from Penn's Schools
      * Departments - Academic & Administrative; Centers & I
      * PennLIN - Gateway to Penn's Library resources
      * Student Life -Undergraduate and Graduate Student Org
      * Almanac - Official weekly of the University
      * PennExpertise - Faculty research interests and exper
      * PennInfo - Penn's Campus Wide Information System
      * PennNet Passport 94-95 - Penn's guide to networking
      * Penn Printout - Penn's computing newsletter
      * PENN E-Mail Directory
      * Interactive Campus Map - And Other Campus Attraction
      * Personal Home Pages - Faculty, Students, & Staff

     Do you have any ideas or comments for the PENN Home Page
```
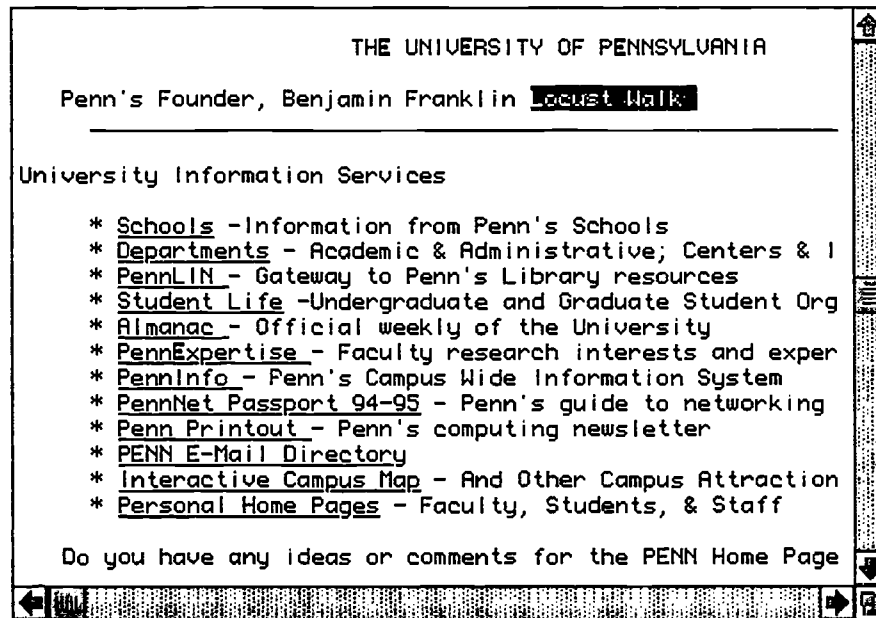
Figure 28.2. The University of Pennsylvania's home page. as viewed using a command-line World-Wide Web client.

In most cases, if you can navigate through a Gopher or FTP server, you should be able to find your way around a WWW server. As before, you will need to begin by opening the client software. If you are using a GUI, this is usually accomplished by clicking on a button marked WWW, Mosaic, or something similar. In a command-line client, you must normally begin by entering a command such as "lynx," "www," "mosaic," or "web"; these commands are not yet standardized, so check your documentation.

Most Web browsers are configured to bring up a home page by default. In the example, the University of Pennsylvania's home page was displayed by default. Penn's home page is of the table of contents variety—this page leads to other pages. To select another home page for viewing, one would either click on the desired hyperlink (GUI) or use the arrow keys to move a highlighter bar to the desired hyperlinks and hit the return key (command-line).

Most Web clients also allow you to log into another home page manually (i.e., without going from one Web page to another until you get to the Web page you desire). This is done by using the "Open URL" or "Another URL" menu option (GUI) or the "go" or "another" command (command-line). After using the menu option or command, enter the URL for the desired page. For instance, to log into the NCAL home page, one would enter http://ncal.literacy.upenn.edu. In Appendix H, you will find a selection of information servers that are relevant to adult literacy providers; the listings include the appropriate URLs.

Any Web page may be printed or saved for off-line viewing. GUI clients allow you to print or save to the hard disk by simply selecting the "Print" or "Save" command from a menu or selection of buttons. Command-line clients often require you to take the intermediate step of sending the document to your e-mail account—like "Gopher Mail" (see the previous section for more details). Normally, the "WWW Mail" feature is accessed by choosing the "m" (for "mail") or "p" (for "print") command. The client will then ask you to enter your e-mail address. When finished, hit the return key. A few minutes later, the document will arrive at your mail box.

As with Gopher, there are a number of WWW features that are not available in command-line clients and that are not available in all GUI clients. Some, but not all, GUI clients allow you to hear audio clips or screen digital movies; however, audio and video files can be very large—in excess of 500K— and thus take a long time to get from the on-line service's computer to your computer over the modem. GUIs and some command-line clients may also be used to download binary data, though you should review Appendix G before using this feature.

With so many companies using the WWW to advertise and/or provide services (our favorite is the FedEx home page, which allows you to check on a package—check out the URL: http://www.fedex.com), WWW will continue to grow almost exponentially into the foreseeable future. However, WWW growth has demonstrated some of the weaknesses of the Internet— weaknesses that the NII will need to address.

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As is probably apparent by now, the Internet is more than just a set of computers, network media, and network devices. It is a rapidly growing and evolving community that spans the globe. No longer is the Internet simply a place for generals, academics, and computer scientists. The Internet is rapidly becoming a fixture in America's schools, workplaces, and homes. Part of the Internet's recent growth and popularity stems from the rapid assimilation of new users who are not affiliated with government or the academy. Rapid assimilation has been possible through reliance on a century-old technology: the telephone. As this guide has demonstrated, using a modem and telephone line, it is possible to gain low-cost access to almost all the resources the Internet has to offer. For the next few years, this route to the Internet will continue to be the most efficacious way for individuals and small- to medium-sized literacy programs to join the Internet.

However, the future development of the Internet will depend on moving beyond the telephone, for telephone technologies create a barrier to exploitation of the Internet's full potential. The emergence of World-Wide Web is the best example of why the telephone system will not support future uses of the Internet. The great advantage of WWW over other information systems on the Internet is the Web's use of multimedia. Documents can (almost literally) come to life through use of computer graphics, audio clips, and digitized video. However, graphics, audio clips, and digitized video segments are very large electronically speaking. A three by five inch graphic at low resolution can require 25 to 50K of storage space. WWW pages usually have graphics of this size and sometimes others that are substantially larger—say 50 to 150K. As a result, WWW pages may require the transmission of between 50 and 250K of information. On the high speed parts of the Internet, this does not pose a problem; the normal transmission rate is between 1.5 and 45 megabytes per second (theoretically), so a normal home page can be displayed in 5 to 10 seconds. Modems are quite a different story. As we discussed before, the most common modem speed today is 14,400 bps; the highest speed modems available on the market are 28,800 bps. However, these are theoretical transfer rates. Actual transfer rates for a 14,400 bps modem are usually between 2,000 and 4,000 bps (2-4K per second). Taking into account the difference between actual and theoretical speeds, it takes (optimistically) 30 seconds to two minutes to download a typical WWW page of information. The lag between request for information and receipt thereof is known as latency. After a while, latency periods become intolerable. There appear to be inherent limitations in the existing phone system that may prevent transmission of data at speeds that are possible using coaxial or fiber optic cables.

It is precisely because of these limitations that the Clinton Administration, Congress, and many telecommunications companies are studying the development of a National Information Infrastructure (NII). Without developing and deploying new technologies to overcome the "bottlenecks" in the telephone system, the full potential of electronic networks for education, research, business, and entertainment will not be realized. The technical side of the NII is already moving from the laboratory to test markets around the country. Both the regional Bell operating companies (ReBOCs) and cable television companies are

testing the next generation of telecommunications equipment. Digital Equipment Corporation, in cooperation with several cable companies, has developed what they call a cable modem. A cable modem uses two cable TV channels to establish a two-way flow of information over existing cable TV wires. Once installed, a cable modem works just like a telephone modem, except that cable modems are capable of transmitting at a rate of 1 to 3 megabytes per second. The ReBOCs are testing new digital phone systems and data compression technology in an attempt to break through the limitations of the existing phone system, though with less success than was originally anticipated. Nevertheless, it is quite likely that within the next five years, the ReBOCs, cable companies, or some other telecommunications entities will be able to offer inexpensive, high-speed data communications to homes and small business. It is only a matter of time and the proper regulatory environment in Washington, DC and the various state capitals.

This brings us to a concluding note on the NII, adult literacy, and the role that adult literacy educators and the field in general can play in this revolution. Like the years preceding them, 1995 and 1996 will witness some of the most unprecedented changes in telecommunications policy seen in almost fifty years, as companies try to capitalize on the Internet and deliver entertainment content via electronic networks. Already, major telecommunications and entertainment companies are lined up in Washington and in key state capitals to assure that their opinions about NII policy are heard, but few voices are being raised in support of NII policies that support education at any level; fewer still are raised in support of adult literacy's interests in the NII. The issues are numerous and complex, but they may be boiled down to two questions. First, are the proposed policies leading toward open access to information, regardless of income level? And second, are these policies promoting the division of society into information haves and have-nots? There is little question that improper use of information technologies can lead to further polarization of society. Many people who enter literacy programs today are actually trying to overcome two deficiencies—deficiencies in their ability to read, write, and calculate and deficiencies in their ability to cope with and use computer and information technologies. However, information technologies can be profoundly empowering, as was discovered by students in China and reformers in Russia, who used telephones, fax machines, and the Internet to get out the truth about their country's policies and actions. Information technology could finally offer an opportunity for adult literacy learners truly to control their own learning—to learn what they want, when they want, where they want, for as long as they want.[†] There are no guarantees that this potential will be realized unless those in the adult literacy community begin to speak out. Several telecommunications companies have already been accused of new forms of community "red-lining" in their NII plans The time to act is now, before new regulations are written in bureaucratic stone.

As a newly initiated member of cyberspace, you need to be aware of these issues and consider becoming involved. You will know best where your points of leverage might be in your own community, but at minimum, consider taking these steps:

[†] For an excellent discussion of the promise of technology for adult literacy in general see U.S. Congress, Office of Technology Assessment. (1993). *Adult Literacy and Technology: Tools For a Lifetime.* GPO: Washington, DC.

- Contact your cable company and local telephone company to find out how they plan to participate in the NII.

- Contact your state or local public utility regulatory agencies to see if they are engaged in planning for the NII.

- Write or call your federal, state, and/or local political representatives to see what positions they have with regard to development of the NII and adult education.

- Contact officials in your local school or school district to see if they are connected to the Internet and whether they are working with any of the networking "players" already.

Finally, share the wealth. Having completed this guide, you have skills that are in short supply in the adult literacy community. NCAL receives many requests for training that cannot be fulfilled every year. Consider using this guide to train others. The best way to influence the direction of the NII is to show that adult literacy practitioners are active participants on the Internet, with views and ideas that should be contributed to the NII debate.

Happy net surfing!!!

REFERENCES

Carl-Mitchell, S., & Quarterman, J. S. (1993). *Practical Internetworking with TCP/IP and UNIX*. Reading, MA: Addison Wesley Publishing Company.

Donohoe, A., Campbell, J., Ciggs, C., Rethemeyer, R. K., & Hopey, C. (1995). *Making sense of technology terminology for adult literacy: A glossary and annotated bibliography* (Practice Guide PG95-01). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Frey, D., & Adams, R. (1989) *!%@:: A directory of electronic mail addressing and networks*. Sebastol, CA: O'Reilly and Associates, Inc.

Harvey-Morgan, J. (1995). *Moving forward the software development agenda in adult literacy: A report based on the Adult Literacy Software Development Conference* (Draft NCAL Report). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Harvey-Morgan, J., Hopey, C., & Rethemeyer, R. K. (1995). *Computers, technology, and adult literacy: Results of a national survey on computer technology use in adult literacy programs* (Draft NCAL Report). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Hopey, C., & Harvey-Morgan, J. (1995). *Funding technology in adult literacy* (Practice Guide PG95-02). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Hopey, C., & Harvey-Morgan, J. (1995). *Technology planning for adult literacy* (Practice Guide PG95-03). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Hopey, C., & Rethemeyer, R. K. (1995). *Making the right choice: Evaluating computer software and hardware for adult literacy instruction* (Practice Guide PG95-04). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

Kosiur, D., & Jones, N. E. H. (1992). *Macworld networking handbook*. San Mateo. CA. IDG Books Worldwide, Inc.

Krol, E. (1992). *The whole Internet: User's guide & catalog*. Sebastol, CA: O'Reilly and Associates, Inc.

Liu, C., Peek, J., Jones, R., Buus, B., & Nye, A. (1994). *Managing Internet information services*. Sebastol, CA: O'Reilly and Associates, Inc.

Turner, T. C. (1993). *Literacy and machines: An overview of the use of technology in adult literacy programs* (Technical Report TR93-03). Philadelphia: University of Pennsylvania, National Center on Adult Literacy.

U.S. Congress, Office of Technology Assessment. (1993). *Adult literacy and new technologies: Tools for a lifetime* (OTA-SET-550). Washington, DC: U S Government Printing Office.

EQUIPMENT CHECK-OFF LISTS FOR APPLE MACINTOSH™ AND IBM-COMPATIBLE COMPUTERS

Equipment Check-Off List

Computer	Already Have	Must Buy/ Upgrade	Cost
Apple Macintosh™ Plus or newer			$
Hard drive with 2 megabytes of open space			$
1 Megabyte memory (2-4 megabytes preferable)			$
Color monitor (optional)			$
System 7.0.1 or higher			$
		Subtotal	$

Equipment Check-Off List

Computer	Already Have	Must Buy/ Upgrade	Cost
Intel 386/486/Pentium			$
1 Megabyte memory (2-4 megabytes preferable)			$
VGA or SVGA-compatible monitor			$
DOS 3.3 or higher			$
Windows™ 3.1 or higher (optional)			$
Mouse (optional)			$
Sound card (optional)			$
System 7.0.1 or higher			$
		Subtotal	$

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Modem (for both Apple Macintosh™ & IBM-Compatible Computers)

Modem
$ _____

Capabilities (check those which apply)

Speed:

9,600 bps _____

14,400 bps _____

19,200 bps _____

28,800 bps _____

Hayes AT™ compatible _____

Mounting:

Internal _____

External _____

Fax capability _____

Cables adapters (if necessary)
$ _____

Subtotal $ _____

Telephone (for both Apple Macintosh™ & IBM-Compatible Computers)

Options (choose one)

Use existing phone line, no additional costs

Install line splitter

Line splitter and installation _____

Telephone wire from phone closet to
computer workspace and installation _____

Install new phone line _____

Line installation _____

Telephone wire from phone closet to
computer workspace and installation _____

Use an existing fax line _____

Telephone wire from phone closet to
computer workspace and installation (if
necessary _____

Subtotal $ _____

Total Equipment Costs $ _____

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This appendix provides a few helpful hints for those who subscribe to an on-line service that uses a command-line interface or for those who wish to access smaller bulletin boards that use command-line interfaces. For clarity, we will refer to the remote computer as the "on-line service's computer," though all information provided below is applicable to both on-line services and bulletin boards. In most cases, command-line services do not provide special client software to control the modem and communicate with the service's computer. Instead, you will need to use a terminal emulation software package. Terminal emulation software, as the name implies, is software that turns your powerful personal computer into a dumb terminal. For a review of mainframe-terminal computing, see the discussion of networking models at the beginning of Part V. Terminal emulation software fulfills two important functions. First, it configures and controls your modem during a session on the service's computer. Second, it coordinates the flow of information to and from your computer and the service's computer. As we shall see, both functions are intertwined.

Most modems are sold with terminal emulation software. There are also several commercial and shareware packages available. If your modem included terminal emulation software, try using the included software before turning to other options. Software included with your modem will be compatible with your modem; other packages may not be. If terminal emulation software was not included, there are several options. The most popular terminal emulation package for Windows™ and DOS machines is ProComm from DataStorm Technologies. Microsoft Windows™ includes a basic terminal emulation package called "Terminal" that may also be used. Terminal may be found in the "Accessories" Program Group container. The most popular commercial package for Macintosh™ users is MicroPhone Plus from Software Ventures Corporation. Another very popular program is Z Term by David Alverson, which is available on the Internet as shareware. Any of these packages should work properly with Hayes-compatible modems.

In order to fulfill its role, the terminal emulation software must be configured properly. There are two types of configuration options: those that control how the terminal emulation software interacts with the modem and those that control how the terminal emulation software interacts with the service's computer. It is important to note the distinction. Those configuration options that control the relationship between software and modem need only be set once (unless you buy a different modem, of course). Those options that control the relationship between software and service computer must be changed any time you dial into a different service. Table B.1 below lists the different configuration options and whether they are modem or service specific.

Table B.1

Software Settings

Service Specific	Modem-Specific
Data bits	Baud rate (speed)
Stop bits	Port
Parity	Init string
Flow control	
Terminal type	
Local echo	
Line feeds	
Line wrap	
Backspace	
Binary file transfers	

We will start by reviewing the modem-specific configuration options. Before we begin, make sure to pull out your terminal emulation software's manual. We will discuss each command generically below; you will need to use your owner's manual to determine how to implement the suggested configurations.

MODEM-SPECIFIC CONFIGURATION

There are three modem-specific configuration options: baud rate (sometimes known as the "speed" setting), port setting, and init string. The first two configurations are fairly straightforward. The baud rate setting tells the software how fast your modem operates. If you are unsure what speed your modem is, check the documentation. The second configuration option is the port setting. On Macintosh™ computers, this setting is usually made by highlighting or

choosing an icon similar to this: from a list. The only reason you would choose any other port is if you are using an internal modem or if you have connected your modem to the printer port (i.e., the port labeled with this icon:

). On IBM-compatible computers, normally you either enter or select the COM port number (i.e., COM 1, COM 2, etc.).

Configuring the init string for the modem is much more difficult. The init string is used to turn on or off certain features (like a fax modem's fax capability) before the terminal emulation software begins a session with a service computer. In most cases, you will not need to specify any init string to make the modem work properly, because the terminal emulation software chooses the correct string when the software is installed. Some software packages will ask to specify the make and model of your modem the first time you use the software. (If you don't find an entry for your specific modem, use the default "Generic Hayes-compatible" option.) If the software does not work properly, check the cable connections, other modem settings, and service-specific settings. If you have eliminated any other possibilities, check your modem's documentation to see if it lists the proper init string. If all else fails,

contact the manufacturer or the publisher of the terminal emulation software for more information.

SERVICE-SPECIFIC SETTINGS

Most of the modem settings are specific to the service. For this reason, you will need to get some basic information from the on-line service before you begin. At minimum, you need to know the number of data bits, parity, stop bits, and the flow control method used by the service. Many services provide this information in a rather cryptic fashion. Look for a line in the documentation or advertisement such as "Set your modem to 8, 0, N" or "Set your modem to 8 data, 0 stop, and no parity."

Many terminal emulation programs allow you to create a "connection document" which stores the service's dial-up number and associated settings. Before progressing to the next step in this appendix, find out how to create a connection document if your software supports this feature.

We'll begin by setting the data bits, stop bits, and parity. These settings tell the modem into which format the data should be put before transmitting to the service. The data bits setting may be set to 5, 6, 7, or 8; the stop bits to 1, 1.5, or 2; and parity to even, odd, or none. Note that the "No" or "None" parity setting may only be used when data bits is set to 8. As we noted above, this information is sometimes written as "8, 1, N" or something to this effect. There is no standard format for stating the data bits, stop bits, and parity in this short-hand. You will have to remember that stop bits cannot be higher than 2 and that the data bits setting cannot be lower than 5 (any letter included should be self-explanatory).

The next setting is for flow control method. As the name implies, flow control is used by modems to make sure that one modem is not sending more information than the other modem can handle at a given time. By "negotiating" a way to signal each other to stop sending information and then to start again, the modems make sure no information is lost because the receiving modem is too busy to process the next batch. There are two flow control methods. One is controlled by the terminal emulation software and is generally known as "XON/XOFF." The other, more commonly used method, is hardware flow control, sometimes also known as RTS/CTS control. If your service documentation does not specify which method to use, try hardware control first.

The next step is to tell the service what type of terminal you are using. As we discussed in the section on Telnet (see Part V), several different manufacturers made terminals for use with mainframes, so you need to let the service know which one your software is emulating. Most services support emulation of VT100 or VT220, so this is usually a safe choice. Another safe choice is TTY. You should, however, consult your documentation to find out which terminal emulations the service accepts.

Local Echo tells terminal emulation software whether to display the characters you type on the screen or not. Ironically, in most cases you do not want to have this turned on. Most on-line services and bulletin boards automatically tell the terminal emulator to display the characters you type. If you have local echo on and the service also sends a command to display the letters

you type, your typing will look like this: "yyoouurr ttyyppiinngg wwiillll lloooookk tthhiiss.." To fix this problem, turn off local echo. If you do not see what you type displayed on the screen, turn local echo on.

Sometimes terminal emulators display all text on one line. Instead of a flowing page of text, it is as if all the words on this page were printed over top of one another. If this happens, you need to set the terminal emulation software to send a "line feed" every time it gets to the end of a line (here meaning that it encounters a "carriage return" character). Some terminal emulators have a command simply labeled "Auto line feed." Others use cryptic acronyms. In Window's™ "Terminal," automatic line feeds are invoked by clicking on the "CR -> CR/LF" (meaning carriage return implies carriage return and line feed) check-box in the "Terminal Preferences" menu.

As with some DOS word processing programs, to see text on-screen as a smooth body, you must have the line wrap set properly. Normally, terminal emulation programs default to line wrap at 80 columns (i.e., 80 characters across the screen). If, however, text from the service comes through all jumbled or cut off, try setting the word wrap lower—72 or 60 columns.

Another frustration with many terminal emulation programs is that the backspace key does not work as expected. Backspace may be configured to back up one space without removing the existing characters (like an arrow key); back up one space and remove the character that was one space to the left of the where the pointer was located (destructive backspace); or to "rubout" the character to the right of the cursor (rubout backspace) whenever the delete/backspace is hit. In most cases, it is least confusing to set the delete/backspace key to "destructive backspace."

Finally, most terminal emulation software allows you to download or upload binary files (i.e., transfer a copy of a piece of software, formatted document, graphic, sound, etc. from one computer to another). Over the years, software developers have created a number of protocols for transmitting binary data over a modem, thus you need to configure your software to use one by default. When you are ready to download a binary file, you will also need to tell the service's computer which transfer protocol your software is using. To demonstrate this, we will step through the process of downloading the text of a grant from the Department of Education's ED Board.

The first step is to configure your software with a default download protocol. There are five "families" of download protocols: XModem, YModem, ZModem, Kermit, and Sealink. Terminal emulation software for DOS and Windows™ usually support the Kermit and XModem protocols; Macintosh™ terminal emulators usually support the XModem, YModem, and ZModem protocols. There are several different versions of the XModem, YModem, and ZModem protocols, the principal difference between versions being the amount of information sent in a given "packet" and the error correction method used. In general, XModem and Kermit are the most widely used protocols; if you are unsure what download protocols are supported, choose one of these two. The ZModem protocol offers the highest rate of transfer; if you are sure your on-line service supports it, choose ZModem. For the purposes of this demonstration, assume that we have configured the modem to download using ZModem.

In this example, we have already dialed into ED Board using the Z Term terminal emulation package and have conducted a search of the Department of Education grants database, finding one for development of educational media. The first part of the text is displayed below. Instead of reading the text on-line, we have chosen to download the entire text. The first step is to enter "d" to start the download process (see Figure A.1).

```
===================================================================
File: 026.TXT                                          Page: 1   ( 12%)
-------------------------------------------------------------------
84.026 Ed Media Research/Production/Distribution/Training

Monday, November 7, 1994

Educational Media Research, Production, Distribution, and
Training Program; Notice inviting applications for new awards
under the Educational Media Research, Production, Distribution,
and Training Program for Fiscal Year (FY) 1995

PURPOSE OF PROGRAM: The purposes of this program are to promote
the general welfare of the deaf, hard-of-hearing, and visually
impaired individuals, and the educational advancement of
individuals with disabilities.

   This program supports the National Education Goals by
assisting those with disabilities in school readiness and adult
literacy.

ELIGIBLE APPLICANTS: Profit and nonprofit public and private
-------------------------------------------------------------------
<U> PgUp         <CR> PgDown        <F>ind      <D>ownload      <+> NextFile
```

Figure A.1. An example of a typical bulletin board display (the U.S. Department of Education's ED Boards, in this case).

The on-line service's computer responds by asking you to specify a download protocol (see Figure A.2). As you can see, there are a number of different options. Unless you are sure the file you are downloading is all text, you should choose an XModem, YModem, ZModem, Kermit, or SEAlink protocol. In this case, since we have set our client to use ZModem by default, we will enter "z" to choose ZModem-90(tm).

```
Select from the following transfer protocols:

T - TYPE file to your screen
C - ASCII with DC2/DC4 Capture
A - ASCII only, no Control Codes
X - XMODEM
O - XMODEM-1k
Y - YMODEM (Batch)
G - YMODEM-g (Batch)
S - SEAlink
K - KERMIT
W - SuperKERMIT (Sliding Windows)
Z - ZMODEM-90(Tm)

Choose one (Q to Quit):
```

Figure A.2. Most bulletin boards will offer you a chance to choose which download protocol you wish to use by displaying a menu like the one above.

Because the terminal emulation software has already been set to ZModem, the transfer starts automatically (see Figure A.3). Z Term provides several types of statistics and graphics to let the user know how much longer the download will take. At the end of the download, Z Term asks where you want the file saved on the hard drive. Some terminal emulation packages will ask this before beginning the download.

```
Select from the following transfer        ═══ ZModem Receive ═══

T - TYPE file to your screen
C - ASCII with DC2/DC4 Capture           [                    ]
A - ASCII only, no Control Codes
X - XMODEM                                File:    026.txt
O - XMODEM-1k                            Folder:  Ski Stuff
Y - YMODEM (Batch)
G - YMODEM-g (Batch)                     Type:    TEXT / MSWD (Text)
S - SERlink
K - KERMIT                               File Size          5860
W - SuperKERMIT (Sliding Windows)        Bytes Rcvd:        3072
Z - ZMODEM-90(Tm)                        Efficiency.        879 cps, 91%
Choose one (Q to Quit): Z               Time elapsed/left   0 05 / 0 03

File Name: 026.TXT                       Status    5860 bytes, 0 06 elapsed, 879
File Size: 5860 Bytes                               cps, 91%
 Protocol: ZMODEM-90(Tm)
Est. Time: 0 mins, 05 secs at 9600      Retries.  0
                                        CRC-32            [ Cancel ]
Awaiting Start Signal
(Ctrl-X to abort)

rz

*** Receive (Z) 026.txt. 5860 bytes, 0:06 elapsed, 879 cps, 91%
```
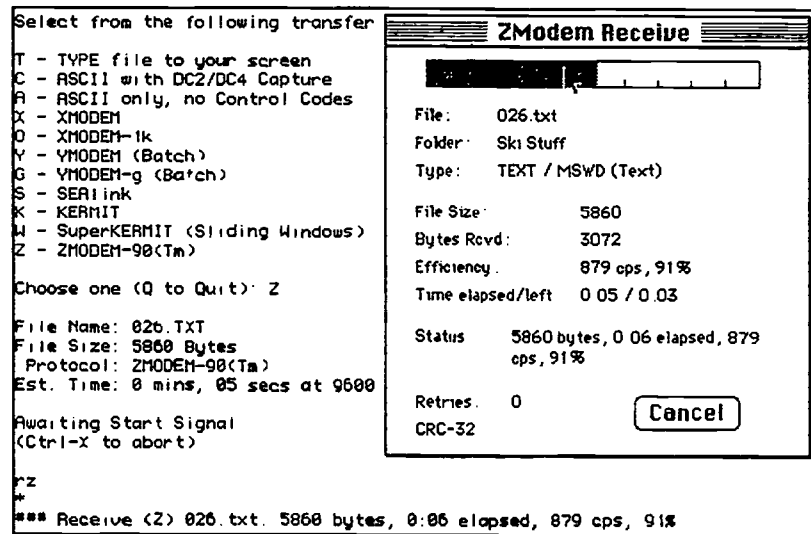
Figure A.3. Terminal emulators usually display a dialog box that charts the program's progress while downloading a file.

In this example, the service supported our default protocol. If, however, the default protocol were not supported, there is usually another option. Most packages will allow you to select a download protocol manually. In our example, if ZModem had not been supported by the service, we could have chosen XModem from the service's list instead. The service's computer would then have waited for our software to start the download. In this case, you would start the download by using a menu option titled "Receive files . . ." or "Download files . . . ". Normally, by choosing this menu option, a second dialog box appears in which you may choose a download protocol. Once the protocol is selected, the computer sends a signal to the service's computer to start the download.

Uploading a binary file follows the same process. You must first tell the terminal emulation package which transfer protocol to use as a default. When you are ready to upload a file, tell the service which protocol your software uses by default; once this is done, the file will be uploaded automatically. If the service does not support your default protocol, you can select a protocol manually as you did to select a protocol manually for downloading a file.

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There are two types of Internet service providers: FreeNets and commercial on-line services. Each offers different types of services.

FREENET PROVIDERS

As the name implies, FreeNets are free (or very low cost) community access points to the Internet. Each FreeNet site provides Internet e-mail accounts for its registered users and a variety of community-oriented on-line services— everything from bulletin boards to library card catalogs. Additionally, some sites offer access to Internet data and navigation tools such as Gopher, WAIS, FTP, and Telnet. Though these services usually focus their content on one community, anyone may join, regardless of location. Those living outside a FreeNet's "home" community will have to pay long distance charges to gain access to the system and may have to pay a higher account fee.

COMMERCIAL DIAL-UP ACCESS TO THE INTERNET

There are three types of commercial services: dial-up e-mail, dial-up IP, and dial-up Internet. Services that offer dial-up e-mail, as the name suggests, provide only e-mail access to the Internet. While you may access a growing number of databases via e-mail requests, e-mail only accounts do not offer access to the most powerful Internet tools like Gopher, Telnet, or WAIS. However, you may access dial-up e-mail accounts using a simple telecommunications program. Dial-up IP accounts offer full access to all the Internet's tools and data sources. You may need to acquire special modem software to use dial-up IP. Dial-up Internet accounts are a hybrid. They offer full Internet access but do not require special software to access the account. The most prominent examples of this type of account are America Online, Delphi Internet Services, and Prodigy. Many commercial providers offer other services in addition to Internet access—anything from on-line stock quotes to airline ticket reservation services. All three types of providers usually offer local access numbers for their services in metropolitan areas of 50,000 to 100,000 inhabitants. Check with your service provider for more details on the type of service it offers.

This list is current as of July 1995. If you know of or discover a service that should be listed here, please contact Karl Rethemeyer at NCAL (rethemeyer@literacy.upenn.edu; (215) 898-2100). Another source of information on this topic is the InterNIC, an organization created by the National Science Foundation to help groups and individuals get connected to and use the Internet. The InterNIC also provides information about the Internet and the various ways to join the Internet community. For more information

about the InterNIC and its services, call (800) 444-4345 between 6 AM and 6 PM Pacific Time.

The National Center on Adult Literacy and the University of Pennsylvania neither support nor endorse the organizations listed below.

LISTING: FREENET PROVIDERS

Note: "Demo" sites may not be available to the public yet or may not offer some of the services mentioned above. Contact the service provider for information on service availability.

UNITED STATES

ALACHUA FREE-NET
Community: Gainesville, Florida
Contact Person: Bruce Stewart
    P.O. Box 1070
    Gainesville, FL 32602-1070
    Phone: 373-3638
E-mail: bs@freenet.ufl.edu
Telnet Access: freenet.ufl.edu
Login: visitor

ARIZONA TELECOMMUNICATIONS COMMUNITY (AzTeC)
Community: Tempe, Arizona
Contact:
    c/o: Telecommunication Services
    Arizona State University
    Box 870201
    Tempe, AZ 85287-0201
Telnet Access: aztec.asu.edu
Login: guest
Password: visitor

BIG SKY TELEGRAPH
Community: Dillon, Montana
Contact Person: Frank Odasz
    Western Montana College of
    the University of Montana
    Dillon, MT 59725
Phone: (406)683-7338
E-mail: franko@bigsky.dillon.mt.us
Access number: (406) 683-7680
Telnet Access: 192.231.192.1 (not receiving guest telnet connections
    currently)

BOULDER COMMUNITY NETWORK
Community: Boulder, Colorado
Contact Person: Catherine Weldon

    c/o University of Colorado,
        Computing & Network Services
    3645 Marine St..,
    Campus Box 455
    Boulder CO 80309-0455
    coordinator@bcn.boulder.co.us
Phone: (303) 492-8176
E-mail: weldon@colorado.edu
Telnet Access: bcn.boulder.co.us

BUFFALO FREE-NET
Community: Buffalo, New York
    (Demo System)
Contact Person: James Finamore
    Town of Tonawanda
    1835 Sheridan Drive
    Buffalo, NY 14223
Phone: (716) 877-8800, ext. 451
E-mail: finamore@ubvms.cc.buffalo.edu
Access Number: (716) 645-6128
Telnet Access: freenet.buffalo.edu

CAMBRIDGE (MA) CIVIC NETWORK
Contact Person: John Altobello
E-mail: jaltobello@civicnet.org
Phone: (617) 492-1278
Fax: (617) 491-3050
Telnet Access: cambridge.civic.network

CAPACCESS: THE NATIONAL CAPITAL AREA PUBLIC ACCESS NETWORK
Community: Washington, DC
Contact:
    The George Washington University
    2002 G. Street, Suite B-1, NW
    Washington, DC 20052
Phone: (202) 994-4245
Fax: (202) 994-2317
E-mail: info@cap.gwu.edu
Access number. (202) 785-1523
    300/1200/2400/9600/14400 Baud
Telnet Access: cap.gwu.edu

CEDARNET
Community: Cedar Falls, Iowa
Contact Person: Robert Muffoletto
PO Box 443
Cedar Falls, IA 50613
Phone: (319) 266-1761
E-mail: muffoletto@umi.edu

CENTRAL VIRGINIA'S FREENET
(CeVaNet)
Telnet Access: freenet.vcu.edu
Login: guest
Password: visitor

CHESAPEAKE FREE-NET
Community: Chesapeake, Maryland
Contact Person: David Boan
Access Number: (410) 819-6860
Telnet Access: cfn.bluecrab.org

THE CLEVELAND FREE-NET
Community: Cleveland, Ohio
Contact Person: Jeff Gumpf
CWRU Information
Network Services
Cleveland, OH 44106
Phone: (216) 368-2982
E-mail: jag@po.cwru.edu
Access Number: (216) 368-3888
Telnet Access: freenet-in-a.cwru.edu

COLUMBIA ONLINE
INFORMATION NETWORK
(COIN)
Community: Columbia, Missouri
Contact: COIN
Daniel Boone Regional Library
P.O. Box 1267
100 West Broadway
Columbia, MO 65205-1267
Phone: (314) 443-3161
E-mail: ccwam@mizzou1.missouri.edu
Access Number: (314) 884-7000
Telnet Access: bigcat.missouri.edu

DAYTON FREE-NET
Community: Dayton, Ohio
Telnet Access: dayton.wright.edu
Login: visitor

DENVER FREE-NET
Community: Denver, Colorado
Contact Person: Drew Mirque
4200 East Ninth Ave.
Campus Box C-288
Denver, CO 80210
Phone: (303) 270-4300

E-mail: drew@freenet.hsc.colorado.edu
Access Number: (303) 270-4865
Telnet Access: freenet.hsc.colorado.edu.
Login: guest.

ENVIRO FREENET
Contact Address: Suite 236, Hamburg
Hall
5000 Forbes Ave.
Pittsburgh, PA 15213
Phone: (412) 268-7187
Fax: (412) 268-7036
E-mail: admin@envirolink.org
Telnet Access: envirolink.org
Login: hit RETURN twice

FORTNET
Community: Fort Collins, Colorado
Contact Person: Michael Cullerton
Director of Operations
155 Circle Drive
Fort Collins, CO 80524
Phone: (970) 493-2101
E-mail: michaelc@fortnet.org
Access Number: (970) 416-1476
Login: guest

GENESEE FREENET
Community: Flint, Michigan
Contact Person: Robert Agle
ConneXion
752 E. Hamilton Ave.
Flint, MI
Phone: (810) 767-3750
Fax: (810) 767-8547
E-mail: bagle@genesee.freenet.org
Access Number: (810) 232-9905
Telnet Access: genesee.freenet.org
Login: guest

GRAND RAPIDS FREE-NET
Community: Grand Rapids, Michigan
Contact Person: Andy Bass
Access Number: 949-2111
Telnet Access: grfn.org
Login: visitor

GREATER DETROIT FREE-NET
Community: metropolitan Detroit,
Michigan
Contact: PO Box 5068
Warren, MI 48090-5068
Telnet Access: detroit.freenet.org
Login: visitor

THE HEARTLAND FREE-NET
Community: Peoria, Illinois
Contact Person: Karen Eggert

Lovelace Technology Center
Peoria, IL 61625
Phone: (309) 677-2544
E-mail: xxadm@heartland.bradley.edu
Access Number: (309) 674-1100
Telnet Access: heartland.bradley.edu

ITHACA FREENET
Community: Ithaca, New York
Contact Person: Jean Currie
215 North Cayuga Street
Ithaca, NY 14850
Phone: (607) 273-9106
E-mail: scrlc@scrlc.org

JACKSON AREA FREE-NET
Community: West Tennessee
Contact: Jackson State Community
College
Jackson area Free-Net
2046 N. Parkway
Jackson, TN 38301
Phone: (901) 427-4435
Access Number: (901) 424-3520
Telnet Access: jackson.freenet.org
Login: visitor

LEBANNON/LACLE DE
INFORMATION ONLINE
NETWORK (LLION)
Contact: WIN
PO Box 1730
St. Peters, MO 63376
E-mail: helpdesk@mail.llion.org
Phone: (417) 532-2148
Telnet Access: telnet.llion.org
Login: guest

LIBERTY NET
Community: Phildelphia, Delaware
County
Phone: (810) 238 3667
E-mail: gasser@libertynet.org
Telephone Access: (810) 232-3667
Telnet Access: libertynet.org
Login: liberty

LORAIN COUNTY FREE-NET
Community: Elyria, Ohio
Contact Person: Thom Gould
32320 Stony Brook Drive
Avon Lake, OH 44012
Phone: (800) 227-7113, ext. 2451
or (216) 277-2451
E-mail: aa003@freenet.lorain.oberlin.edu
Access Number: (216) 366-9721
Telnet Access: freenet.lorain.oberlin.edu.
Login: guest

LOS ANGELES FREE-NET
Community: Los Angeles, California
Contact: Los Angeles Free-Net
Office
16161 Ventura Boulevard
Encino, CA 91436
Phone: (818) 954-0080
Access Number: (8818) 776-5000
Telnet Access: lafn.org
Login: 2 for visitor

MEDINA COUNTY FREE-NET
Community: Medina, Ohio
Contact Person: Gary Linden
Medina Gen. Hosp Project Director
Medina General Hospital
1000 E. Washington Street
P.O. Box 427
Medina, OH 44258-0427
Phone: (216) 725-1000 Ext. 2550
E-mail: aa001@medina.freenet.edu
Access Number: (216) 723-6732
Telnet Access: (not receiving guest telnet
connections currently)

MIDNET COMMUNITY ACCESS
NETWORK OF COLUMBIA &
THE MIDLANDS OF SOTH
CAROLINA
Contact: College of Library and
Information Science
University of South Carolina,
Columbia.   SC 29208
Phone: 777-4695
Fax: 777-7938
Access Number: 256-6306
Telnet Access: midnet.csd.scarolina.edu
Login: visitor

MILWAUKEE OMNIFEST
Community: Milwaukee, Wisconsin
Contact: UWM
Center for Community
Computing
P. O. Box 413
Milwaukee, WI 53201-0413
Phone: (414) 229-5641
Fax: (414) 229-6930
Access Number: (414) 229-6664
Telnet Access: omnifest.uwm.edu
Login: visitor

MOBILE AREA FREE-NET
Contact: Community: Mobile, Alabama
Mobile Area Free-Net
P.O. Box 40894
Mobile, AL 36640-0894

Voice (334) 405-4600
Access Number: (334) 405-INFO (4636)
Telnet Access: ns1.maf.mobile.al.us
Login: visitor

NATIONAL CAPITAL FREE-NET
Community: Ottawa, Canada
Contact Person: David Sutherland
    Computing Services
    Carleton University
    Ottawa CANADA K1S 5B6
Phone: (613) 788-2600 ext. 3701
E-mail: aa001@freenet.carleton.ca
Access Number: (613) 780-3733
Telnet Access: freenet.carleton.ca

R.A.I.N. (Rural Area Information Network)
Community: Pilot Grove, Missouri
Contact Person: John Watson
    PO Box 101
    Blackwater, MO 65322
E-mail: John@rain.gen.mo.us
Telnet Access: rain.gen.mo.us
Login: visitor

RIO GRANDE FREENET
Community: El Paso, Texas; Juarez,
    Mexico, and the Upper Rio
    Grande
Contact: Don Furth
    P.O. Box 20500
    El Paso Community College
    El Paso, TX 79998
Phone: (915) 594-2190
E-mail: aa100@rgfn.epcc.edu
Access Number (915) 775-5600
    300/1200/2400/9600 baud
Telnet Access: rgfn.epcc.edu

SEATTLE COMMUNITY NETWORK
Community: Seattle, Washington
Contact Person: Nancy Kunitsugu
Phone: (206) 365-4528
E-mail: help@scn.org
Access Number: (206) 386-4199
Telnet Access: scn.org
Login: visitor

SENDIT
Community: North Dakota educators
Phone: (701) 237-8109
E-mail: sackman@sendit.nodak.edu
Telnet Access: sendit.nodak.edu

**SOUTHEAST LIBRARY
INFORMATION NETWORK
(SEFLIN)**
Community: South Florida

Phone: (305) 357-7318
Fax: (305) 357-6998.
E-mail:
    infodesk@bcfreenet.seflin.lib.fl.us
Telnet Access: bcfreenet.seflin.lib.fl.us
Login: visitor

**SOUTHEASTERN REGIONAL OHIO
FREE-NET**
Community: Southeastern Ohio
Contact: South Eastern Ohio Regional
    Free-Net
    PO Box 5621, Athens, OH 45701-5621
Telnet Access: seorf.ohiou.edu
Login: guest

**SOUTHEASTERN VIRGINIA
REGIONAL FREE-NET** (SEVAnet)
Community: Southeastern Virginia
E-mail: seva@seva.net
Telnet Access: seva.net
Login: guest

SUNCOAST FREE-NET
Telnet Access: scfn.thpl.lib.fl.us
Login: visitor

**TALAWANDA LEARNING
COMMUNITY NETWORK**
Community: Oxford, Ohio
Contact Person: Robert Pickering
    331 West Church Street
    Oxford, OH 45056
E-mail: rap@tlcnet.muohio.edu
Access Numbers:
    (513) 529-6114 (2400 baud)
    (513) 529-4999 (9600 baud)
Telnet Access: tlcnet.muohio.edu

TALLAHASSEE FREE-NET
Community: Tallahassee, Florida
    (Demo System)
Contact Person: Hilbert Levitz
    Dept. of Computer Science
    Florida State University
    Tallahassee, FL 32306
Phone: (904) 644-1796
E-mail: levitz@cs.fsu.edu

TRAVERSE CITY FREE-NET
Community: Traverse City, MI
Contact Person: Connie Minster
    Northwestern Michigan College
    Information Technology
      Department
    Traverse City Free-Net
    1701 East Front Street
    Traverse City, MI 49684

E-mail: connie@nmc.edu
Telnet Access: leo.nmc.edu

Login: guest
Password: guest

TRISTATE ONLINE
Community: Cincinnati, Ohio
Contact Person: Michael King
    TSO System Administrator
    Cincinnati Bell Directory. Inc.
    Room 102-2000
    201 East 4th Street
    Cincinnati, OH 45201-2301
Phone: (513) 397-1396
E-mail: sysadmin@cbos.uc.edu
Access Number: 513-579-1990
Telnet Access: cbos.uc.edu. Select option
    CBOS

CALGARY FREE-NET
Telnet Access: freenet.calgary.ab.ca
Login: guest

CHEBUCTO COMMUNITY NET
Telnet Access: cfn.cs.dal.ca
Login: guest

CIAO
Telnet Access: ciao.trail.bc.ca
Login: guest

TWIN CITIES FREE-NET
Community: Minneapolis / St. Paul
Contact: Twin Cities Free-Net
    P.O. Box 581338
    Minneapolis, MN 55458-1338
Phone: (612) 379-9144
Access Number: (612) 305-0995
Telnet Access: freenet.msp.mn.us
Login: guest

EDMONTON FREE-NET
Telnet Access: freenet.edmonton.ab.ca
Login: guest

HALTON COMMUNITY NETWORK
Telnet Access: halinet.sheridanc.on.ca
Login: guest

HAMILTON-WENTWORTH FREE-NET
Telnet Access: freenet.hamilton.on.ca
Login: guest

VIRGINIA PUBLIC EDUCATION NETWORK
Community: Educators in Virginia
Contact Person: Daniel Arkin, Ph.D.
    Virginia Department of
    Education
    James Monroe Building
    22nd floor
    101 North 14th Street
    Richmond, VA 23216
E-mail: darkin@freenet.vcu.edu
Telnet Access: vdoe386.vak12ed.edu

NATIONAL CAPITAL FREE-NET
Telnet Access: freenet.carleton.ca
Login: guest

NIAGRA PENNISULA FREE-NET
Telnet Access: freenet.niagara.com
Login: guest

PRINCE GEORGE FREENET
Telnet Access: freennet.unbc.edu
Login: guest

THE YOUNGSTOWN FREE-NET
Community: Youngstown, Ohio
Contact Person: Lou Anschuetz
    YSU Computer Center
    Youngstown, OH 44555
Phone: (216) 742-3075
E-mail: lou@yfn.ysu.edu
Access Number: (216) 742-3072 -
        300/1200/2400 Baud
Telnet Access: yfn.ysu.edu (not receiving
    telnet connections currently)

SASKATOON FREE-NET
Telnet Access: free.sfn.saskatoon.sk.ca
Login: guest

SEA-TO-SKY FREE-NET
Telnet Access: sea-to-sky-freenet.bc.ca
Login: guest

ST. JOHN'S INFONET
Contact: Randy Dodge
Phone: (709) 737-4594
URL: http://infonet.st-johns.nf.ca/
Telnet Access: infonet.st-johns.nf.ca
Login: guest
Password: Hit RETURN

CANADA

BIG SKY FREENET OF MANITOBA, INC.
Phone: (204) 992-4357
Telnet Access: winnie.freenet.mb.ca

TORONTO FREE-NET
Login: guest
Telnet Access: freenet.toronto.on.ca

VANCOUVER REGIONAL FREE-NET
Telnet Access: freenet.vancouver.bc.ca
Login: guest

VICTORIA FREE-NET
Contact Person: Gareth Shearman
Victoria Free-Net Association
C/O Vancouver Island Advanced

Technology Centre (VIATC)
Suite 203-1110 Government Street
Victoria, British Columbia V8W 1Y2
CANADA
Phone: (604) 385-4302
E-mail: shearman@cue.bc.ca
Access Number: (604) 595-2300
Telnet Access: freenet.victoria.bc.ca

COMMERCIAL DIAL UP ACCESS TO THE INTERNET:

Note: "Demo" sites may not be available to the public yet or may not offer some of the services mentioned above. Contact the service provider for information on service availability.

ACCESS INFO SYSTEMS
Phone: (707) 422-1034
Fax: (707) 422-0331
E-mail: info@community.net
Area codes: 708, 510

ACES RESEARCH
Phone: (602) 322-6500
Fax: (602) 322-9755
E-mail: sales@aces.com
Area codes: 602

ACQUIRED KNOWLEDGE SYSTEMS, INC.
Phone: (305) 525-2574
Fax: (305) 462-2329
E-mail: samek@aksi.net
Access Number: (305) 462-2638
URL: http://www.aksi.net/
Area codes: 305

ACM NETWORK SERVICES
Contact: Angela Abbott
Phone: (817) 776-6876
Fax: (817) 751-7785
E-mail: account-info@acm.org
URL: http://www.acm.org/
Area codes: 800, 817, nationwide

AMNET INFORMATION SERVICES
Phone: (408) 257-0900
Fax: (408) 257-5452
E-mail: info@aimnet.com
Access Number: (408) 366-9000
URL: http://www.aimnet.com/
Area codes: 408, 415, 510

ALBANYNET

Phone: (518) 465-0873
E-mail: sales@albany.net
Access Number: (518) 432-1751
URL: http://www.albany.net/
Area codes: 518

ATLERNET (UUNET Technologies)
Phone: (800) 4UUNET4
Fax: (703) 204-8007
E-mail: info@uunet.uu.net
URL: http://www.uu.net/
Area codes: nationwide

AMERICAN INFORMATION SYSTEMS (AIS)
Contact: Mike Hakimi, Josh Schneider
Phone: (708) 413-8400
Fax: (708) 413-8401
E-mail: schneid@ais.net
Area codes: 708, 312

AMERICAN ONLINE, INC.
Phone: (800) 827-6364
E-mail: info@aol.com
Area codes: nationwide

APK PUBLIC ACCESS UNI*
Contact: Zbigniew Tyrlik
Phone: (216) 481-9428
E-mail: support@wariat.org
URL: http://www.wariat.org/
Area codes: 216

APLATFORM
Contact: Michael Teicher
Phone: (415) 941-2641
Fax: (415) 941-2647
E-mail: support@aplatform.com

URL: http://usa.net/
Area codes: 415

ANS
Phone: (800) 456-8267, (703) 758-7700
Fax: (703) 758-7717
E-mail: info@ans.net
URL: gopher://gopher.ans.net/
Area codes: nationwide

BBN Planet Corporation, Western Regic ..
Phone: (415) 934-2655
Fax: (415) 934-2665
E-mail: info@barrnet.net
URL: http://www.barrnet.net/
Area codes: California, Nevada

BECKMEYER DEVELOPMENT (BDT)
Phone: (510) 530-9637
Fax: (510) 530-0451
E-mail: info@bdt.com
URL: http://www.bdt.com/
Area codes: 510

BEST INTERNET
    COMMUNICATIONS, INC. (BEST)
Contact: Rich White
Phone: (415) 964-2378
Fax: (415) 691-4195
E-mail: info@best.com
URL: http://www.best.com
Area codes: 408, 415, 510

BINCnet
Contact: Dave Ward
Phone: (608) 233-5222
Fax: (608) 233-9795
E-mail: ward@binc.net
Area codes: 608 414, 715

BIX (Delphi Internet Services)
Contact: BIX Member Services
Phone: (800) 695-4775, (617) 354-4137
Fax: (617) 441-4903
E-mail: info@bix.com
Access Number: (800) 695-4882, (617) 491-
    5410 (login "bix")
Area codes: nationwide

THE BLACK BOX
Contact: Marc Newman
Phone: (713) 480-2684
E-mail: info@blkbox.com
Area codes: 713

BLARG! ONLINE SERVICES
Contact: Marc Lewis
Phone: (206) 783-8981

Fax: (206) 706-0618
E-mail: marc@blarg.com
URL: http://www.blarg.com/
Access Number: (206) 784-9681
Area codes: 206

BLYTHE SYSTEMS
Contact: Max Hudson
Phone: (212) 348-2875
Fax: (212) 633-2889
E-mail: accounts@blythe.org
Access Number: (212) 675-9690
Area codes: 212, 718

BRAZOS INFORMATION HIGHWAY
    SERVICES
Contact: Butch Kemper
Phone: (409) 693-9336
E-mail: info@bihs.net
URL: http://www.bihs.net/
Area codes: 409

CAPCON LIBRARY NETWORK
Contact: Jeanne Otten
Phone: (202) 331-5771
Fax: (202) 797-7719
E-mail: info@capcon.net
Area codes: 202, 301, 410, 703

CAPITOL AREA INTERNET
    SERVICE (CAIS)
Contact: Debbie Alston
Phone: (703) 448-4470
Fax: (703) 790-8805
E-mail: dalston@cais.com
Area codes: 202, 301, 410, 703

CCnet COMMUNICATIONS
Phone: (510) 988-0680
Fax: (510) 988-0689
E-mail: info@ccnet.com
Access Number: (510) 988-0680, 419-3600.
    355-3030 (login "guest")
URL: http://www.ccnet.com/
Area codes: 510, 415, 408

THE CENTRAL CONNECTION
Phone: (818) 735-3000
Fax: (818) 879-9997
E-mail: info@centcon.com
URL: http://www.ccnet.com/
Area codes: 510, 415, 408

CENTURION TECHNOLOGY, INC.
Contact: Jeffrey Jablow
Phone: (813) 572-5556
Fax: (813) 572-1452
E-mail: jablow@cent.com
Area codes: 800, 813

CERFnet
Phone: (800) 876-2373, (619) 455-3900
Fax: (619) 455-3990
E-mail: info@cerf.net, sales@cerf.net
Access Number: (800) 723-7363
URL: http://www.cerf.net/
Area codes: 800, 310, 415, 510, 619, 714, 818

CHANNEL 1
Contact: Jamie Walsh
Phone: (617) 864-0100
E-mail: (617) 354-3100
E-mail: info@channel1.com
Access Number: (617) 354-3230
URL: http://www.channel1.com
Area codes: 617

CHARM NET
Contact: Erik Monti
Phone: (410) 558-3900
Fax: (410) 558-3901
E-mail: emonti@charm.net
Access Number: (410) 558-3300
URL: http://www.charm.net
Area codes: 410, 301, 202, 703

CICnet
Phone: (800) 947-4754, (313) 998-6703
Fax: (313) 998-6105
E-mail: info@cic.net
URL: http://www.cic.net/
Area codes: midwest

CLARK INTERNET SERVICES (ClarkNet)
Contact: ClarkNet Office
Phone: Call 800-735-2258 (MD Relay Service) then give 410-730-9764 to the answering operator. This is a deaf owned/operated company so you will be using a voice service to communicate with the sales staff.
Fax: (410) 730-9765
E-mail: info@clark.net
URL: http://www.clark.net/
Area codes: 410, 301, 202, 703

CLASS
Cooperative Agency for Library Systems and Services
Phone: (800) 488-4559
E-mail: class@class.org
Area: nationwide

CLOUD 9 INTERNET
Contact: Scott Drassinower
Phone: (914) 682-0626

Fax: (914) 682-0506
E-mail: scottd@cloud9.net
URL: http://www.cloud9.net
Area codes: 914

CLOUDNET
Phone: (612) 240-8243
E-mail: info@cloudnet.com
URL: http://magellan.cloudnet.net
Area codes: 612

COLORADO INTERNET COOOPERATIVE
Phone: (303) 443-3786
Fax: (303) 443-9718
E-mail: contact@coop.net
URL: http://www.coop.net/coop
Area codes: 303

COLORADO SUPERNET, INC.
Contact: Sales/Help Desk
Phone: (303) 296-8202
Fax: (303) 296-8224
E-mail: info@csn.org
URL: http://www.csn.org/
Area codes: 303, 719, 800

COMMUNITY ConneXion
Contact: Sameer Parekh
Phone: (510) 841-2014
E-mail: info@c2.org
URL: http://www.c2.org/
Area codes: 510

COMPUSERVE INFORMATION SYSTEM
Phone: (800) 848-8990
E-mail: postmaster@csi.compuserve.com
Area codes: nationwide

NC-REN (North Carolina Research and Education Network, formerly CONCERT)
Contact: Naomi Courter
Phone: (919) 248-1999
Fax: (919) 248-1405
E-mail: info@concert.net
URL: http://www.concert.net/
Area codes: North Carolina

CRIS
Phone: (517) 895-0500
Fax: (517) 895-0529
E-mail: sysop@cris.com
Access Number: (517) 895-0510
Area codes: nationwide

COMMUNITY NEWS SERVICE
Phone: (719) 579-9120

99

E-Mail: klaus@cscns.com
Area codes: 719

THE CONNECTION
Phone: (201) 435-4414
Fax: (201) 435-4414
E-mail: info@cnct.com
Access Number: (201) 435-4000
    Login "guest"
Area codes: 201

CONNIX: THE CONNECTICUT INTERNET EXCHANGE
Contact: Jim Hogue
Phone: (203) 349-7059
E-mail: office@connix.com
Access Number: (203) 349-1176
URL: http://www.connix.com/
Area codes: 203

COSMIC INTERNET SERVICES
Phone: (516) 342-7597
Access Number: (516) 342-7270
    Login: "guest"
Area codes: 516

CREATIVE DATA CONSULTANTS
Contact: Matt Preston
Phone: (718) 229-0489 x23
E-mail: info@silly.com
Access Number: (718) 229-7096
    Login "guest"
Area codes: 718, 212, 516

CRL NETWORK SERVICES
Phone: (415) 837-5300
E-mail: sales@crl.com
Area codes: 210, 212, 213, 214, 310, 404,
    415, 510, 512, 602, 617,
707, 713, 714, 818

CROSSROADS COMMUNICATIONS
Phone: (602) 813-9040
Fax: (602) 545-7470
E-mail: info@xroads.com
Access Number: (602) 813-9041
    Login "guest"
URL: http://xroads.xroads.com/home.html
Area codes: 602

CSUnet (California State Unversity)
Contact: Mary Jane Whitson
Phone: (310) 985-9445
Fax: (310) 985-9093
E-mail: maryjane@csu.net
URL: http://www.calstate.edu/
Area codes: California

CTS NETWORK SERVICES
Contact: Sales
Phone: (619) 637-3637
Fax: (619) 637-3630
E-mail: support@cts.com
URL: http://www.cts.com/
Area codes: 619

CYBERGATE, INC.
Contact: Dan Sullivan, Tom Benham
Phone: (305) 428-4283
Fax: (305) 428-7977
E-mail: sales@gate.net, sullivan@gate.net
URL: http://www.gate.net/
Area codes: 305, 407, 813, 904

CYBERLINK COMMUNICATIONS
Contact: Jack Valko
Phone: (206) 281-5397, (515) 945-7000
Fax: (206) 281-0421
E-mail: sales@cyberspace.com
URL: http://www.cyberspace.com/
Area codes: 206

DALLAS VIETNAMESE NETWORK
Contact: Stephen Jones
Phone: (214) 248-8701
Fax: (214) 317-2574
E-mail: support@sdf.lonestar.org
Access Number: (214)248-9811 (login "visitor")
Area codes: 214

DAREX ASSOCIATES
Contact: Alex
Phone: (415) 903-4720
E-mail: info@darex.com
URL: http://www.darex.com/
Area codes: 415, 408

DASH - Denver Area Super Highway
Contact: Angel Prouty
Phone: (800) 624-8597, (303) 674-9784
E-ma' info@dash.com, custserv@dash.com
URL: http://www.dash.com
Area codes: 303

DATAWAVE NETWORK SERVICES
Contact: Michael Fredkin
Phone: (805) 730-7775
Fax: (805) 730-7779
E-mail: sales@datawave.net
URL: http://www.datawave.net/inet-service
Area codes: 805

DATA TRANSFER GROUP
Phone: (619) 220-8601
E-mail: help@access.thegroup.net
URL: http://www.thegroup.net/
Area codes: 619

DELPHI INTERNET SERVICES
Contact: Walt Howe
Phone: (800) 695-4005
Fax: (617) 491-6642
E-mail: walthowe@delphi.com
URL: http://www.delphi.com/
Area codes: All - 617 direct, others through
   Sprintnet & Tymnet

DES MOINES INTERNET
Contact: Brent Finer
Phone: (515) 270-9191
Fax: (515) 270-8648
E-mail: brentf@dsmnet.com
URL: http://www.dsmnet.com/
Area codes: 515

THE DESTEK GROUP, INC.
Contact: New Accounts
Phone: (603) 635-3857 or (508) 363-2413
Fax: (508) 363-2155
E-Mail: info@destek.net
URL: http://www.destek.net/Destek
Area codes: 508, 603, 802

DFW INTERNET SERVICES, INC.
Contact: Jack Beech
Phone: (817) 332-5116
Fax: (817) 870-1501
E-mail: sales@dfw.net
Access Number: (817) 429-3520
URL: http://www.dfw.net/
Area codes: 214, 817

**DHM INFORMATION
   MANAGEMENT, INC.**
Contact: Dirk Harms-Merbitz
Phone: (310) 214-3349
Fax: (310) 214-3090
E-mail: dharms@dhm.com
URL: http://www.dhm.com/
Area codes: 213, 310, 714, 818

DIGILINK NETWORK SERVICES
Phone: (310) 542-7421
E-mail: info@digilink.net, bob@digilink.net
Area codes: 213, 310, 714, 818

DIGITAL EXPRESS GROUP
Contact: Sales Department
Phone: (301) 220-2020. (410) 813-2724, (800)
   969-9090
Fax: (301) 220-0477
E-mail: sales@digex.net
URL: http://www.digex.net

Area codes: 201, 202, 301, 410, 609. 703.
   718, 908

The DORSAI EMBASSY
Contact: Charles Rawls, Jack Brooks
Phone: (718) 392-3667
E-mail: info@dorsai.org
Access Number: (718) 392-4060 (login "new")
URL: http://www.dorsai.org/
Area codes: 718, 212, 201. 203, 914, 516

DMConnection
Contact: Sales
Phone: (508) 568-1618
Fax: (508) 562-1133
E-mail: postmaster@dmc.com
Area codes: 508

THE DUCK POND PUBLIC UNIX
Contact: Nick Sayer
Fax: (408) 249-9630
E-mail: postmaster@kfu.com
Access Number: (408) 249-9640 (login "guest")
URL: http://www.kfu.com/
Area codes: 408

EARTHLINK NETWORK, INC.
Contact: Sales
Phone: (213) 644-9500
Fax: (213) 644-9510
E-mail: info@earthlink.net
URL: http://www.earthlink.net/
Area codes: 213, 310, 818

ECHO COMMUNICATIONS GROUP
Contact: Stacy Horn
Phone: (212) 255-3839
Fax: (212) 255-9440
E-mail: horn@echonyc.com
Access Number: (212) 989-8411, (212) 989-
   3386 (login "newuser")
Area codes: 201, 516

eCity INTERNET
Contact: JTM MultiMedia, Inc.
Phone: (515) 277-1990
BBS: (515) 277-1038
Fax: (515) 397-9717
E-mail: jtm@ecity.net
URL: http://www.ecity.net/
Area codes: 515

THE EDEN MATIX
Contact: John Herzer
Phone: (512) 478-9900
Fax: (512) 478-9936
E-mail: jch@eden.com
URL: http://www.eden.com/
Area codes: 512

THE EDGE
Contact: Tim Choate, Jon Lusky, Bob Neal
Phone: (615) 455-9915 (Tullahoma), (615)
    726-8700 (Nashville)
Fax: (615) 454-2042
E-mail: info@edge.net
Access Number: (615) 256-0050 (login
    "newuser")
URL: http://www.edge.net/
Area codes: 615

ElectriCiti INCORPORATED
Phone: (619) 338-9000
E-mail: info@electriciti.com
Access Number: (619) 687-3930
URL: http://www.electriciti.com,
    gopher.electriciti.com
Area codes: 619,408,415,510

EriNet ONLINE COMMUNICATIONS
Contact: Luke Gain
Phone: (513) 436-1700
Fax: (513) 436-1466
E-mail: info@erinet.com
Access Number: (513) 436-9915
URL: http://www.mall2000.com/eri/eri.html
Area codes: 513

ESCAPE (Kazan Corp)
Phone: (212) 888-8780
Fax: (212) 832-0344
E-mail: info@escape.com
Access Number: (212) 888-8212
URL: http://www.escape.com/
Area codes: 212, 718

ESKIMO NORTH
Phone: (206) 367-7457
E-mail: nanock@eskimo.com
URL: http://www.eskimo.com/
Access Number: (206) 367-3837
Area codes: 206

ESNET COMMUNICATIONS
Contact: Steve Froeschke
Phone: (619) 287-5943
E-mail: steve@cg57.esnet.com
Area codes: 619

eWORLD
Phone: (800) 775-4556
E-mail: subscribe@eworld.com
URL: http://www.eworld.com/
Area codes: nationwide

EVERGREEN INTERNET
Contact: Jody Coombs
Phone: (602) 230-9330

Fax: (602) 230-9773
E-mail: sales@enet.net
Area codes: 702, 801, 602, 208, 303, 505

EXCHANGE NETWORK SERVICES, INC.
Contact: Michael Krause
Phone: (216) 261-4593
E-mail: info@en.com
URL: http://www.en.com
Area codes: 216

EXEC-PC BBS
Contact: Internet Dept
Phone: (800) EXECPC-1, (414) 789-4200
Fax: (414) 789-1946
E-mail: info@execpc.com
URL: http://www.execpc.com/
Area codes: nationwide

FGInet, INC.
Contact: Tom Woodward
Phone: (217) 544-2775
Fax: (217) 522-8716
E-mail: newuser@mail.fgi.net
URL: http://www.fgi.net
Area codes: 217

FISHNET (Prometheus Information Corp)
Contact: Peter Sardella
Phone: (610) 337-9994
Fax: (610) 337-9918
E-mail: info@pond.com
URL: http://www.pond.com/
Area codes: 215, 610

FLORIDA ONLINE
Contact: Jerry Russell
Phone: (407) 635-8888
Fax: (407) 635-9050
E-mail: jerry@digital.net
Access Number: (407) 633-4710
URL: http://digital.net/
Area codes: 407, 305, 904, 813

FREDNET
Phone: (301) 69802386
E-mail: info@fred.net
Access Number: (301) 698-5006
URL: http://www.fred.net
Area codes: 301

FREELANCE SYSTEMS PROGRAMMING
Phone: (513) 254-7246
E-mail: fsp@dayton.fsp.com
Area codes: 513

FREESIDES COMMUNICATIONS
Phone: (800) 968-8750
Fax: (512) 837-0343
E-mail: sales@fc.net
URL: http://www.fc.net/
Area codes: 210, 512

FULLFEED COMMUNICATIONS
Contact: Katie Stachoviak
Phone: (608) 246-4239
E-mail: info@fullfeed.com
Access Number: (608) 246-2701
URL: http://www.fullfeed.com/
Area codes: 608, 414, 715

FUTURIS NETWORK, INC.
Contact: Hugh Brower
Phone: (203) 359-8868
E-mail: sales@futuris.net
URL: http://www.futuris.net/
Area codes: 203, 914, 800

FX NET
Phone: (704) 338-4670
Fax: (704) 338-4679
E-mail: info@fx.net
URL: http://www.fx.net
Area codes: 800, 704, 803

GATEWAY TO THE WORLD, INC.
Contact: Michael Jansen
Phone: (305) 670-2930
E-mail: mjansen@gate.com
URL: http://www.gate.com/
Area codes: nationwide (also Latin America)

GETNET INTERNATIONAL, INC.
Phone: (602) 468-7455
Fax: (602) 468-7838
E-Mail: info@getnet.com
URL: http://www.getnet.com
Area Code: 602

Global Connect Inc
Phone: (804) 229-4484
Fax: (804) 229-6557
E-mail: info@gc.net
URL: http://www.gc.net/
Area codes: nationwide (including Canada)

GLOBAL ENTERPRISES SERVICES, INC.
Contact: Cheryl Ferrell
Phone: (609) 897-7324, (800) 35-TIGER
Fax: (609) 897-7310
E-mail: market@jvnc.net

GLOBAL VISION, INC.

Contact: George Derdziak
Phone: (803) 241-0901
Fax: (803) 297-5649
E-mail: derdziak@globalvision.net
URL: http://globalnews.globalvision.net:8001/index.html
Area codes: 803

GREAT BASIN INTERNET SERVICES
Contact: Customer Service
Phone: (702) 829-2244
Fax: (702) 829-9926
E-mail: info@greatbasin.com
Access Number: (702) 348-4844
URL: http://www.greatbasin.com/
Area codes: 702

GSS INTERNET
Contact: Mike Lester, Jeff Jones
Phone: (918) 835-3655
Fax: (918) 835-9996
E-mail: info@galstar.com
Area codes: 405, 918

HALCYON
Phone: (206) 426-9298
E-mail: info@remote.halcyon.com
Area: Pudget Sound area

HAWAII ONLINE
Contact: Lynn Taylor, Larry Cross
Phone: (808) 246-1880, (808) 533-6981
Fax: (808) 246-4734
E-mail: info@aloha.net
Access Number: (808) 533-7113 (login "guest")
URL: http://www.aloha.net/
Area codes: 808

HEVANET COMMUNICATIONS
Contact: Craig Swift
Phone: (503) 228-3520
Fax: (503) 274-4144
E-mail: info@hevanet.com
URL: http://www.hevanet.com/
Services: Shell, SLIP. PPP, telnet. WWW. FTP
Area codes: 503

HOLO NET INFORMATION ACCESS
Technologies, Inc
Contact: Sales
Phone: (510) 704-0160
Fax: (510) 704-8019
E-mail: support@holonet.net
URL: http://www.holonet.net/
Area codes: nationwide

I-2000
Contact: Mike Farina
Phone: (516) 867-6379
E-mail: mikef@i-2000.com
Access Number: (516) 249-5488 (login "info" password "new user")
Area codes: 203, 212, 516, 718, 908, 914, 917

IAC NET
Contact: Devon Sean McCullough
Phone: (513) 887-8877
E-mail: info@iac.net
URL: http://www.iac.net/
Area Codes: Cincinnati metro area

ICNet / INNOVATIVE CONCEPTS
Phone: (313) 998-0090
Fax: (313) 998-0816
E-mail: info@ic.net
URL: http://www.ic.net,
    gopher://gopher.ic.net
Area codes: 313, 810, 616, 517, 906

IDS WORLD NETWORK
Phone: (800) IDS-1680
E-mail: info@ids.net
URL: http://www.ids.net/
Area codes: 401, 305, 407, 914

IGLOU INTERNET SERVICES
Phone: (800) 436-IGLOU
Fax: (502) 968-0449
E-mail: info@iglou.com
Access Number: (502) 964-5390, (606) 431-0081 (login "new")
URL: http://iglou.com/
Area codes: 502, 812, 606, 513

ILLUMINATI ONLINE
Phone: (512) 462-0999, (512) 447-7866
E-mail: admin@io.com
URL: http://io.com/
Area codes: 512

INFINET (Infinite Systems)
Contact: Sales
Phone: (614) 268-9941
Fax: (614) 268-3668
E-mail: sales@infinet.com
URL: http://www.infinet.com/
Access Number: (614) 224-3410 (login "new" or "guest")
Area codes: 614

INFO-HIGHWAY INTERNATIONAL
Contact: Steve McNeely
Phone: (713)447-7025, (800) 256-1370

Fax: (713)351-0956
E-mail: smcneely@infohwy.com
URL: ftp: //ftp.infohwy.com/
Area codes: 409, 713

INGRESS COMMUNICATIONS, INC.
Phone: (212) 679-8592
Fax: (212) 213-0736
E-mail: info@ingress.com
URL: http://www.ingress.com/
Access Number: (212) 679-0179
    Login "guest"
Area codes: 212, 718

INNOVATIVE DATA SERVICES
Phone: (810) 478-3554
Fax: (810) 478-2950
E-mail: info@id.net
URL: http://www.id.net/
Area codes: 313, 810

INS INFO SERVICES
Contact: Customer Service
Phone: (800) 546-6587
Fax: (515) 830-0345
E-mail: service@ins.infonet.net
URL: http://www.infonet.net/
Area codes: 800, 319, 402, 515, 712

INSTITUTE FOR GLOBAL COMMUNICATIONS (IGC)
Contact: Sarah Hutchison
Phone: (415) 442-0220
Fax: (415) 546-1794
E-mail: support@igc.apc.org
Access Number: (415) 322-0162
URL: http://www.igc.apc.org/
Area codes: 415 and others

INTAC ACCESS CORPORATION
Contact: Sales
Phone: (201) 944-1417
Fax: (201) 944-1434
E-mail: info@intac.com
Access Number: (201) 944-3990
URL: http://www.intac.com
Area codes: 201, 908

INTELLIGENCE NETWORK ONLINE, INC.
Phone: (813) 442-0114
E-mail: sales@intnet.net
URL: http://www.intnet.com,
    ftp: //ftp.intnet.net
Area codes: Tampa Bay metro area (813)

INTERACCESS COMPANY
Contact: Lev Kaye

Phone: (800) 967-1580
Fax: (708) 498-3289
E-mail: info@interaccess.com
URL: http://www.interaccess.net/
Area codes: 708, 312, 815

INTERACTIVE NETWORKS, INC.
Contact: Frank Altieri
Phone: (201) 881-1878, (800) 561-1878
Fax: (201) 881-1788
E-mail: frank@interactive.net
URL: http://www.interactive.net/
Access Number: (201) 881-0794 (login "newuser")
Area codes: 201

INTERGATE, INC.
Phone: (404) 429-9599
Access Number: (404) 423-1122
Area codes: 404

THE INTERNET ACCESS COMPANY
Phone: (617) 276-7200
Fax: (617) 275-2224
E-mail: info@tiac.net
URL: http://www.tiac.net/
Access Number: (617) 275-0331, (508) 452-4040
Area codes: 617, 508

INTERNET ACCESS ONLINE COMMUNICATIONS SERVICE
Phone: (513) 887-8877
E-mail: sales@iac.com
Access Number: (513) 887-8855
Area codes: 513

INTERNET ALASKA
Contact: Lance Ahern
Phone: (907) 562-4638
Fax: (907) 562-1677
E-mail: info@alaska.net
URL: http://www.alaska.net
Area codes: 907

INTERNET ATLANTA
Contact: Dorn Hetzel
Phone: (404) 410-9000
Fax: (404) 410-9005
E-mail: info@atlanta.com
URL: http://www.com/atlanta/
Area codes: 404, 706, 912 (dialup) - frame relay and T1 (nationwide)

INTERNET CONNECT, INC.
Phone: (414) 476-ICON (4266)
E-mail: info@inc.net
Access Number: (414) 47-ACCESS NUMBER

Area codes: 414

INTERNET CONNECT SERVICES
Contact: Tom Sterne, Bill Fashbaugh
Phone: (512) 572-9987, (713) 439-0949
Fax: (512) 572-8193
E-mail: staff@icsi.net
Area codes: 409, 512, 713

THE INTERNET CONNECTION
Contact: Martn Levy
Phone: (408) 461-INET
Fax: (408) 438-8390
E-mail: sales@ico.net
URL: http://www.ico.net
Area codes: 408

INTERNET DIRECT, INC.
Phone: (602) 274-0100, (602) 324-0100
Fax: (602) 274-8518
E-mail: sales@indirect.com
URL: http://www.indirect.com/
Services: Shell, SLIP, PPP
Area codes: 602

INTERNET DIRECT OF UTAH
Contact: John Hardy
Phone: (801) 578-0300
Fax: (801) 578-0330
E-mail: johnh@indirect.com
URL: http://www.cyber-street.com/
Area codes: 801

INTERNET EXPRESS
Contact: Customer Service
Phone: (800) 592-1240
Fax: (719) 592-1201
E-mail: service@usa.net
Access Number: n/a
URL: http://usa.net/
Area codes: 719, 303, 505, 602, 800

INTERNET SERVICES OF ATLANTA
Contact: Allan Chong
Phone: (404) 454-4638
Fax: (404) 919-9527
E-mail: allan@is.net
URL: http://www.is.net
Area codes: 404, 800

INTERNET NEBRASKA
Contact: Steve Reichenbach
Phone: (402) 434-8680
E-mail: info@inetnebr.com
URL: http://www.inetnebr.com/
Area codes: 402

INTERNET ONLINE SERVICES
Contact: Suzie Park
Phone: (800) 221-3756
Fax: (800) 928-1057
E-mail: accounts@ios.com
URL: http://www.ios.com/
Area codes: 201, 212, 518

INTERNET ON-RAMP, INC.
Phone: (509) 927-RAMP (7267), (509) 927-7267
Fax: (509) 927-0273
E-mail: info@on-ramp.ior.com
URL: http://www.ior.com/
Services: Shell, SLIP, CSLIP, PPP, UUCP, leased line
Area codes: 509

INTERNET U
Contact: Jim Wells
Phone: (407) 952-8487
Fax: (407) 722-2863
E-mail: info@iu.net
URL: http://iu.net/
Area codes: 407

INTERNETWORK SERVICES
Phone: (612) 391-7300
E-mail: info@inet-serv.com
URL: gopher://proteon.inet-serv.com
Area codes: 612, 507, 800

INTERNETWORKS
Contact: Sales
Phone: (503) 233-4774
Fax: (503) 233-0344
E-mail: info@i.net
Area codes: nationwide

INTERNEX INFORMATION SERVICES, INC.
Contact: Sales
Phone: (415) 473-3060
Fax: (415) 473-3062
E-mail: sales@internex.net
URL: http://www.internex.net
Area codes: 415, 408, 510

INTERPATH
Phone: (919) 890-6305, (800) 849-6305
Fax: (919) 890-6319
E-mail: info@interpath.net
URL: http://www.interpath.net/
Area codes: 919, 800

INTERPORT COMMUNICATIONS CORP
Phone: (212) 989-1128

E-mail: sales@interport.net, info@interport.net (autoreply)
Access Number: (212) 989-1258
URL: http://www.interport.net/
Area codes: 212, 718

INTERQUEST INC.
Contact: Paul Stephanouk
Phone: (205) 464-8280
Fax: (205) 464-8281
E-mail: paul@iquest.com
Access Number: (205) 464-8244
URL: http://www.iquest.com/
Area codes: 205

INTUITIVE INFORMATION, INC.
Contact: Jim Winkleman
Phone: (508) 342-1100
Fax: (508) 342-2075
E-mail: info@iii.net
Access Number: (508) 342-1174, (508) 370-3934, (508) 854-8152
URL: http://www.iii.net/
Area codes: 508

IQuest NETWORK SERVICES
Contact: Robert Hoquim, Tom Neville
Phone: (317) 259-5050, (800) 844-UNIX
Fax: (317) 259-7289
E-mail: info@iquest.net
URL: http://www.iquest.net
Area codes: 317

JAX GATEWAY TO THE WORLD
Phone: (904) 730-7692
Fax: (904) 730-8045
E-mail: sales@jax.gttw.com
Access Number: (904) 448-0444
URL: http://jax.gttw.com/
Area codes: 904

KAIWAN CORPORATION
Contact: Rachel Hwang
Phone: (714) 638-2139
Fax: (714) 638-0455
E-mail: sales@kaiwan.com
Area codes: 714, 213, 310, 818, 909, 805

LASERNET
Contact: Rick Bill
Phone: (703) 591-4232
Fax: (703) 591-7164
E-mail: info@laser.net
Access Number: (703) 934-9020
URL: http://www.laser.net/
Area codes: 202, 301, 703

LEONARDO INTERNET
Contact: Jim Pickrell
Phone: (310) 395-5500
Fax: (310) 395-9924
E-mail: jimp@leonardo.net
URL: http://www.laser.net/
Area codes: 310

LI NET, INC.
Contact: Michael Reilly
Phone: (516) 476-1168
E-mail: questions@li.net
Access Number: (516) 265-1065
URL: http://www.li.net/
Area codes: 516

LIGHTSIDE, INC.
Contact: Fred Condo, Dennis Hescox
Phone: (818) 858-9261
Fax: (818) 858-8982
E-mail: lightside@lightside.com
URL: http://www.lightside.com/
Area codes: 818, 310, 714, 909

LINE X COMMUNICATIONS
Contact: Sales
Phone: (415) 455-1650
E-mail: info@linex.com
Access Number: (415) 455-1655
URL: http://linex.com/
Area codes: 415

THE LITTLE GARDEN
Phone: (415) 487-1902
Fax: (415) 552-6088
E-mail: info@tlg.org
URL: http://www.tlg.org/
Area codes: San Francisco Bay Area

LOS NETTOS
Contact: Joe Kemp
Phone: (310) 822-1551
Fax: (310) 823-6714
E-mail: los-nettos-info@isi.edu
Area codes: Los Angeles metro area

LONG ISLAND INFORMATION, INC
Phone: (516) 248-5381
E-mail: info@liii.com
URL: http://www.liii.com/
Access Number: (516) 294-0124
Area codes: 516

LYCEUM
Phone: (404) 377-7575
Fax: (404) 377-7878
E-mail: info@lyceum.com
URL: gopher://infoserver.lyceum.com/

MAESTRO TECHNOLOGIES, INC.
Contact: Raj Lekhi, Sue Bathla
Phone: (212) 240-9600
E-mail: staff@maestro.com,
   rlekhi@maestro.com
Area codes: 212, 718, 516

MAINE.NET, INC.
Contact: Andy Robinson
Phone: (207) 780-6381
Fax: (207) 780-6301
E-mail: atr@maine.net
URL: ftp://ftp.maine.net/public/service.txt
Area codes: 207

MCI MAIL ENGINEERING
Phone: (800) 444-6245
   (202) 833-8484
E-mail: 2671163@mcimail.com
Area: nationwide

MCSNet
Phone: (312) 248-8649
Fax: (312) 248-8649
E-mail: info@mcs.net
URL: http://www.mcs.net/
Area codes: 312, 708, 815

METRONET, INC.
Phone: (214) 705-2900, (817) 543-8756
Fax: (214) 401-2802
E-mail: info@metronet.com
Access Number: (214) 705-2901, (817) 261-
   1127 (login "info")
URL: http://www.metronet.com:
   70/0h/metronetinfo/About.html
Area codes: 214, 817

MHV NET
Contact: Chris Hawkinson
Phone: (914) 229-9853, (800) 998-7131
E-mail: info@mhv.net
Access Number: (914) 473-0191
URL: http://www.mhv.net/
Area codes: 914

MICHNET
Contact: MichNet Recruiting Staff
Phone: (313) 764-9430
Fax: (313) 747-3185
E-mail: recruiting@merit.edu
Area codes: 313, 616, 517, 810, 906

MIDnet
Phone: (402) 472-7600
Fax: (402) 472-5640
E-mail: nic@westie.mid.net
Area codes: midwest

MILLENNIUM COMMUNICATIONS
Phone: (507) 282-8943, (612) 338-5509
Fax: (507) 282-8943
E-mail: info@millcom.com
URL: http://www.millcomm.com
Area codes: 507, 612

MILWAUKEE INTERNET X
Phone: (414) 962-8172
E-mail: sysop@mixcom.com
Area: Milwaukee area

MIND SPRING ENTERPRISES, INC.
Phone: (404) 888-0725
Fax: (404) 870-0220
E-mail: sales@mindspring.com
URL: http://www.mindspring.com/
Area codes: 404, 706

MINNESOTA MICRONET
Phone: (612) 681-8018
Fax: (612) 452-6360
E-mail: info@mm.com
Access Number: (612) 681-9265
Services: SLIP, SLIP, PPP
Area codes: 612

MINNESOTA REGIONAL NETWORK
(MRNet)
Phone: (612) 342-2570
E-mail: sales@mr.net
*URL:*http://www.mr.net/Services/dialup
Area codes: 612, 507, 218

MIX COMMUNICATIONS
Contact: Dean Roth
Phone: (414) 228-0739
E-mail: sales@mixcom.com
Access Number: (414) 241-5469
URL: http://www/mixcom.com/mixcom/
Area codes: 414

MOONTOWER, INC.
Contact: Luther Keeler
Phone: (512) 837-8670
E-mail: help@moontower.com
URL: gopher://moontower.com/
Area codes: 512

MORAN COMMUNICATIONS GROUP
Contact: Joe Moran
Phone: (716) 639-1254
E-mail: info@moontower.com
URL: http://www.moran.com/
Area codes: nationwide

MORDOR INTERNATIONAL

Phone: (201) 433-7343, (212) 843-3451
Fax: (201) 433-4222
E-mail: info@ritz.mordor.com
Area codes: 201, 212, 718

MSEN INC.
Contact: Owen Scott Medd
Phone: (313) 998-4562
Fax: (313) 998-4563
E-mail: info@msen.com
URL: http://www.msen.com/
Area codes: 800, 313, 517, 616, 906

MV COMMUNICATIONS
Phone: (603) 429-2223
Fax: (603) 424-0386
E-mail: info@mv.mv.com
URL: http://www.mv.com/
Area codes: 603

NATIONAL INTERNET SOURCE, INC. (NIS, Inc)
Phone: (201) 825-4600
Fax: (201) 825-0650
E-mail: info@maple.nis.net
Access Number: (201) 236-0558
Area codes: 201

NCM, INC.
Contact: Morgie or Robert
E-mail: morgie@tpe.ncm.com
URL: http://www.ncm.com/
Access Number: (703) 749-9150
Area codes: 301, 202, 703

NEARNET
Contact: NEARNET Information Hotline
Phone: (617) 873-8730
Fax: (617) 873-5620
E-mail: nearnet-join@near.net
URL: http://www.near.net
Area codes: nationwide

NEIGHBORHOOD INTERNET CONNECTION
Contact: Richard Combes
Phone: (201) 934-1445
Fax: (201) 934-1445
E-mail: info@nic.com, combes@nic.com
Access Number: (201) 236-8360
Area codes: 201

NEOSOFT, INC.
Contact: Jay M. Williams
Phone: (713) 684-5969
Fax: (713) 684-5922
E-mail: jmw3@neosoft.com
URL: http://www.neosoft.com/
Area codes: 800, 713, 409, 214, 504, 314

NET AXIS
Contact: Luis Hernandez
Phone: (203) 969-0618
Fax: (203) 921-1544
E-mail: luis@netaxis.com
URL: http://www.netaxis.com

NETCOM ON-ONE
   COMMUNICATION SERVICES
Phone: (408) 554-8649, (800) 501-8649
Fax: (408) 241-9145
E-mail: info@netcom.com
URL: http://www.netcom.com/
Access Number: (408) 554-8649
Area codes: 201, 206, 212, 214, 303, 310,
   312, 404, 408, 415, 503,
510, 512, 602, 617, 619, 702, 703, 714, 818,
   916, 919

netILLINOIS
Contact: Peter Roll
Phone: (708) 866-1825
Fax: (708) 866-1857
E-mail: proll@illinois.net
Area codes: Illinois area codes

NETIS PUBLIC ACCESS INTERNET
Contact: Eric Poole
Phone: (603) 437-1811
Fax: (603) 437-1811
Access Number: (603) 432-2517
E-mail: epoole@scoot.netis.com
Area codes: 603

The NETSIDE NETWORK
Contact: Greg Ferrante
Phone: (803) 732-7757
Access Number: (803) 732-7340
E-mail: info@netside.com
URL: http://www.netside.com/
Area codes: 803

NETWORK 23, INC
Contact: Nick Jarecki
Phone: (212) 786-4810
E-mail: info@net23.com
Area codes: 212, 917

NETWORK 99, INC
Phone: (702) 442-7353, (602) 780-7533, (800)
   NET-99IP
E-mail: net99@cluster.mcs.net
Area codes: nationwide

NETWORK ACCESS SERVICES
Contact: Sales
E-mail: info@nas.com

URL: http://www.nas.com
Access Number: (206) 733-9279
Area codes: northwest Washington state

NETWORK INTENSIVE
Contact: Michelle Bilder
Phone: (800) 273-5600
Fax: (714) 450-8410
E-mail: info@ni.net
Access Number: (714) 450-8400
URL: http://www.ni.net/
Area codes: 714

NETWORK INTERNET SERVICES
Contact: Sales
Phone: (516) 543-0234
Fax: (516) 543-0274
E-mail: info@netusa.net
URL: http://www.netusa.net/
Area codes: 516

THE NETWORK LINK, INC.
Contact: Steve Froeschke
Phone: (619) 278-5943
E-mail: stevef@tnl1.tnwl.com
Area codes: 619, 317

NEVADA NET
Contact: Braddlee, Ph.D.
Phone: (702) 784-6861
Fax: (702) 784-1108
E-mail: braddlee@nevada.edu
URL: http://www.scs.unr.edu
Area codes: 702

NEW JERSEY COMPUTER
   CONNECTION
Contact: Brian Kramer
Phone: (609) 896-2799
Fax: (609) 896-2994
E-mail: info@pluto.njcc.com
URL: http://www.njcc.com
Area codes: 609

NEW MEXICO TECHNET, INC.
Contact: Marianne Granoff
Phone: (505) 345-6555
Fax: (505) 435-6559
E-mail: granoff@technet.nm.org
Area codes: 505, 602, 303, 915, 800

NEW YORK NET
Contact: Bob Tinkelman
Phone: (718) 776-6811
FAX: (718) 217-9407
E-mail: sales@new-york.net
Area codes: 201, 203, 212, 516, 609, 718,
   908, 914, 917

NORTH AMERICAN INTERNET COMPANY
Phone: (800) 952-INET
Fax: (203) 953-5635
E-mail: info@nai.net
URL: http://www.nai.net/
Area codes: Connecticut

NORTH BAY NETWORK
Phone: (415) 472-1600
E-mail: support@nbn.com
URL: http://www.nbn.com/
Area codes: San Francisco Bay Area

NORTH SHORE ACCESS
Contact: Adam Gray
Phone: (617) 593-3110
Fax: (617) 593-6858
E-mail: info@shore.net
Access Number: (617) 593-4557
URL: http://www.shore.net/
Area codes: 617, 508

NORTHCOAST INTERNET
Phone: (707) 443-8696
E-mail: info@northcoast.com
URL: http://www.northcoast.com/
Area codes: 707

NORTHWEST COMMLINK
Contact: Garlend Tyacke
Phone: (206) 336-0103
E-mail: gtyacke@nwcl.net
Area codes: 206

NORTHWEST NEXUS, INC.
Contact: Information
Phone: (206) 455-3505
Fax: (206) 455-4672
E-mail: info@nwnexus.wa.com
Access Number: (206) 382-6245
URL: http://www.halcyon.com/nwnexus
Area codes: 206

NORTHWEST NET
Contact: Member Relations
Phone: (206) 562-3000
Fax: (206) 562-4822
E-mail: info@nwnet.net
Area codes: 206

NOVA LINK
URL: gopher://gopher.novalink.com/
Area codes: nationwide and international

NOVANET, INC
Phone: (703) 524-4800

Fax: (703) 524-4801
E-mail: sales@novanet.com
Access Number: (703) 524-4802
URL: http://www.novanet.com
Area codes: 703, 202, 301

NUANCE NETWORK SERVICES
Phone: (205) 533-4296
Fax: (205) 533-4296
E-mail: info@nuance.com
URL: http://www.nuance.com/
Area codes: 205

NYSERNet
Phone: (315) 453-2912
Fax: (315) 453-3052
E-mail: info@nysernet.org
URL: http://nysernet.org/
Area codes: 212, 315, 516, 518, 607. 716. 718, 914

NYX
Contact: Andrew Burt
Phone: (303) 871-3308
E-mail: info@nyx.cs.du.edu
Area codes: 303

OARnet
Phone: (800) 627-8101, (614) 728-8100
Fax: (614) 728-8110
E-mail: info@oar.net
URL: http://www.oar.net/
Area codes: 614, 419, 513, 216, 800

OLD COLORADO CITY COMMUNICATIONS
Phone: (719) 528-5849
Fax: (719) 528-5869
E-mail: thefox@oldcolo.com
Area codes: 719

ONRAMP ACCESS, INC.
Contact: Chad Kissinger
Phone: (512) 322-9200
E-mail: info@onr.com
URL: http://www.onr.com
Area codes: 512

ON-RAMP TECHNOLOGIES, INC.
Contact: Andrew Komochank
Phone: (214) 746-4710
Fax: (214) 746-4856
E-mail: sales@onramp.net
URL: http://www.onramp.com
Area codes: 214, 817, 713

PACIFIC INFORMATION EXCHANGE, INC.
Phone: (808) 596-7494
Fax: (808) 593-1403
E-mail: info@pixi.com
URL: http://www.pixi.com
Area code: 808

PACIFIC INTERNET
Contact: James Persky
Phone: (707) 468-1005
Fax: (707) 468-8266
E-mail: info@pacific.net
URL: http://www.pacific.net/
Area codes: 707

PACIFIC RIM NETWORK, INC
Contact: Richard Huff
Phone: (206) 650-0442
Fax: (206) 738-8315
E-mail: sales@pacificrim.com
URL: http://www.pacificrim.com/
Area codes: 800, 206

PACIFIER COMPUTERS
Phone: (206) 693-2116
Fax: (206) 254-3898
E-mail: sales@pacifier.com
Access Number: (206) 693-0325
URL: http://www.pacifier.com/
Area codes: 206

PACKETWORKS, INC.
Contact: Chip Short
Phone: (813) 446-8826
Fax: (813) 447-1585
E-mail: info@packet.net
URL: http://www.packet.net
Area codes: 813

PANIX/PUBLIC ACCESS NETWORK
Phone: (212) 741-4400
Fax: (212) 741-5311
E-mail: info-person@panix.com
Access Number: (212) 741-4545
URL: http://www.panix.com/
Area codes: 212, 718, 516, 201, 914

PCNet
Phone: (800) 66-4INET
Fax: (203) 250-2250
E-mail: sales@pcnet.com
Access Number: (203) 250-1205
Area codes: 203

PERFORMANCE SYSTEMS INTERNATIONAL, INC. (PSI)
Phone: (800) 827-7482

E-mail: info@psi.com
Area codes: 408, 415

PHANTOM ACCESS TECHNOLOGIES, INC
Phone: (212) 989-2418
Fax: (212) 989-8648
E-mail: info@phantom.com
URL: http://www.phantom.com
Area codes: 212, 718, 516, 914

PING
Contact: Brett Koller
Phone: (800) 746-4635, (404) 399-1670
E-mail: bdk@ping.com
Area codes: 404, 800 (includes Hawaii and Alaska)

PIONEER GLOBAL
Contact: Craig Komins
Phone: (617) 375-0200
Fax: (617) 375-0201
E-mail: sales@pn.com
URL: http://www.pn.com
Area codes: 617

THE PIPELINE NETWORK
Phone: (212) 267-3636
Fax: (212) 267-4380
E-mail: staff@pipeline.com
Services: Shell
Area codes: nationwide

PLANET ACCESS NETWORKS
Contact: Fred Laparo
Phone: (201) 691-4704
Fax: (201) 691-7588
E-mail: fred@planet.net
URL: http://www.planet.net/
Area codes: 201, 908, 319, 205

THE POINT
Phone: (812) 246-8032
E-mail: arlie@thepoint.com
URL: http://www.thepoint.com/
Area codes: Louisville, KY metro area

PORTAL INFORMATION NETWORK
Contact: Customer Service
Phone: (800) 433-6444, (408) 973-9111
Fax: (408) 725-1580
E-mail: cs@portal.com
URL: http://www.portal.com
Area codes: nationwide

PREPNET
Contact: Thomas Bajzek
Phone: (412) 268-7870

1*1

Fax: (412) 268-7875
E-mail: twb+@andrew.cmu.edu
Area codes: Pennsylvania

PRIMENET
Phone: (602) 870-1010, (800) 4 NET FUN
Fax: (602) 870-1010
E-mail: info@primenet.com
Access Number: (602) 395-1111
URL: http://www.primenet.com/
Area codes: 602, 213, 818

PRODIGY
Phone: (800) PRODIGY
E-mail: into99a@prodigy.com
URL: http://www.prodigy.com/
Area codes: nationwide

PSINet
Contact: Sales
Phone: (800) 82PSI82, (703) 620-6651
Fax: (703) 620-2430
E-mail: info@psi.com
URL: http://www.psi.net/
Area codes: nationwide

QUAKENET
Contact: Mike Park
Phone: (415) 655-6607
E-mail: info@quake.net (autoreply),
admin@quake.net (human)
URL: http://www.quake.net/
Area codes: 415

**QUANTUM NETWORKING
SOLUTIONS, INC.**
Phone: (703) 878-4680
Fax: (703) 878-4220
E-mail: cjl@qnet.com
URL: http://www.gcr.com/
Area Codes: 702, 202, 805

THE RABBIT NETWORK, INC
Phone: (800) 456-0094
Fax: (810) 790-0156
E-mail: info@rabbit.net
Area codes: 810, 800 (entire U.S. and
Canada)

RAINet, INC
Contact: Robert Chew
Phone: 503 227-5665
Fax: 503 297-9078
E-mail: robert@rain.net
URL: http://www.rain.net
Area codes: 206, 503

RAINDROP LABORATORIES
Contact: Alan Batie
E-mail: info@agora.rdrop.com
Access Number: (503) 293-1772
URL: http://www.rdrop.com/
Area codes: 503

REAL/TIME COMMUNICATIONS
Phone: (512) 451-0046
Fax: (512) 459-3858
E-mail: info@realtime.net
URL: http://www.realtime.net/
Area codes: 512

RED RIVER NET
Contact: Craig Lien
Phone: (701) 232-2227
E-mail: lien@rrnet.com
URL: http://www.rrnet.com
Area codes: 701, 218

RIPCO COMMUNICATION, INC
Contact: Bruce Esquibel
Phone: (312) 665-0065
E-mail: info@ripco.com
URL: http://www.ripco.com
Area codes: 312, 708

ROCKY MOUNTAIN INTERNET
Contact: Rick Mount, Jim Welch
Phone: (800) 900-RMII
Fax: (719) 576-0301
E-mail: mountr@rmii.com, jimw@rmii.com
Area codes: 303, 719

SACREMENTO NETWORK ACCESS
Contact: George Hall
Phone: (916) 565-4500
Fax: (916) 565-4501
E-mail: sales@sna.com
URL: http://www.sna.com
Area codes: 800, 916, 209, 510, 702

SATELINET COMMUNICATIONS
Contact: Yanek Martinson
Phone: (305) 434-8738
Fax: (305) 680-9848
E-mail: martinson@satelnet.org
Access Number: (305) 587-1930
URL: http://www.satelnet.org/
Area codes: 305

SAVVY
Phone: (516) 626-2090
E-mail: info@savvy.com
Access Number: (516) 626-2109
Area codes: 516

SCHUNIX
Contact: Robert Schultz
Phone: (508) 853-0258
Fax: (508) 757-1645
E-mail: info@schunix.com
Access Number: (508) 853-0340
URL: http://schunix.com
Area codes: 508

SCRUZ-NET
Contact: Matthew Kaufman
Phone: (800) 319-5555, (408) 457-5050
Fax: (408) 457-1020
E-mail: info@scruz.net
URL: http://www.scruz.net/
Area codes: 408, 415

SEA NET
Contact: Igor Klimenko
Phone: (206) 343-7828
Fax: (206) 626-0722
E-mail: igor@seanet.com
URL: http://www.seanet.com/
Area codes: 206

THE SENSE MEDIA
E-mail: info@sensemedia.com
URL: http://sensemedia.com/
Area codes: 206, 408, 808

SESQUINET
Contact: Farrell Gerbode
Phone: (713) 527-4988
Fax: (713) 527-6099
E-mail: farrell@rice.edu
Area codes: 713

SIBYLLINE, INC
Contact: Dan Faules
Phone: (501) 521-4660
Fax: (501) 521-4659
E-mail: info@sibylline.com
URL: http://www.sibylline.com/
Area codes: 501

SIERRA NET
Contact: Giles Rider, Bruce Komito
Phone: (702) 832-6911
Fax: (702) 831-3970
E-mail: info@sierra.net
Access Number: (702) 832-8441
URL: http://www.sierra.net/home.html
Area codes: 702, 916

SIMS, INC
Contact: Jim Sims
Phone: (803) 762-4956
Fax: (803) 762-4956

E-mail: info@sims.net
URL: http://www.sims.net
Area codes: 803

SIRIUS CONNECTIONS
Phone: (415) 284-4700
E-mail: info@sirius.com
URL: http://www.sirius.com/
Area codes: 415, 510

SKAGIT ON-LINE SERVICES
Contact: Patrick Garrett
Phone: (206) 755-0190
E-mail: info@sos.net
URL: http://www.sos.net/
Area codes: 206

SKYNET CORP
Contact: Mike Johnson
Phone: (816) 483-0002
Fax: (816) 483-8852
E-mail: info@sky.net
Area codes: 816, 913

SKYPOINT COMMUNICATIONS, INC.
Phone: (612) 475-2959
Fax: (612) 449-0488
E-mail: info@skypoint.com
Access Number: (612) 473-5646
URL: http://www.skypoint.com/
Area codes: Minneapolis/Saint Paul
metro area

SMART DOCS DATA SERVICES
Phone: (805) 294-1273
E-mail: admin@smartdocs.com
Access Number: (805) 295-3972
URL: http://www.smartdocs.com/
Area codes: 805, 818

SOL TEC, INC
Contact: Christina Heal
Phone: (317) 920-1765
Fax: (317) 925-7260
E-mail: xheal@soltec.com
URL: http://www.soltec.com
Area code: 317, 217, 815

SOUTH CAROLINA SUPERNET, INC
Contact: Brian Connelly
Phone: (803) 748-1207
Fax: (803) 771-2300
E-mail: info@scsn.net
Access Number: (803) 779-0055
URL: http://www.scsn.net/
Area codes: 803

SOUTH COAST COMPUTING SERVICES, INC
Phone: (800) 221-6478
Fax: (713) 917-5005
E-mail: sales@sccsi.com
URL: http://www.sccsi.com/
Area codes: 800, 713, 918

SOUTH VALLEY INTERNET
Phone: (408) 683-4533
Fax: (408) 683-4533
E-mail: info@garlic.com
URL: http://www.garlic.com
Area codes: 408

SOUTHWEST CYBERPORT
Contact: Mark Costlow
Phone: (505) 271-0009
E-mail: costlow@swcp.com
Access Number: (505) 294-2816
URL: http://www.swcp.com
Area codes: 505

SOUTHWIND INTERNET ACCESS, INC
Contact: Jeff Stehman
Phone: (316) 263-7963
Fax: (316) 267-3943
E-mail: staff@southwind.net
Area codes: 316

SPRINTLINK
Contact: Marti Kiser
Phone: (703) 904-2156
E-mail: info@sprintlink.net
URL: http://www.sprintlink.net/
Area codes: nationwide

SS NET, INC
Contact: Scott Harris
Phone: (302) 378-1386
Fax: (302) 378-3871
E-mail: info@ssnet.com, sharris@ssnet.com
Area codes: 610, 302

STARNET COMMUNICATIONS, INC
Winternet)
Contact: Mike Horwath
Phone: (612) 941-9177
Fax: (612) 942-9871
E-mail: info@winternet.com
URL: http://www.winternet.com
Area codes: 612

SUPERNET INTERNET SERVICES
Contact: John Banghart
Phone: (800) HOOKED-UP
Fax: (717) 390-8944

E-mail: john@success.net, info@success.net
URL: http://www.success.net/
Area codes: 717

SURA NET
Contact: Kimberly Donaldson
Phone: (301) 982-4600
Fax: (301) 982-4605
E-mail: kdonalds@sura.net
URL: http://www.sura.net/
Area codes: southeastern U.S.

COMMUNICATIONS
Contact: Jamie Saker
Phone: (402) 346-4638
Fax: (402) 346-0208
E-mail: jsaker@synergy.net
URL: http://www.synergy.net/
Area codes: 402 and surrounding midwestern states

SYMNET
Phone: (904) 385-1061
E-mail: info@symnet.net
URL: http://www.symnet.net/
Services: Shell, SLIP, PPP
Area codes: 904

TELALINK CORPORATION
Phone: (615) 321-9100
Fax: (615) 321-9129
E-mail: sales@nashville.net
URL: http://www.nashville.net/
Area codes: 615

TELEPORT, INC.
Phone: (503) 223-0076
Fax: (503) 223-4372
E-mail: sales@teleport.com
URL: http://www.teleport.com/
Area codes: 503, 206

TELERAMA PUBLIC ACCESS INTERNET
Contact: Peter Berger
Phone: (412) 481-3505
Fax: (412) 481-8568
E-mail: sysop@telerama.lm.com
URL: http://www.lm.com
Area codes: 412, 814

TEZCATLIPOCA, INC
Contact: Charles Ewen MacMillan
Phone: (312) 850-0181
Fax: (312) 829-1627
E-mail: ilixi@tezcat.com
Access Number: (312) 850-0112
URL: http://tezcat.com/
Area codes: 312, 708

THEnet
Contact: Frank Sayre
Phone: (512) 471-2444
Fax: (512) 471-2449
E-mail: f.sayre@utexas.edu
Area codes: Texas

THOUGHT PORT, INC
Contact: David Bartlett
Phone: (314) 474-6870
Fax: (314) 474-4122
E-mail: info@thoughtport.com
URL: http://www.thoughtport.com
Area codes: Chicago, Columbia MO,
New York, Pittsburgh and Salt Lake City metro
 areas.

**TOWNSEND COMMUNICATIONS,
 INC**
Contact: Ned Schumann
Phone: (206) 385-0464
E-mail: inquiries@olympus.net
URL: http://www.olympus.net/
Area codes: 206

**TRAVELLER INFORMATION
 SERVICES**
Contact: Jay Davis
Phone: (800) 840-TNET
Fax: (205) 883-4293
E-mail: info@traveller.com
URL: http://www.traveller.com/tis
Area codes: 205

THE TURNING POINT
Contact: Mike Byrnes
Phone: (512) 499-8400, (512) 703-4401
E-mail: help@tpoint.net
Area codes: 816, 913, 504, 316

TYRELL CORP
Contact: Kerri McCoy
Phone: (800) TYRELL-1
Fax: (816) 741-5315
E-mail: support@tyrell.net
Access Number: (816) 454-6788
Area codes: 816, 913, 504, 316

TZ-LINK
Contact: Drew Monroe
Phone: (914) 353-5443
E-mail: drew@j51.com
Access Number: (914) 353-4618
URL: http://www.j51.com/
Area codes: 914

ULTRANET COMMUNICATIONS

Phone: (508) 229-8400, (800) 763-8111
Fax: (508) 229-2375
E-mail: info@ultranet.com
Access Number: (508) 229-8111
URL: http://www.ultranet.com/
Area codes: 508

US NET, INC
Phone: (301) 572-5926
Fax: (301) 572-5201
E-mail: info@us.net
URL: http://www.us.net/
Area codes: 301, 202, 703

UUNET TECHNOLOGIES, INC
Phone: (800) 488-6384
E-mail: info@uunet.uu.net
Area codes: nationwide

VIANET COMMUNICATIONS
Contact: Joe McGuckin
Phone: (415) 903-2242
Fax: (415) 903-2241
E-mail: joe@via.net
Access Number: (415) 969-1387
URL: http://www.via.net/
Area codes: 408, 415, 213, 818, 310

VNET INTERNET ACCESS, INC
Phone: (800) 377-3282
Fax: (704) 334-6880
E-mail: info@vnet.net
URL: http://www.vnet.net/
Area codes: 704, 910, 919

VOICE NET / DCS
Phone: (215) 674-9290
Fax: (215) 674-9662
E-mail: info@voicenet.com
Area codes: 800, 215

WEB PROFESSIONALS, INC
Phone: (408) 865-0899
Fax: (408) 865-1618
E-mail: info@professionals.com
URL: http://professionals.com/
Area codes: 408

THE WELL
Phone: (415) 332-4335
Fax: (415) 332-WELL
E-mail: info@well.com
URL: http://www.well.com/
Area codes: 415

WEST COAST ONLINE!
Contact: Christopher Ward
Phone: (800 WCO INTERNET

Fax: (707) 586-5254
E-mail: info@calon.com
Area codes: 415, 510, 707, 408, 916, 209

WEST NET
Contact: Lillian or Chris
Phone: (914) 967-7816
E-mail: staff@westnet.com
Access Number: (914) 967-7802
URL: http://www.westnet.com
Area codes: 914

WIDOMAKER COMMUNICATIONS
Contact: Ben Loyall
Phone: (804) 253-7621
E-mail: bloyall@widomaker.com
URL: http://www.widomaker.com/
Area codes: 804

WILDER SYSTEMS, INC
Contact: Webster Mudge
Phone: (617) 933-8810
Fax: (617) 933-8648
E-mail: info@id.wing.net
URL: http://www.wilder.com/wing.html
Area codes: 617

WISCNET
Contact: Tad Pinkerton
Phone: (608) 262-8874
Fax: (608) 262-4679
E-mail: tad@cs.wisc.edu
Area codes: Wisconsin

@WIZARD.COM
Phone: (702) 871-4461
Fax: (702) 871-4249
E-mail: info@wizard.com
Access Number: (702) 871-3102
Area codes: 702

WIZVAX COMMUNICATIONS
Phone: (518) 271-6005
E-mail: root@wizvax.com
Access Number: (518) 271-0049
Area codes: 518

WLN
Contact: Rushton Brandis
Phone: (800) DIAL-WLN
Fax: (206) 923-4009
E-mail: info@wln.com
URL: http://www.wln.com
Area codes: 800, 206, 509, 503, 208, 406, 360

THE WORLD
Phone: (617) 739-0202

Fax: (617) 739-0914
E-mail: staff@world.std.com
URL: http://www.std.com/
Access Number: (617) 739-9753, (508) 366-4422
Area codes: 617, 508

A WORLD OF DIFFERENCE, INC
Phone: (803) 769-4488
E-mail: info@awod.com
Area codes: 803

WORLD WIDE ACCESS
Contact: Kathleen Vrona
Phone: (708) 367-1870
Fax: (708) 367-1872
E-mail: support@wwa.com
URL: http://www.wwa.com
Area codes: 312, 708, 815, 414

WV NET
Contact: Harper Grimm
Phone: (304) 293-5192
Fax: (304) 293-5540
E-mail: cc011041@wvnvms.wvnet.edu
Area codes: West Virginia

THE XENSEI CORPORATION
Contact: Theresa Antrim
Phone: (617) 773-4785
E-mail: sales@xensei.com, terri@xensei.com
URL: http://www.xensei.com/
Area codes: 617

X MISSION
Phone: (801) 539-0852
Fax: (801) 539-0853
E-mail: support@xmission.com
URL: http://www.xmission.com/
Area codes: 801

YOU TOOLS CORPORATION (FAST.NET)
Phone: (610) 954-5910
Fax: (610) 954-5925
E-mail: internet@youtools.com
URL: http://www.youtools.com/fastnet
Area codes: 610, 215, 717

ZILKER INTERNET PARK
Phone: (512) 206-3850
Fax: (512) 206-3852
E-mail: info@zilker.net
URL: http://www.zilker.net/
Area codes: 512

zNET
Phone: (408) 477-9638

Fax: (619) 755-8149
E-mail: info@znet.com
URL: http://www.znet.com/
Area codes: 408

ZOCALO ENGINEERING
Contact: Bill Woodcock
Phone: (510) 540-8000
Fax: (510) 548-1891
E-mail: info@zocalo.net
Area codes: 510, 415

ZONE ONE NETWORK EXCHANGE
(ZONE)
Contact: Lee Chen
Phone: (718) 549-8078
Fax: (718) 884-3889
E-mail: info@zone.net
Access Number: (718) 884-5405
URL: http://www.zone.net/
Area codes: 800, 718, 212, 914, 516, 917,
201, 908

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COUNTRY CODES

This list contains the two-letter country codes that are used as right-most term in domain names for computers outside the United States. This list is current as of January 1995.

AD	Andorra		CH	Switzerland
AE	United Arab Emirates		CI	Ivory Coast
AF	Afghanistan		CK	Cook Islands
AG	Antigua and Barbuda		CL	Chile
AI	Anguilla		CM	Cameroon
AL	Albania		CN	China
AM	Armenia		CO	Colombia
AN	Netherland Antilles		CR	Costa Rica
AO	Angola		CS	Czechoslovakia
AQ	Antarctica		CU	Cuba
AR	Argentina		CV	Cape Verde
AS	American Samoa		CX	Christmas Island
AT	Austria		CY	Cyprus
AU	Australia		CZ	Czech Republic
AW	Aruba		DE	Germany
AZ	Azerbaidjan		DJ	Djibouti
BA	Bosnia-Herzegovina		DK	Denmark
BB	Barbados		DM	Dominica
BD	Bangladesh		DO	Dominican Republic
BE	Belgium		DZ	Algeria
BF	Burkina Faso		EC	Ecuador
BG	Bulgaria		EE	Estonia
BH	Bahrain		EG	Egypt
BI	Burundi		EH	Western Sahara
BJ	Benin		ES	Spain
BM	Bermuda		ET	Ethiopia
BN	Brunei Darussalam		FI	Finland
BO	Bolivia		FJ	Fiji
BR	Brazil		FK	Falkland Isl.(Malvinas)
BS	Bahamas		FM	Micronesia
BT	Buthan		FO	Faroe Islands
BV	Bouvet Island		FR	France
BW	Botswana		FX	France (European Ter.)
BY	Belarus		GA	Gabon
BZ	Belize		GB	Great Britain (UK)
CA	Canada		GD	Grenada
CC	Cocos (Keeling) Isl.		GE	Georgia
CF	Central African Rep.		GH	Ghana
CG	Congo		GI	Gibraltar

GL	Greenland	MG	Madagascar
GP	Guadeloupe (Fr.)	MH	Marshall Islands
GQ	Equatorial Guinea	ML	Mali
GF	Guyana (Fr.)	MM	Myanmar
GM	Gambia	MN	Mongolia
GN	Guinea	MO	Macau
GR	Greece	MP	Northern Mariana Isl.
GT	Guatemala	MQ	Martinique (Fr.)
GU	Guam (US)	MR	Mauritania
GW	Guinea Bissau	MS	Montserrat
GY	Guyana	MT	Malta
HK	Hong Kong	MU	Mauritius
HM	Heard & McDonald Isl.	MV	Maldives
HN	Honduras	MW	Malawi
HR	Croatia	MX	Mexico
HT	Haiti	MY	Malaysia
HU	Hungary	MZ	Mozambique
ID	Indonesia	NA	Namibia
IE	Ireland	NC	New Caledonia (Fr.)
IL	Israel	NE	Niger
IN	India	NF	Norfolk Island
IO	British Indian O. Terr.	NG	Nigeria
IQ	Iraq	NI	Nicaragua
IR	Iran	NL	Netherlands
IS	Iceland	NO	Norway
IT	Italy	NP	Nepal
JM	Jamaica	NR	Nauru
JO	Jordan	NT	Neutral Zone
JP	Japan	NU	Niue
KE	Kenya	NZ	New Zealand
KG	Kirgistan	OM	Oman
KH	Cambodia	PA	Panama
KI	Kiribati	PE	Peru
KM	Comoros	PF	Polynesia (Fr.)
KN	St.Kitts Nevis Anguilla	PG	Papua New Guinea
KP	Korea (North)	PH	Philippines
KR	Korea (South)	PK	Pakistan
KW	Kuwait	PL	Poland
KY	Cayman Islands	PM	St. Pierre & Miquelon
KZ	Kazachstan	PN	Pitcairn
LA	Laos	PT	Portugal
LB	Lebanon	PR	Puerto Rico (US)
LC	Saint Lucia	PW	Palau
LI	Liechtenstein	PY	Paraguay
LK	Sri Lanka	QA	Qatar
LR	Liberia	RE	Reunion (Fr.)
LS	Lesotho	RO	Romania
LT	Lithuania	RU	Russian Federation
LU	Luxembourg	RW	Rwanda
LV	Latvia	SA	Saudi Arabia
LY	Libya	SB	Solomon Islands
MA	Morocco	SC	Seychelles
MC	Monaco	SD	Sudan
MD	Moldavia	SE	Sweden

SG	Singapore
SH	St. Helena
SI	Slovenia
SJ	Svalbard & Jan Mayen Is
SK	Slovak Republic
SL	Sierra Leone
SM	San Marino
SN	Senegal
SO	Somalia
SR	Suriname
ST	St. Tome and Principe
SU	Soviet Union
SV	El Salvador
SY	Syria
SZ	Swaziland
TC	Turks & Caicos Islands
TD	Chad
TF	French Southern Terr.
TG	Togo
TH	Thailand
TJ	Tadjikistan
TK	Tokelau
TM	Turkmenistan
TN	Tunisia
TO	Tonga
TP	East Timor
TR	Turkey
TT	Trinidad & Tobago
TV	Tuvalu
TW	Taiwan
TZ	Tanzania
UA	Ukraine
UG	Uganda
UK	United Kingdom
UM	US Minor outlying Isl.
US	United States
UY	Uruguay
UZ	Uzbekistan
VA	Vatican City State
VC	St.Vincent & Grenadines
VE	Venezuela
VG	Virgin Islands (British)
VI	Virgin Islands (US)
VN	Vietnam
VU	Vanuatu
WF	Wallis & Futuna Islands
WS	Samoa
YE	Yemen
YU	Yugoslavia
ZA	South Africa
ZM	Zambia
ZR	Zaire
ZW	Zimbabwe

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DETERMINING YOUR INTERNET ADDRESS FROM YOUR ON-LINE SERVICE IDENTIFICATION CODE

Because e-mail is such a popular feature of any on-line service, most major on-line providers allow their users to send and receive e-mail from users on the Internet. In order for other Internet users to send you e-mail, you must convert your account identification code into a valid e-mail address. Each service calls its identification code something a little different—a "screenname" on AOL, "User ID number" on CompuServe®, and so forth. In all cases, additional information must be added to the account identification in order for e-mail to reach your service. Below are the proper conversions for the five largest services.

America Online (AOL)
Add "@aol.com" to the America Online screenname.
Examples: AOL screenname = John Doe
Internet Address: John Doe@aol.com
(Note: The space in the screen name between "John" and "Doe" is also included between "John" and "Doe" in the Internet address)
AOL address = Johndoe
Internet address: Johndoe@aol.com

Delphi Internet Services
Add "@delphi.com" to the Delphi username.
Example: Delphi username = Doe
Internet address: Doe@delphi.com

CompuServe®:
Replace the comma in the CompuServe® user ID number with a period and add "@compuserve.com"
Example: CompuServe® user ID = 98765,321
Internet address: 98765.321@compuserve.com

GEnie®:
Add "@genie.geis.com" to the GEnie® mail ID.
Example: GEnie address = Johndoe
Internet address: johndoe@genie.geis.com
(Note: GEnie® *does not* use the account number as the first part of the e-mail address. GEnie® assigns a separate "GE mail ID".)

Prodigy®:
Add "@prodigy.com" to the Prodigy service ID.
Example: Prodigy service ID = DKGS71A
Internet address: DKGS71A@prodigy.com

During the last couple of years, a number of LISTSERVs directly or indirectly related to adult literacy topics have developed. Below, you will find information on subscribing to the LISTSERVs we have identified. This document is broken into three sections. Section I lists the LISTSERVs that cover general issues in adult literacy and adult education. Section II lists the LISTSERVs that address topics in adult numeracy. Section III lists those LISTSERVs that are not directly related to adult literacy or adult education but that might be useful to practitioners or program managers in adult literacy.

SECTION I GENERAL LITERACY LISTSERVs

AEDNET: NOVA UNIVERSITY

To join the list and receive the mailings from AEDNET:

Send a message to: LISTSERV@alpha.acast.nova.edu (make the subject "None") saying: subscribe AEDNET <your full name here>

For example:
    To: LISTSERV@alpha.acast.nova.edu
    Subject: None
    Message:
        subscribe AEDNET John Doe
(Note: Put your name in place of "John Doe")

To submit a message to AEDNET:
Send the e-mail message to: AEDNET@alpha.acast.nova.edu

The Adult Education Network (AEDNET) is an international network of individuals interested in adult education. The network is operated through a LISTSERV that enables subscribers to share information. Researchers, practitioners, and graduate students in adult and continuing education are provided with opportunities to discuss important topics and concerns in an on-line environment.

AEDNET is operated by the Adult Education Program of the Programs for Higher Education of the Abraham S. Fischler Center for the Advancement of Education at Nova Southeastern University located in Fort Lauderdale, Florida. AEDNET activities include network-wide discussions and information exchanges on topics and queries, conferences and special events, of interest to adult and continuing educators. Also, a refereed electronic journal, New Horizons in Adult Education, is distributed through AEDNET.

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CATALYST: NATIONAL COUNCIL ON COMMUNITY SERVICES AND CONTINUING EDUCATION

To join the list and receive the mailings from CATALYST:

Send a message to: LISTSERV@vtvm1.cc.vt.edu (make the subject "None")
saying: subscribe CATALYST <your full name here>

For example:
   To: LISTSERV@vtvm1.cc.vt.edu
   Subject: None
   Message:
      subscribe CATALYST John Doe

(Note: Put your name in place of "John Doe")

This LISTSERV distributes CATALYST, a refereed print journal of the same name. The journal is issued quarterly. CATALYST is not a true LISTSERV in that it does not support an ongoing discussion of a given topic.

LEARNER: NYSERNET

To join the list and receive the mailings from LEARNER:

Send a message to: LISTSERV@nysernet.org (make the subject "None")
saying: subscribe LEARNER <your full name here>

For example:
   To: LISTSERV@nysernet.org
   Subject: None
   Message:
      subscribe LEARNER John Doe

(Note: Put your name in place of "John Doe")

To submit a message to LEARNER:
Send the mail message to: LEARNER@nysernet.org

LEARNER is a moderated literacy discussion group for adult learners to practice their newly learned reading and writing skills by posting messages to the list which can be read by other new learners. The sharing of ideas, helpful tips and concerns are all fine ways to use this group.
LEARNER also provides a way to meet and personally write to other people by setting up individual pen-pal contacts. Tutors or teachers are encouraged to help their learners use this list and to assist their students in making such contacts.

This list, however, is not the appropriate forum for the general discussion of literacy issues by those who are not learners. Those who wish to take part in such discussion are encouraged to subscribe to the list LITERACY that was formed to meet that need.

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NOTE: If you are an experienced adult reader and would like to correspond with a new reader (as a type of mentor), please feel free to use this forum (LEARNER) to set up a personal pen-pal contact also.

Any questions should be directed to the list owner, Beverly Choltco-Devlin at the e-mail address mville3@nysernet.org.

LITERACY: NYSERNET

To join the list and receive the mailings from LITERACY:

Send a message to: LISTSERV@nysernet.org (make the subject "None") saying: subscribe LITERACY <your full name here>

For example:
> To: LISTSERV@nysernet.org
> Subject: None
> Message:
> > subscribe LITERACY John Doe

(Note: Put your name in place of "John Doe")

To submit a message to LITERACY:
Send the mail message to: LITERACY@nysernet.org

LITERACY is a moderated general discussion group for those individuals concerned with the issues of Literacy. It is hoped that the group will foster discussion by those involved in teaching adults to read and write. It is also open to anyone who is interested in the topic of Literacy in general. Discussion of such topics as family literacy are also welcome. The sharing of ideas, tips, helpful resources, teaching tools, and personal experiences are all to be encouraged.

The primary focus of the list is the fostering of literacy in those adults for whom English is the native language, but who, for any number of reasons, never learned to read or write. It is acknowledged that the learning of English as a second language is also considered a literacy issue, but the specific concerns of this issue are beyond the scope of this list. Of course any "general" literacy discussion issues which happen to arise from the teaching of English as a second language are welcome. There is a separate list for discussion of Literacy issues regarding English as a second or non-native language—TESLIT-L (see below).

It should be noted that this list is not the appropriate forum for correspondence between learners or the development of pen-pal contacts. A separate list group (LEARNER) has been formed to meet those needs. Adult learners and their tutors are encouraged to subscribe to and particip... that forum.
Any questions should be directed to Beverly Choltco-Devlin, list owner, at the address mville3@nysernet.org.

NLA: NATIONAL LITERACY ALLIANCE

To join the list and receive the mailings from NLA:

Send a message to: Majordomo@world.std.com (make the subject "None")
saying: subscribe nla <your e-mail address>

For example:
   To: Majordomo@world.std.com
   Subject: None
   Message:
      subscribe nla doe@literacy.upenn.edu

(Note: Put your e-mail address in place of "doe@literacy.upenn.edu")

To submit a message to NLA:
Send the mail message to: nla@world.std.com

The National Literacy Alliance sponsors an electronic list to discuss national policy issues that affect adult literacy education and adult learners. The goal of this list is to keep advocates informed about critical legislative and public policy issues so that timely, coordinated policy actions are possible. It also serves as a forum for discussion of these issues. Users are encouraged to post ideas, questions, and information once they are subscribed.

OTAN-L: OTAN-NCAL

To join the list and receive the mailings from OTAN-L:

Send a message to: listserv@listserv.hlpusd.k12.ca.us (make the subject "None")
saying: subscribe OTAN-L <your full name here>

For example:
   To: listserv@listserv.hlpusd.k12.ca.us
   Subject: None
   Message:
      subscribe OTAN-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to OTAN-L Technology:
Send the mail message to: OTAN-L@listserv.hlpusd.k12.ca.us

OTAN, in partnership with NCAL, has created an e-mail-based mailing list on technology issues.

If you have trouble using OTAN-L, send a message with "help" in the body to listserv@listserv.hlpusd.k12.ca.us. The system will send back an e-mail message with a list of commands and an explanation of their use.

PRISON-L

To join the list and receive the mailings from PRISON-L:

Send a message to: listserv@dartcms1.dartmouth.edu (make the subject "None") saying: subscribe PRISON-L <your full name here>

For example:
> To: listserv@dartcms1.dartmouth.edu
> Subject: None
> Message:
> > subscribe PRISON-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to PRISON-L:
Send the mail message to: PRISON-L@dartcms1.dartmouth.edu

PRISON-L promotes information exchange and discussion between people who presently teach or have taught in prisons.

TESL-L: FUND FOR THE IMPROVEMENT OF POST-SECONDARY EDUCATION, U.S. DEPARTMENT OF EDUCATION

To join the list and receive the mailings from TESL-L:
Send a message to: listserv@cunyvm.cuny.edu (make the subject "None") saying: subscribe TESL-L <your full name here>

For example:
> To: listserv@cunyvm.cuny.edu
> Subject: None
> Message:
> > subscribe TESL-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to TESL-L:
Send the mail message to: TESL-L@cunyvm.cuny.edu

Teachers of English as a Second Language focuses on classroom issues related to the English language education of non-native English speakers around the world. This LISTSERV is sponsored by the Fund for the Improvement of Post-Secondary Education of the U.S. Department of Education.

IMPORTANT: TESL-L acts as a master list for a number of other lists on ESL issues, that is, you must first subscribe to TESL-L before you can subscribe to other lists (like TESLIT-L—see below).

Any questions should be directed to Anthea Tillyer, the list owner and moderator, at the address abthc@cunyvm.cuny.edu.

TESLCA-L: FUND FOR THE IMPROVEMENT OF POST-SECONDARY EDUCATION, U.S. DEPARTMENT OF EDUCATION

To join the list and receive the mailings from TESLCA-L:

IMPORTANT:

Send a message to: listserv@cunyvm.cuny.edu (make the subject "None")
saying: subscribe TESLCA-L <your full name here>

For example:
    To: listserv@cunyvm.cuny.edu
    Subject: None
    Message:
        subscribe TESLCA-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to TESLCA-L:
Send the mail message to: TESLCA-L@cunyvm.cuny.edu

TESLCA-L is a sub-list of TESL-L. TESLIT-L focuses on using computers to teach English as a second language to both children and adults.

Any questions should be directed to Anthea Tillyer, the list owner and moderator, at the address abthc@cunyvm.cuny.edu.

TESLEC-L: FUND FOR THE IMPROVEMENT OF POST-SECONDARY EDUCATION, U.S. DEPARTMENT OF EDUCATION

To join the list and receive the mailings from TESLEC-L:

IMPORTANT: to join TESLEC-L, you must first become a member of TESL-L (see above).

Send a message to: listserv@cunyvm.cuny.edu (make the subject "None") saying: subscribe TESLEC-L <your full name here>

For example:
    To: listserv@cunyvm.cuny.edu
    Subject: None
    Message:
        subscribe TESLEC-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to TESLEC-L:
Send the mail message to: TESLEC-L@cunyvm.cuny.edu

TESLEC-L is a sub-list of TESL-L. TESLIT-L focuses on using electronic communications (like e-mail) to teach English as a second language to both children and adults, and provides a teacher-to-teacher/student-to-student e-mail pen pal exchange.

Any questions should be directed to Anthea Tillyer, the list owner and moderator, at the address abthc@cunyvm.cuny.edu.

**TESLIT-L: FUND FOR THE IMPROVEMENT OF POST-SECONDARY
EDUCATION, U.S. DEPARTMENT OF EDUCATION**

To join the list and receive the mailings from TESLIT-L:

IMPORTANT: to join TESLIT-L, you must first become a member of TESL-L
(see above).

Send a message to: listserv@cunyvm.cuny.edu (make the subject
"None") saying: subscribe TESLIT-L <your full name here>

For example:
    To: listserv@cunyvm.cuny.edu
    Subject: None
    Message:
       subscribe TESLIT-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to TESLIT-L:
Send the mail message to: TESLIT-L@cunyvm.cuny.edu

TESLIT-L is a sub-list of TESL-L. TESLIT-L focuses on issues of literacy and
the teaching of English as a second language in adult education and adult
literacy programs.

Any questions should be directed to Anthea Tillyer, the list owner and
moderator, at the address abthc@cunyvm.cuny.edu.

SECTION II   ADULT NUMERACY LISTSERVS

NUMERACY: ADULT NUMERACY PRACTITIONER NETWORK

To join the list and receive the mailings from NUMERACY:
Send a message to: majordomo@world.std.com
saying: subscribe NUMERACY <your e-mail address>

For example:
    To: majordomo@world.std.com
    Subject: None
    Message:
       subscribe NUMERACY doe@literacy.upenn.edu

(Note: Put your e-mail address in place of "doe@literacy.upenn.edu")

To submit a message to NUMERACY: send the mail message to:
numeracy@world.std.com

NUMERACY is an electronic mailing list for members of the Adult Numeracy
Practitioner's Network (ANPN) and others interested in discussing educational
issues related to adult mathematical literacy. ANPN welcomes ABE, GED,

ESL, and workplace literacy teachers, tutors, and adult learners to meet freely in this electronic forum to share the challenges, problems, insights, and rewards of teaching and learning adult math and numeracy skills.

FAM-MATH: FAMILY MATH LIST

To join the list and receive the mailings from FAMILY MATH LIST:

Send a message to: LISTSERV@uic.edu (make the subject "None") saying: subscribe FAM-MATH <your full name here>

For example:
> To: LISTSERV@uic.edu
> Subject: None
> Message:
> > subscribe FAM-MATH John Doe

(Note: Put your name in place of "John Doe")

To submit a message to FAM-MATH: send the mail message to: FAM-MATH@uic.edu.

Family Math is a newsletter on issues in family mathematics instruction.

NCTM-L: NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

To join the list and receive the mailings from NCTM-L:

Send a message to: LISTPROC@sci-ed.fit.edu (make the subject "None") saying: subscribe NCTM-L <your full name here>

For example:
> To: LISTPROC@sci-ed.fit.edu
> Subject: None
> Message:
> > subscribe NCTM-L John Doe

(Note: Put your name in place of "John Doe")

Though this list is primarily used by K-12 practitioners, it is a tremendous source for ideas about the teaching of mathematics.

SECTION III LITERACY-RELATED LISTSERVS

EDNET: UNIVERSITY OF MASSACHUSETTS

To join the list and receive the mailings from EDNET:

Send a message to: listproc@nic.umass.edu (make the subject "None") saying: subscribe EDNET <your full name here>

For example:
    To: listproc@nic.umass.edu
    Subject: None
    Message:
        subscribe EDNET John Doe

(Note: Put your name in place of "John Doe")

To submit a message to EDNET:
Send the mail message to: EDNET@nic.umass.edu.

EDNET is devoted to exploring the educational potential of the Internet. Discussions cover topics from elementary to adult higher education.

Any questions should be directed to Prescott Smith, the list owner and moderator, at the address pgsmith@educ.umass.edu.

EDUPAGE: EDUCOM

To join the list and receive the mailings from EDUPAGE:

Send a message to: listproc@educom.edu (make the subject "None") saying: subscribe EDUPAGE <your full name here>

For example:
    To: listproc@educom.edu
    Subject: None
    Message:
        subscribe EDUPAGE John Doe

(Note: Put your name in place of "John Doe")

To send comments about Edupage:
send an e-mail message to: comments@educom.edu.

EDUPAGE is not a true LISTSERV. Instead, it is a distribution list for the EDUPAGE newsletter. EDUPAGE is a thrice weekly summary of articles in the popular press related to the Internet and National Information Infrastructure. Most of the articles summarized address emerging policy issues in this area.

Back issues of Edupage are available by WAIS, Gopher, and anonymous ftp from educom.edu. Edupage is also distributed in Spanish and Portuguese translations, courtesy of RNP, a project of the Brazilian National Research Council. For information on the translated version, send an e-mail message to: edunews@nc-rj.rnp.br.

SCOUT-REPORT: INTERNIC INFORMATION SERVICES

To join the list and receive the mailings from SCOUT-REPORT:
Send a message to: majordomo@is.internic.net (make the subject "None") saying: subscribe SCOUT-REPORT <your e-mail address>

For example:
        To: majordomo@is.internic.net
        Subject: None
        Message:
                subscribe SCOUT-REPORT doe@literacy.upenn.edu

(Note: Put your e-mail address in place of "doe@literacy.upenn.edu")
The Scout Report is a weekly electronic publication offered by InterNIC Information Services, the NSF-funded agency responsible for helping individuals and organizations connect to the Internet. Its purpose is to display in one place the highlights of new information resource announcements and other news that occurred on the Internet during the previous week. A wide range of resources are included in the Report, however the emphasis is on those that are thought to be of interest to the research and education community, the InterNIC's primary audience. The Scout Report list is not a true LISTSERV in that it does not support an on-going discussion on a given topic.

TQM-L: UNIVERSITY OF KANSAS

To join the list and receive the mailings from TECHED-I :
Send a message to: listserv@ukanvm.cc.ukans.edu (make the subject "None") saying: subscribe TQM-L <your full name here>

For example:
        To: listserv@ukanvm.cc.ukans.edu
        Subject: None
        Message:
                subscribe TQM-L John Doe

(Note: Put your name in place of "John Doe")

To submit a message to TQM-L:
Send the mail message to: TQM-L@ukanvm.cc.ukans.edu

TQM-L is a forum for the open discussion of all aspects of Total Quality Management concepts and how these concepts can be implemented in institutions of higher education.

Any questions should be directed to Phil Endacott, the list owner and moderator, at the address supervisor@sweep.fo.ukans.edu.

FINDING AND USING LOW-COST COMPUTER SOFTWARE WITH WORLD-WIDE WEB, GOPHER, AND FTP

SECTION I · INTRODUCTION

One of the most popular features of both commercial on-line services and the Internet is the ability to retrieve "ready-to-use" software from electronic archives. Most archives provide two types of software. The first is called freeware. As the name implies, freeware is available free of charge to anyone who can download it (i.e., copy the program from the archive's hard disk to the user's hard disk). The second type is called shareware. Shareware is made available by amateur and professional programmers on the honor system: you download the program to your computer, try it for a few days, and then either send payment to the author or remove the program from your hard drive. Almost all network service providers maintain software archives, and there are several huge, publicly available archives on the Internet.

Finding the Archives

The range and variety of archives that you will be able to access depends largely on who provides your network service. If you have an account with GEnie®, Prodigy, CompuServe®, or any other bulletin board that does not offer access to the Internet, you will only be able to access the software archives provided by those services. However, anyone with Internet access (including those with America Online [AOL], Prodigy and Delphi Internet Services accounts) will be able to access both Internet archives and archives provided by the service (like AOL's education software archive). Check the documentation that came with your service's start-up kit for more information on finding its software archive and for instructions on how to download software from the archive to your computer.

Internet Archives Available Through Gopher and FTP

Below is a list of several Internet software archives that may be accessed using either FTP or Gopher (excepting the Outreach and Technical Assistance Network archives, which may only be accessed using Gopher). These archives offer a wide range of programs—from system utilities, to games, to gradebook utilities and courseware.

To find the archives using Gopher, the best course is to log into the Home Gopher. The servers marked with an asterisk (*) are found in the folder/directory "Internet file server (ftp) sites." All others may be found by first

selecting the "Other Gopher and Information Servers" directory. Within this folder, you will find another folder/directory entitled "All Gopher Servers in the World." The "All Gopher Servers in the World" folder/directory contains the alphabetical list of all the Gopher servers worldwide; scroll down the list until you find the server you want to visit.

To access the archives using FTP, use the domain names provided to log into the archive's server. All servers are available using "anonymous" as the username. The password may be left blank, though most services would prefer that you enter your e-mail address as the password.

You may also access any of these servers using a World-Wide Web browser by entering the URL provided in each entry.

NOTE: Some of the servers listed below are difficult to gain access to during business hours because of high usage.

Outreach and Technical Assistance Network (OTAN)
Gopher: gopher.scoe.otan.dni.us
URL: http://www.scoe.otan.dni.us/

OTAN, a bulletin board system developed in cooperation with the State of California specifically for adult literacy practitioners, maintains an archive of Macintosh freeware and shareware for adult literacy. In addition, OTAN is developing an archive of demonstration software provided by major adult literacy software vendors.

MERIT Software Archives (University of Michigan)*
Domain name: mac.archive.umich.edu
URL: ftp://mac.archive.umich.edu

MERIT's archive contains more than 5,000 programs for Apple II, Microsoft DOS™, Microsoft Windows™, Macintosh™, Atari, Amiga, and Apollo computers. The MERIT archive also "mirrors" (contains a complete backup copy of) the SUMEX-AIM archive and the WUarchive, so logging into this resource gets you three archives in one.

⌐ ⌐ d Filesystem (University of Iowa)*
D⌐ ain name: grind.isca.uiowa.edu
URL: ftp://grind.isca.uiowa.edu

The Grind Filesystem is maintained v student volunteers at the University of Iowa. It offers more than 5 gigabytes (5 billion bytes) of freeware and shareware. The largest offerings are for the Mac and IBM platforms (both DOS and Windows™); however, they also have a substantial archive of Apple II and Amiga software.

Info-Mac/SUMEX-AIM Archive (Stanford University)*
Domain name: sumex-aim.stanford.edu
URL: ftp://sumex-aim.stanford.edu

Many consider Info-Mac to be the forerunner of all Macintosh™ archives. Because of this notoriety, it is often very difficult to gain access to Info-Mac; the administrators restrict the number of people who can sign on

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simultaneously. Thus you will probably have better results trying to log onto the mirror sites at MERIT or the WUArchive.

WUArchive (Washington University)*
Domain name: `wuarchive.wustl.edu`
URL: `ftp://wuarchive.wustl.edu`

Like Info-Mac, the WUArchive is considered the antecedent of all IBM-compatible archives on the Internet. In addition, the WUArchive also mirrors several other sites, including Info-Mac and the University of Indiana Windows Archive.

Center for Innovative Computer Applications (CICA)
Domain name: `ftp.cica.indiana.edu`
URL: `http://cica.cica.indiana.edu`

The Center for Innovative Computer Applications (CICA) currently provides to the anonymous ftp user, free of charge, over 1.5 GB of freeware and shareware Windows-related files. The archive contains a wide range of application and software, from utilities, to graphics, to educational software.

America Online Mirror Site
Domain name: `mirrors.aol.com`
URL: `http://mirrors.aol.com`

As a service to the Internet, America Online maintains a server with mirrors of several popular FTP sites, including CICA and InfoMac.

Getting Your Freeware or Shareware Up and Running

Once you have downloaded a piece of software, there are a couple of steps you will probably need to take in order to use the software. First, some software archives encode their software. Encoding is the process of converting the binary code (i.e., 1s and 0s) into an alpha-numeric representation. There are two reasons archivists encode software stored on their computers. First, Macintosh files have a peculiar structure which may be disturbed if the archive is maintained on a DOS/Windows™ or UNIX™-based server. To preserve the structure, archivists encode the software so that a DOS/Windows™ or UNIX™ system treats the software like a plain text document. Second, FTP, Gopher, or World-Wide Web sites may be accessed using e-mail. E-mail, by definition, may only transmit alpha-numeric information. Thus if the archivists want to make their wares available to people who only have e-mail access, they must encode the software to a form that e-mail systems will accept (i.e., letters and numbers like one would see in any e-mail message).

Most FTP, WWW, and Gopher clients automatically decode software as it downloads the file. However, some clients available from on-line services do not automatically decode, and in some cases the automatic decode will fail. You can tell a file has failed to decode if one of the following occurs:

• The downloaded file has a file extension of .hqx, .bsc, .bsq, .uu, or .uue

• If, when you try to execute the file, your word processor opens instead

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- The file fails to execute as expected

If the file fails to execute, you can determine if the file is in encoded form using your word processor software. Open your word processor software and use the "Open" command to find the file you downloaded (you may need to set the "display file type" option to something like "all files"). Try to open the document. If the file is encoded, the word processor software will display something like this:

BinHex Example

```
(This file must be converted with BinHex 4.)

:#9&eCA*j)'Pd)3""8&"-
BdTY15!!N!H9fPBa!*!%!3#3!j%K!!#3!
#%!!!5jrj!
+!!!"!!$rN!X!N!Ar#9&eCA*j)'Pd)3)!N!
0"8&"-BdTY15%!!36r`!#3"N&38%a
M5Qdj)3!""2r!!*!5TTfD3J#3"TAD!2rep
Hb3"!AXN!2epIm!!2repHb3#2Aer`!
!rrAel*!"HcepIm!!2repH`&l*!'pIAr!!$r
pIAXN!MepIm!!2repHb3"!AXN!2
```

UUencode Example

```
begin 644 TEACHTEXT
M_]C_X``02D9)1@`!`0```0`!``#_
VP!#``@&!@<&!0@'!P<)"0@*
#!0-#`L+
M#!D2$P\4'1H?'AT:'!P@)"XG(
"(L(QP<*#<I+#`Q-
#0T'R<Y/3@R/"XS-#+_
MVP!#`0D)"0P+#!@-
#1@R(1PA,C(R,C(R,C(R,C(R,
C(R,C(R,C(R,C(R,C(R
M,C(R,C(R,C(R,C(R,C(R,C(R,
C(R,C+_P``1"``@`H`#`2(``A$!`
Q$!_\0`
```

If you find that the software you downloaded is encoded, you will need to use a decoding program to make the program usable. There are two widely used encoding standards; you will need to get the proper decoder for each. The first is BinHex. BinHex has become the standard for encoding Macintosh™ software; it is also sometimes used to encode Apple II files. You can tell if a file has been "binhex'ed" if the program has a file extension ".hqx", ".bsc," or ".bsq," or if, when you viewed the file with your word processor, you found the line "(This File must be converted with BinHex 4.0)" at the top. The most widely used Macintosh™ decoder for BinHex is a program titled *BinHex 4.0* by Yves Lemprepeur. On the Apple II, the decoder is called *BINSCII*. It is available from the MERIT archive listed above. There is a DOS/Windows™ decoder for BinHex entitled *BinHex.*

The second file encoding standard is UUencode, a standard developed more than 20 years ago for UNIX computers. Almost any type of file may be UUencoded; however, the standard is most often used to encode graphics files. UUencode is very similar to BinHex, except that UUencode allows for splitting the encoded file into several pieces. For instance, it is possible to split a 800K UUencoded file into eight 100K segments for transmission. There are UUdecode programs available for Macintosh™ and Windows™ computers, the most popular being *UUlite* or *UUundo* for the Macintosh™ and *SPUUTools* or *UUcode* for Windows™.

After decoding, the next step is to check whether the software has been compressed. A file or program is considered "compressed" when it has been run through compression software that rewrites the file or program so that it

takes up less space on the archive's hard disk. However, once compressed, the software is no longer in the "language" the computer understands. Consequently, once you download a compressed program or file, you must decompress it before using it.

Note that file encoding and file compression are distinct from one another. Files are encoded to assure error-free transmission across the Internet. Files are compressed to make transmission times shorter and to save space on the archive's hard drive. Thus one must usually decode software (either automatically as the file is downloaded or manually if the auto-decoder fails) and then decompress it.

You can tell whether a program has been compressed by checking several attributes of the program. First, many compressed files have a three letter extension added to their name. For instance, an application name like "program.sit" indicates that the software has been compressed using a Mac shareware program called *StuffIt!* The extension ".sea" indicates that the file has been compressed in a manner that allows it to be decompressed by simply executing the file (or by double clicking on it in the Macintosh™ or Windows™ environment). Listed below is a chart of extensions that indicate a file is compressed, the type of computer on which the compressed file or program is usually used, and the program used to compress the file or program. Although all of these programs are used on the Internet archives and major bulletin board services, *StuffIt!* for Macintosh and *PKZip* and *WinZip* for DOS and Windows are by far the most popular programs. A number of archives offer free programs that de-compress *PKZip*, *Stuffit!*, or *CompactorPro* archives.

Extension	Platform	Program
	DOS/Windows™	*Arc*
cpt	Macintosh™	*Compactor Pro*
exe*	DOS/Windows™	Self-extracting (do not need a program to uncompress)
gzip	DOS/Windows™	*GNU Zip*
pit	DOS/Windows™	*PackIt II, PackIt III*
sea	Macintosh™, DOS/Windows™	Self-extracting (do not need a program to uncompress)
shk	Apple II	*ShrinkIt*
sit	Macintosh™	*StuffIt!*
Z	Unix™ (sometimes DOS/ Windows™ and Macintosh™)	Unix *COMPRESS*
zip	DOS/Windows™	*PKZip, Unzip*
zoo	DOS/Windows™	*Zoo*

* "Exe" is also the file extension for most DOS/Windows™ applications, so you cannot be sure a program with a file extension of "exe" is a self-extracting file until you try to execute the file, unless other documentation downloaded with the file states specifically that a <file>.exe is a self-extracting archive.

Next, make sure to protect against infection of your computer by a virus (a program that tries to alter or delete information stored on your hard drive). The *vast majority* of freeware and shareware is virus free, but it is always a good idea to have a virus protection program installed before using your new software. If you don't already have a virus protection program, the first thing you might want to download is one of the free protection programs available on the Internet or through your network service.

There are two free virus protection tools on the network: *Disinfectant* for the Mac and *FProt* for DOS™ and Windows™. *Disinfectant* may be retrieved from any of the Macintosh archives listed above. *FProt* is available from University of Alabama's FTP server (domain name: risc.ua.edu; URL: ftp://risc.ua.edu). (*FProt* is free for use by individuals; however, a $1 licensing fee is charged for use in offices or educational institutions.) Other popular commercial packages include *SAM* for the Macintosh™ from Symantec, Inc. and *Vi-Spy* for DOS and Windows™ from RG Software.

Finally, you should test the downloaded software with the existing configuration of your computer. As you probably know, new software can conflict with existing pieces of software installed on your system. Since freeware and shareware are often written by new or amateur programmers, there is a somewhat higher chance that they will conflict with existing software. It is always a good idea to test freeware and shareware for a little while before using them as integral parts of your instructional or administrative program.

The vitality of the freeware/shareware system is dependent on users providing financial incentives for new developers to enter the market. Please do your part: pay for shareware promptly.

APPENDIX H: FINDING ADULT LITERACY INFORMATION SERVERS ON THE INTERNET

Over the last few years, a number of groups and organizations that provide information and resources to the adult literacy community have created Internet information servers to distribute their publications and products. As it has become cheaper and easier to join the Internet, the number of literacy-related resources on the Internet has grown extremely rapidly. Rather than provide an exhaustive list of servers with adult literacy content that would become obsolete the day it was published, we have compiled a list of starting points for your search. There are two types of Internet servers listed. The first type are large adult literacy or adult literacy-related organizations that are committed to finding Internet resources and making electronic links to those resources through their servers. The second type of servers are those that support an Internet search engine that could be used to find resources.

For each organization or search engine, the World-Wide Web Universal Resource Locator (URL) is provided. Those items that have URL's that begin with `http` may only be accessed using a World-Wide Web client like Mosaic, Netscape, Prodigy's WWW client, or America Online's WWW interface. For those who only have access to Gopher, you may find these servers by logging into the "Home Gopher" (at the URL: `gopher://domain name gopher2.tc.umn.edu`) and looking in the folder/directory "Other Gopher and Information Servers/All Gopher Servers in the World." The servers are listed by their organization name. If your Gopher client supports the "Another gopher" command, you may log into any server by entering the domain name listed for the server (i.e., the information listed after "gopher://"). Those using World-Wide Web should use the "Open URL" command to log into any of the servers.

SECTION I: LITERACY ORGANIZATION

National Center on Adult Literacy (NCAL)

URL: http://ncal.literacy.upenn.edu
gopher://ncal.literacy.upenn.edu

Distributes research reports, newsletters, and other information resources prepared by the National Center on Adult Literacy, including:
- Research reports on numerous topics in adult literacy
- Archive of shareware/freeware for use in adult numeracy programs
- Database of commercial adult literacy software
- Archives of messages to adult literacy LISTSERVs and directions for joining those LISTSERVs
- Conference announcements
- Links to other adult literacy-oriented Gopher and World-Wide Web servers

AskERIC: Educational Resource Information Center
URL: gopher://ericir.syr.edu
              http://eryx.syr.edu/Main.html

General educational information center that can be searched for math-related information; ERIC is continually being updated and revised. Resources include:
* Lesson plans
* Bibliographies
* News and announcements
* ERIC digests and full length articles
* Electronic books, journals, and reference tools
* Links to other education resources and gophers

National Institute for Literacy (NIFL)
URL: http://novel.nifl.gov

Provides access to a number of databases, grant information, calendars and on-line discussions. Resources include:
* Databases, including ERIC, Library of Congress, OTAN, National Literacy Database of Canada, and some NIFL materials
* Simultaneous search of several literacy databases
* Legislation, grant announcements, calendar of events
* On-line discussion forums on several topics
* Several academic library card catalog systems

Outreach and Technical Assistance Network (OTAN)
URL: gopher://gopher.scoe.otan.dni.us
              http://www.scoe.otan.dni.us

Collection of materials generated by California's OTAN Network since 1989. Resources include:
* Course outlines
* Curricula resources (teaching modules/lessons that may be downloaded
* News and announcements
* Grant information, want ads, California Department of Education Information
* Lesson plans
* Shareware and freeware archives
* Demonstration software
* Various bibliographies
* Reference materials

U.S. Department of Education
URL: http://www.ed.gov
              gopher://gopher.ed.gov

Main U.S. Department of Education servers; contains information on everything from grants to research findings to contact information within the Department. Resources include:
* Guide to U.S. Department of Education Programs
* Teacher's Guide to the U.S. Department of Education
* Researcher's Guide to the U.S. Department of Education
* Catalog of Federal Domestic Assistance (CFDA)
* Goals 2000 Initiative

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- Information on School-to-Work and Office of Vocational and Adult Education (OVAE) initiatives
- Information on current and upcoming grants
- Department publications and software
- Links to servers at Department-funded institutions

SECTION II INTERNET SEARCH ENGINES

The LYCOS Home Page: Carnegie Mellon University
URL: http://www.lycos.com
This search engine, served by Carnegie Mellon University, will allow you to search on document titles and content. The index searches document titles, headings, links, and the keywords that it locates in these documents.

Open Text Web Index: Open Text Corporation
URL: http://www.opentext.com
The Open Text Web Index is one of the fastest, most complete indexes to the web available. The search engine ranks the items found by the number of times a key word or words appears in the text.

Meta-Search Page: University of Geneva
URL: http://cuiwww.unige.ch/meta-index.html
This page contains a link to every known Internet search engine available, including those used to locate software, e-mail address, and the VERONICA system. You can also find on-line thesauruses and dictionaries from this page. Though very complete, the Meta-Search page can be somewhat confusing to use.

VERONICA: University of Minnesota
URL: gopher://gopher.tc.umn.edu
VERONICA, as described in Part V, is the primary search engine for Gopherspace. To find Gopher, first log into the sever, then select the folder/directory "Other Gopher and Information Server"; when the new menu appears, select the folder/directory "Search titles in Gopherspace using veronica."

WebCrawler: University of Washington
URL: http://www.webcrawler.com
This engine allows searches by document title and content. Results are rank ordered, using the number of times a key word or words appears in the document found.

1.0