NorthWestNet

User Services Internet Resource Guide (NUSIRG)

Third Edition

March,1992

Section 1: NUSIRG, The Internet, and You

On-Line PostScript Version, March 28, 1992

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How To Get NUSIRG

THE NORTHWESTNET USER SERVICES INTERNET RESOURCE GUIDE

You can either get NUSIRG at no charge by the Internet "File Transfer Protocol" (FTP), or you can purchase a bound copy from NorthWestNet. If you have a connection to the Internet, you are encouraged to follow these instructions for using FTP to obtain NUSIRG. If you can't use FTP (or don't know how yet!), instructions on how to order a printed and bound copy from NorthWestNet are included on the next page.

Free Copies of NUSIRG By File Transfer Protocol (FTP)

NUSIRG is available at no charge, by FTP, as text-only or PostScript files. The text-only files are in a simple format which can be printed by most kinds of printers or viewed on-screen with most text editors. The PostScript files produce output which is essentially identical to the bound version of NUSIRG.

If you have access to a computer connected to the Internet, all you have to do is follow the simple instructions below.

Note: commands you type are shown in the left hand column in lower case (don't type the #'s!); UPPER CASE and ">" indicates prompts from the computer that will appear on your screen.

What you type (or what you'll see)	Explanation
1) ftp ftphost.nwnet.net	Connect to the NorthWestNet FTP host.
2) LOGIN: anonymous	At the "LOGIN:" prompt enter "anonymous".
3) PASSWORD: your-user-id@address	At the "PASSWORD:" prompt, please enter your user-id@your.full.internet.address (e.g., robessin@uwvvd.derrg.edu).
4) FTP> cd nic/nwnet/user-guide	Change directories (cd) to the directory containing FTP copies of NUSIRG.
5) FTP> get README.nusirg	Use the "get" command followed by a filename from the list on the next page to copy a file; get "README.nusirg" first, which contains the most up-to-date information about NUSIRG files.
6) FTP> ls	The "ls" command will produce a listing of the names of the files in the NUSIRG directory (see below).
7) FTP> quit	The "quit" command will end your FTP session.

The file "README.nusirg" contains more detailed information about the files in the NUSIRG directory.

Files in the NUSIRG directory	Description of file's contents
README.nusirg	A detailed description of NUSIRG files.
nusirg,Index.ps	Index for all of NUSIRG
nusirg.Index.txt	
nusirg.about.nwnet.and.aup.ps	NWNET & NSFNET backbone information and policies
nusirg.about.nwnet.and.aup.txt	
nusirg.beginner.overview.ps	Overview of NUSIRG and the Internet.
nusirg.beginner.overview.txt	
nusirg.email.ftp.telnet.ps	Basic Internet tools: e-mail, FTP, TELNET and Archie
nusirg.email.ftp.telnet.txt	
nusirg.listserv.usenet.ps	Using USENET and LISTSERV.
nusirg.listserv.usenet.txt	
nusirg.online.info.resources.ps	On-line books, libraries, databases, WAIS, and directory services
nusirg.online.info.resources.txt	
nusirg.supercomputers.ps	Supercomputer use and access information.
nusirg.supercomputers.txt	
nusirg.teach.k-12.ps	The Internet and K-12 education.
nusirg.teach.k-12.txt	
nusirg.whole-guide.ps.tar.Z	All of NUSIRG in compressed and archived format.
nusirg.whole-guide.txt.tar.Z	

Notice that the file names above occur in pairs differing only in the last parts of their names. Files ending with "ps" are in PostScript format and cannot be printed unless you have access to a PostScript printer. You should not copy the files whose names end with "tar.Z" unless you know how to handle compressed and archived files, which is explained in the file "README.nusirg".

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If you would prefer to purchase an already printed and bound copy (or if you are unable to use FTP), NUSIRG is available for $20.00 per copy from NorthWestNet.

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phone:	(206) 562-3000
fax:	(206) 562-4822

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If you have questions, comments, or suggestions about NUSIRG, please send e-mail to nusirg@nwnet.net

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Acknowledgements

It is perhaps appropriate that a book which is meant to demonstrate the extraordinary wealth of resources available on the Internet was written using the Internet itself as the main source of information. Only a very small set of printed books were consulted during the preparation of this document. Therefore, primary thanks go to the Internet itself, for being such a treasure trove of information!

Snippets of information were collected from tens of thousands of postings in many discussion groups, including USENET, LISTSERVers, and Internet Interest groups. I thank everyone who so willingly shares their knowledge in these forums. Reading typical questions from new Internet users posted in these forums was also invaluable for helping to determine what should be included in an entry-level Internet guide. Another useful source of information was existing, online Internet documentation written by Internet user services staff around the world, and a large number of helpful documents about the Internet written by individuals on their own initiative, and shared on the Internet.

I am very thankful to Larry Gales of the University of Washington, who wrote the chapter on Supercomputer Access, and to user services staff at the supercomputer sites for providing up-to-date descriptions of their state-of-the-art sites.

Very useful support, reviews, corrections and suggestions were provided throughout this project by the NUSIRG Editorial Review Committee: Dorette Dusterhoff, Eric Hood, Janaka Jayawardena, Dan Jordt, Dick Markwood, Paul Mauvais, Danny Raphael and Sandy Sprafka.

Special thanks go to Danny Raphael (Director of User Services, University Computing Services, University of Washington), who loaned me a Macintosh computer and a modem for the duration of this project. Most research and writing was done from my home, which became an "electronic cottage" in the global village by virtue of a simple modem connection to the Internet. This Users Guide is proof that anyone in the world can access the wealth of Internet resources from their own homes with minimal hardware and software requirements.

NUSIRG was written in three very hectic and obsessive months, July through September, 1991. I'd like to thank my friends and family for their support and understanding while I was transformed into a "virtual knowbot in cyberspace."

Jonathan Kochmer
The Cottage
Seattle, Washington
October 6, 1991

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Chapter 1: Overview of the NorthWestNet User Services Internet Resource Guide (NUSIRG)

When people ask for education they normally mean something more than mere training, something more than mere knowledge of facts, something more than a mere diversion. Maybe they cannot themselves formulate precisely what they are looking for; but I think what they are really looking for is ideas that would make the world, and their own lives, intelligible to them. When a thing is intelligible, you have a sense of participation...

E. F. Schumaker
Small Is Beautiful (pg. 84)

Once you get started, you'll start to understand...

Overheard in a crowd

INTRODUCTION

Most of us use complex technologies like automobiles, televisions, or telephones every day, without knowing exactly how they work. We take it for granted that when we turn on a radio we'll hear news or music, and that when we start a car we'll get to where we want to go.

Until very recently, using computer networks was like using a car in the beginning of the 20th century.

Charlie Chaplin and Buster Keaton made comedies featuring wrestling matches with temperamental cars. It was funny because everybody knew you couldn't drive to the next town without getting greasy up to your elbows at least once. The technology was still being perfected, and sometimes it was hard to get where you were going.

It was also hard to figure out how to find the places you were looking for.

There's an old joke in New England about a city slicker asking for directions from a farmer sitting on his front porch. The farmer says, "You can't get there from here." As a person who grew up in the country, I've always thought this was short for saying, "well, I could give you directions, but unless you grew up in these parts, you probably won't understand anyway...."

But things have changed with automobiles, and they're beginning to change with computer networks.

Computer networks have jumped the first hurdle on the path which all technologies must run. They are now usually very reliable. Most of the time, you can press a few buttons and know that your message will be received by someone thousands of miles away, in a few seconds. Today, global computer networks are being used daily by millions of people who don't know much more about computers than the average person knows about the inner workings of a television set.

The purpose of NUSIRG is to help network users get over the second great hurdle of new technologies: Now that computer networks are reliable, what can they be used for? And once you know what can be done, you'll learn "how to get there from here." You can think of NUSIRG as a set of basic driving lessons, and a glove compartment full of "road maps" to the many interconnected routes and valuable services that together comprise a worldwide computer network known as "The Internet" (See Chapter 2: The Internet).

WHAT IS THE INTERNET?

The Internet is a world-wide network of networks which is able to inter-connect computers ranging from the simplest PCs to the most sophisticated mainframes. Internet users can use the Internet for an extraordinary range of purposes - long distance collaborations, freely copying programs and documents to and from remote computers, accessing library catalogs, logging in to supercomputers - the list of current Internet activities is large and the range of possible future applications is as unlimited as our imagination.

The Internet is huge. As of June, 1991, it was estimated that the Internet is comprised of more than 5,000 networks connecting more than 350,000 computers. In fact, because it is in direct communication with satellites far above us, the Internet is already bigger than the earth.

The Internet is used by a large and diverse community of people. An estimated 3,500,000 people from many of the world's nations use the Internet, and this number is continuing to grow exponentially.

The Internet is also incredibly complex. There probably isn't a single person who understands everything about it. Remember this whenever you get confused, and you'll probably feel better!

But once you've mastered a few basic skills, the Internet is easy to use. Already, there are thousands of elementary school students in the world engaging in global communication through the Internet, and millions of other people from all walks of life who count on the Internet as an integral part of their day-to-day educational and research activities.

HOW TO USE NUSIRG

> *...a book is more than a verbal structure, or a series of verbal structures; a book is the dialogue with the reader, and the peculiar accent he gives to its voice, and the changing and durable images it leaves in his memory. That dialogue is infinite.*
>
> Jorge Luis Borges
> "For Bertrand Russell"

Use NUSIRG Either As A Book Or As Individual Documents

NUSIRG has been written so that it can be used either as a unified book, or as stand-alone chapters to teach you about specific Internet resources. Regardless of which way you use NUSIRG, each chapter will give you an indication of which other chapters of NUSIRG or other sources of Internet documentation will provide necessary background, or more detailed treatment of the topic at hand.

Customize Your Copy Of NUSIRG!

This document will be most effective if it is a continuing dialogue, between you, the Internet, and NorthWestNet User services.

NUSIRG is meant to be a document that you can easily customize to your particular level of expertise and sets of interests. It is hoped that everyone who uses this guide will get some of the many documents referenced at the end of every chapter, and put them in the appropriate locations in their own particular version of NUSIRG. This document will have succeeded in one of it's primary goals if there are as many versions of NUSIRG as there are NUSIRG users, just like everybody's glove compartment contains a different collection of road maps.

Most of the documents referenced can be obtained, for free, through a computer connected to the Internet. Getting free information is one of the easiest and most important networks skills you will learn.

NUSIRG has been written for anyone who uses the Internet: from kindergarten teachers at small and isolated rural schools, to the most sophisticated supercomputer users at major urban research institutions. Throughout, every attempt has been made to keep the text simple without being simplistic, and thorough without being thoroughly overwhelming.

MASTER ELECTRONIC MAIL, FTP AND TELNET; FROM THERE ON, EXPLORE!

Every Internet user is different, but nonetheless most network activities are based on three basic skills: using electronic mail, copying files from remote computers (FTP), and logging in to remote computers (TELNET). It is also a good idea to get an overview of the Internet as a whole. You should read through the chapters on the Internet, electronic mail, FTP, and TELNET first, unless this material is already old hat to you. Although the remainder of NUSIRG is designed in a somewhat incremental fashion, you should be able to bounce around between chapters without too much difficulty once you've mastered the basic "Internet-working" skills.

Most chapters have the following structure (where "x" is the topic of the chapter):

"What is x ?"
"What is x used for?"
"What do I need to know before I start using 'x'"
A general overview of x
A short example using x
A longer example using x with step-by-step explanations
"For more information on x...."

Because the Internet is able to support a tremendous diversity of hardware and software, it is sometimes impossible to present an example which is guaranteed to work for everyone. In such cases, a "generic example" is presented to illustrate the essential features of a particular Internet topic. When necessary, you should obtain appropriate documentation from your instructor or user services staff on how a particular application is used at your site. By the winter of 1991, you'll be able to access a collection of such documentation in the computer archives of the NorthWestNet Network Information Center, but this service is not yet available.

COMMUNICATE WITH NORTHWESTNET USER SERVICES

If you are a computer instructor or user services staff member, feel free to duplicate and distribute any or all parts of NUSIRG, for your students or clients, provided that appropriate attribution is given to both NWACC and NorthWestNet. The requirement for appropriate attribution will be satisfied by the inclusion of the inside cover/copyright page with every copy. If you make significant changes to the documents, indicate that your document is a modified version of NUSIRG. And, if you feel the changes you make result in notable improvements of the document, please send us a copy so the next edition of NUSIRG can be even better! All comments and suggestions from anyone using NUSIRG will be gladly taken, and, when possible, will be used to improve the next editions. At the end of the guide there is a "User's Feedback Form" which you are encouraged to fill out and return to NorthWestNet user services.

Welcome to the Internet - you are now a participating member of a global village!

Chapter 2: The Internet

Is it a fact ... that by means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time? Rather, the round globe is a vast head, a brain, an instinct with intelligence! Or, shall we say, it is itself a thought, nothing but thought, and no longer the substance which we deemed it!

Nathaniel Hawthorne, 1851

GENERAL INTRODUCTION

The Internet is a world-wide computer network which allows you to communicate with millions of other Internet users and to use the resources of computers throughout the world. No matter how humble your own computer might be, if it is connected to the Internet, you have a virtually unlimited wealth of resources available for your every day use.

To whet your appetite for "Internet-working," here's a partial list of the many ways you can use the Internet:

Communicating with other people:

- ❑ exchange electronic mail
- ❑ engage in online, real time discussion with other Internet users
- ❑ subscribe to discussion or subscription groups of people sharing your interests

Accessing the resources of other Internet computers:

- ❑ browse through electronic library catalogs
- ❑ copy computer files or software from archives
- ❑ access databases for teaching or research
- ❑ obtain free electronic books
- ❑ use educational and information services
- ❑ find Internet directory services
- ❑ access supercomputer sites

The details of how you can do all of this (and more!) is described in the rest of the chapters of NUSIRG.

This document is intended to give you a brief description of what the Internet is and how it works.

OVERVIEW OF THE INTERNET

What Is A Computer Network?

A computer network can be as simple as two computers in an office connected by a cable.

A simple computer network linking identical computers can be very useful in situations where all users are performing the same tasks, for example in a classroom or a business office. This kind of a setup allows files and mail to be transferred between the computers of the network, and may allow access to a centralized "hard disk" for sharing software, data files, and printers. But until the mid 1970's, it was difficult to link, or "internetwork," networks containing different kinds of computers.

What is An "Internet?"

Although simple computer networks are useful, a network which connects a variety of computers with distinctive features offers much more flexibility to its users. In such a network, you can use one kind of computer to rapidly perform complex calculations. When the first computer is done, you could use a network to send the output to a different computer more suited for easy preparation of colorful graphs.

But just like people can best communicate when they speak the same language, computers can best participate in a simple network when they use the same hardware and software to code, transmit, and receive data.

An "internet" is a more complex kind of computer network which allows computers with distinctive software and hardware to communicate by translating messages to a mutually understandable "communications protocol." The first real internet, ARPANET, arose from research supported by the Advanced Research Projects Agency (ARPA), now DARPA, Defense Advanced Research Projects Agency.

The standardized communications protocols which made the ARPANET possible evolved from the early NCP to today's "TCP/IP Protocol Suite."

TCP/IP makes certain that two computers reach an agreement about the basic rules of data exchange, and guarantees that messages are properly packaged and transmitted through the network. (References to detailed descriptions of the many activities of TCP/IP are listed at the end of this document). TCP/IP is one of the fundamental building blocks upon which standardized services can be built across diverse computers.

What Is The Internet?

- ❏ The Internet is a network of networks, all of which use the TCP/IP protocol suite as their standard communications protocols;
- ❏ The Internet interconnects supercomputers, mainframes, workstations, personal computers, and even laptop computers and packet radios;
- ❏ The Internet is huge; as of 1991 it comprises more than 5,000 networks, serving over 350,000 hosts and is used by more than 3.5 million people. These numbers will continue to grow every day!;
- ❏ Perhaps most importantly, the Internet is a global village of Internet users who can communicate across the planet as easily as you might walk to your next door neighbor's house.

Internet Addresses

Please read this section carefully. In order to communicate and navigate within the Internet global village, you have to know how to read and write Internet addresses. You need to specify an Internet address every time you send mail to an Internet user, or when you access Internet services like electronic library catalogs.

Internet addresses are very similar to postal mail addresses in form and function. For example, here's how someone from another country might address a letter to someone in the United States:

Jane Q. Public
11 Maple Street
Seattle,
Washington
USA

The address starts with a person's name. The next three lines provide increasingly general information about where she lives, from street to country. Since streets are in cities, cities are in states, and states are in countries, this can be described as a hierarchical addressing scheme.

Computers accessed by users of the Internet are "network hosts." Each network host has an "address," using the same sort of hierarchical addressing scheme as postal addresses, by which it is known to computers and users of the network. Most of the time, you will be able to use Internet addresses in the Domain Name System (DNS) format.

Suppose that Jane Q. Public has an account on an Internet computer at the University of Washington. (Her Internet address might look like the first line; her postal address is shown in the same format, on the second line, to illustrate the basic similarity between the two systems):

Internet:	jqpublic@ibmpc23.biology.washington.edu
US Mail:	JaneQPublic,11MapleStreet,Seattle,Washington,USA

The Internet address contains the following parts:

jqpublic	a "user-id" (User Identification)
@	"this user-id is located at"
ibmpc23	a particular Internet host within
biology	the biology department at the University of Washington campus network, within
washington	the Internet in Washington State, within
edu	the education-oriented portion of the Internet in the U.S.

While using the Internet, you may encounter or need to use another style of Internet address, which contains numbers instead of letters. This numeric addressing system is called the IP address and is in fact the addressing system by which computers are known to other computers (The Domain Name System is a convenience for us human beings, who are better at reading and remembering letters and words.)

For example, the hypothetical computer at the University of Washington which is called

ibmpc23.biology.washington.edu

in the Domain Name System might have the following IP numeric address:

128.95.10.207

Notice that this IP address has four parts, just like the Domain Name System address. Although it may be tempting to think that the four words separated by dots in the Domain Name System translate directly to the four numbers in the IP address, this is not the case. A more appropriate analogy is the way names are paired with phone numbers; they may be assigned and reassigned arbitrarily.

Domains and Hosts

The first part of an Internet address in DNS format always represents the name of an individual computer, or "host." The rest of the name represents "domains" and "subdomains," which are hierarchically arranged.

Consider the following three addresses:

nwnet.net	(host.domain)
stis.nsf.gov	(host.subdomain.domain)
nri.reston.va.us	(host.subdomain.subdomain.domain)

The last part of an Internet address in DNS format always represents a "top level" domain. Within the United States, here are some of the top level domains that have been assigned:

ARPA	Advanced Projects Research Agency
COM	Commercial organizations
EDU	Educational and research institutions
GOV	Government agencies
MIL	Military agencies
NET	Major network support centers domain
ORG	Other organizations
US	U.S. geographical domains (e.g., WA.US.)

The Internet As A Network Of Networks

The worldwide Internet is currently composed of more than 5000 component networks, all of which use the TCP/IP Protocols.

Many of the details of the organization and administration of the Internet within the United States could be drastically altered by pending legislation to establish a National Research and Education Network (NREN). Consequently, the information in this section is purposely fairly general. But at the very least, this section provides a broad-brush description of how the Internet in the United States is organized, as of the autumn of 1991.

How the Internet Is Structured Within The U.S.

Internet networks within the United States are organized hierarchically into national, regional, and various sorts of local networks. The purpose of each network is to provide Internet services to a particular geographic region or constituency.

National Networks Providers

National networks provide high-speed, long distance computer communication across the United States. At the present time, there are several distinct national level networks operated by various U.S. government agencies, not-for-profit organization, and commercial enterprises.

Although all of these networks span the nation, often have sites at the same locations, and all use the TCP/IP protocols, they are, for the most part, logically and administratively distinct entities that internetwork only through one or a few gateways.

The most prevalent national network for the Internet user at higher educational institutions is NSFNET, which serves as the backbone connecting most regional educational networks.

Here's a brief summary of some of the most widely used national networks in the Internet.

- ❏ NSFNET (National Science Foundation Network) was originally created to facilitate reliable communication between universities and to provide easy access to NSF-sponsored supercomputers. Its focus has now broadened to provide Internet connectivity to smaller colleges and post-secondary educational institutions.

- ❏ UUNET is a non-profit organization which provides electronic mail connectivity to more than 1,000 subscribing sites.

- ❏ ESnet (Energy Sciences Network) is operated by the Department of Energy, and is comprised of what were formerly HEPNET (High Energy Physics Network) and MFENET (Magnetic Fusion Energy Network), which connects physics departments conducting research in magnetic fusion energy.

- ❏ DDN (Defense Data Network) is funded by the Department of Defense, and itself contains a number of national level networks (ARPANET, DISNET, MILNET, SCINET, and WINCS) devoted to military communications.

- ❏ NSN (NASA Science Network) is for NASA staff, and research and academic sites performing NASA sponsored research who need access to a number of scientific databases and supercomputer sites.

- ❏ SPAN (Space Physics Analysis Network) is a data comparison network for researchers in Solar, Terrestrial, and Interplanetary Physics, but has since expanded to cover other disciplines. SPAN's primary services are for NASA (the National Aeronautics and Space Administration) and ESA (the European Space Agency).

- ❏ USAN (University Satellite Network) serves organizations doing research in the atmospheric and oceanographic sciences, featuring satellite access to the National Center for Atmospheric Research (NCAR) supercomputer facility.

Regional Internet Networks

Most regional Internet networks were created by funding from the National Science Foundation to provide networking services to universities and research institutions in specific geographic regions within the U.S.. Like

the national Internet networks, most regional Internet networks have a Network Information Center and a Network Operations Center.

NSF-funded regional networks are connected to NSFNET at a "backbone site." For example, NorthWestNet (a regional network serving the northwestern U.S., including Alaska) is linked to NSFNET at the University of Washington in Seattle.

The existence of regional Internet-based networks is generally not perceivable to the average Internet user, much as the existence of regional phone companies is usually not apparent to you when you make a long distance phone call.

Many university Internet hosts are also beginning to act as local hubs to provide Internet access for primary and secondary schools.

Here is a list of some of the regional networks:

BARRNet:	"Bay Area Regional Research Network" (San Francisco)
CERFnet:	"California Education and Research Federation Network"
CICnet:	"Committee of Institutional Cooperation Network" Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin
JVNCNet:	"John von Neumann Center Network"; originally a supercomputer access network, now a regional serving the mid-Atlantic states
Los Nettos:	A regional network for the Los Angeles area
MIDnet:	A regional network for the Midwestern states Arkansas, Illinois, Iowa, Kansas, Missouri, Nebraska, Oklahoma
MRNet:	"Minnesota Regional Network"
NEARnet:	"New England Academic and Research Network" Connecticut, Maine, Massachusetts, New Hampshire Rhode Island, Vermont
NorthWestNet:	A regional network for the northwestern states Alaska, Idaho, Montana, North Dakota, Oregon, Washington
NYSERNet:	"New York State Educational and Research Network"
PREPnet:	"Pennsylvania Research and Economic Partnership Network"
Sesquinet:	"Texas Sesquicentennial Network"
SURAnet:	"Southeastern Universities Research Association Network"Alabama, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, North Carolina, South Carolina, Tennessee, Virginia, West Virginia
THEnet:	"Texas Higher Education Network"
WESTNET:	A regional network for the Rocky Mountain states Arizona, Colorado, Idaho, New Mexico, Utah, Wyoming

Internet Network NICs and NOCs

Most national and regional Internet networks have a NIC (Network Information Center) and a NOC (Network Operations Center).

A network's NIC provides centralized support for users and User Services staff throughout their network. Typical NIC activities can include: preparing, distributing, and maintaining documentation for network users, publication of newsletters; maintenance of a central computer archive of information files or other resources; and educational training classes for the users and network staff of member institutions.

A network's NOC deals with the operational aspects of running the network, including installation and maintenance of the network's hardware and software; daily monitoring and troubleshooting of the network's activity; and establishing connections to new network sites. NOC staff may also field questions from technical representatives from member institutions and from institutions which are contemplating connecting to the network.

Supercomputer Access Oriented Internet Networks

Finally, several Internet networks are dedicated to providing local access to the various NSF-sponsored supercomputer sites:

LANL:	Los Alamos National Laboratory Integrated Computing Network
NCSANet:	"National Center for Supercomputing Applications Network" Illinois, Indiana, Wisconsin
PSCNET:	Pittsburgh Supercomputing Center Network Pennsylvania, Maryland, Michigan, Oklahoma
SDSCnet:	San Diego Supercomputer Center Network

Statewide and Within-State Networks

Almost all 50 states currently have active statewide networks in place. Some of them use the TCP/IP protocols, thereby allowing attached computers to inter-communicate when connected to the Internet.

Metropolitan networks are a more recent entry to the network world. As the name suggests, these networks are designed to provide network services to geographically-restricted metropolitan regions.

NON-INTERNET NETWORKS

There are several very important national level computer networks in the United States which do not use the TCP/IP protocols, and thus, are not technically part of the Internet.

From an Internet user's perspective, a significant difficulty with non-Internet networks is that it is not possible, or at least very difficult, to perform remote logins to computers in such networks.

Nonetheless, you can communicate with users and computer on many non-Internet networks via e-mail messages sent to electronic mail "gateways." Gateways are responsible for translating messages created for transport across TCP/IP networks into messages that can be transported by the other networks.

Such gateways allow you to send mail to users on such non Internet networks, and in some cases allows you to access valuable services which are offered by these networks.

Corporation for Research and Educational Networking (CREN)

CREN is an umbrella organization which was responsible for two national networks, BITNET and CSNET. As of October 1991, CSNET was no longer operational. BITNET, however, is still a major provider of national educational networking.

BITNET--"Because It's Time Network"--was designed to facilitate electronic communications among universities throughout the world. BITNET is a strongly multi-disciplinary network with users in all academic fields. BITNET is of interest to Internet users because of a variety of unique and valuable services such as mature and widely used file and discussion list servers (such as LISTSERV). Like the Internet, BITNET has sister networks throughout the world which share network protocols (such as EARN, the European Academic and Research Network). The services of BITNET and its related networks are readily accessible to Internet users through gateways at several sites which are connected to both the Internet and to BITNET. For more information about electronic mail gateways, refer to Chapter 3 of NUSIRG.

FOR MORE INFORMATION ABOUT THE INTERNET

Although most information on the Internet is available as online documents, there are several notable printed books on The Internet specifically, and networking generally.

Published Books And Articles About Internet Networks

Frey, D. and R. Adams. 1990 !%@:: A Directory of Electronic Mail Addressing and Networks. O'Reilly and Associates, Sebastopol, CA.

LaQuey, T. L. 1989. "Networks for Academics," Academic Computing 4(3):32-39. Academic Computing Publications, Inc.., McKinney, TX.

LaQuey, T. L. 1990. User's Directory of Computer Networks. Digital Press, Bedford, MA.

Quarterman, J. S. 1989. "Etiquette and Ethics," ConneXions - The Interoperability Report 3(4):12-16. Advanced Computing Environments, Mountain View, CA.

Quarterman, J. S. 1990. The Matrix: Computer Networks and Conferencing Systems Worldwide. Digital Press, Bedford, MA.

Stoll, C. 1989. The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage, Doubleday, New York, NY.

Published Information About Internet Protocols

Comer, D. E. 1991. Internetworking With TCP/IP. Volume 1: Principles, Protocols, and Architecture. Prentice Hall, Inc.., Englewood Cliffs, NJ.

Garcia-Luna-Aceves, J. J., M. K. Stahl, and C. A. Ward. 1989. Internet Protocol Handbook: The Domain Name System (DNS) Handbook. SRI International, Network Information Systems Center, Menlo Park, CA.

Stallings, W. 1990. Handbook of Computer-Communications Standards Volume 1: The Open System (OSI) Model and OSI-Related Standards; Volume 2: Local Area Network Standards; Volume 3: The TCP/IP Protocol Suite. Macmillan, New York, NY.

About "Online" Internet Information

The Internet is, to a large degree, self documented. There is an enormous amount of "online" information stored on computers throughout the Internet. A large percentage of such online information can be retrieved by using FTP (File Transfer Protocol), a tool for copying information to and from Internet computers. For detailed information on how to use FTP, refer to Chapter 4 of NUSIRG.

About Requests for Comments (RFC's)

RFC's are an essential source of information about the Internet. As of September 1991 there were more than 1,000 RFC's containing general information, technical specifications about the "nuts and bolts" of the Internet, and occasional general essays of interest to Internet users. Complete sets of RFC's are available in many "FTP archives"; one currently authoritative source of RFC's is:

FTP Host:	nnsc.nsf.net	
directory:	rfc	
files:	rfc-index.txt	(a current index of all RFC's)
	rfc1000.txt	(each RFC is named rfcXXXX, where "XXXX" is the RFC number, e.g., rfc1000)
	etc...	

Online Overviews About Internet Networks

Bowers, K., T. LaQuey, J. Reynolds, K. Roubicek, M. Stahl and A. Yuan. 1990 RFC 1175: FYI on Where to Start - A Bibliography of Internetworking Information.

FTP Host:	nnsc.nsf.net
directory:	rfc
file:	rfc1175.txt

Spurgeon, C. 1990. Network Reading List. The University of Texas at Austin Computation Center, Austin, TX.

FTP Host:	emx.utexas.edu	
directory:	pub/netinfo/docs	
files:	network-reading-list.txt	(ASCII format)
	network-reading-list.ps	(PostScript format)

NSF Network Service Center. (ongoing). Internet Resource Guide. NSF Network Service Center, Cambridge, MA

FTP Host:	nnsc.nsf.net
directory:	resource-guide

file:	README	(copy this file with FTP for instructions on the options you have for FTP'ing or subscribing to the NNSC Internet Resource Guide)

Online Information About Internet Protocols

Hedrick, C. L. 1987. Introduction to the Internet Protocols. Rutgers University Computer Science Facilities Group, Piscataway, NJ.

FTP Host:	topaz.rutgers.edu	
directory:	pub/tcp-ip-docs	
files:	tcp-ip-intro.1	
	tcp-ip-intro.2	

Hedrick, C. L. 1988. Introduction to Administration of an Internet-based Local Network. Rutgers University Computer Science Facilities Group, Piscataway, NJ.

FTP Host:	athos.rutgers.edu	
directory:	runet	
files:	tcp-ip-admin.doc	(ASCII format)
	tcp-ip-admin.ps	(PostScript format)

Krol, E. 1989. RFC1118: "The Hitchhiker's Guide to the Internet. University of Illinois Urbana, Urbana-Champaign, IL

FTP Host:	nnsc.nsf.net
directory:	rfc
file:	rfc1118.txt

Oganizations And Periodic Conferences Relevant to Internet Users

ACM SIGCOMM Symposium

The Association for Computing Machinery
11 West 42nd Street
New York, NY 10036-8097

phone: (212) 869-7440
fax: (212) 869-0481.

IDG Communication Networks Conference & Exposition

IDG Conference Management Group
P.O. Box 9171
Framingham, MA 01701

phone (800) 225-4698
(508) 879-6700
fax: (508) 872-8237

Internet Engineering Task Force (IETF)

Corporation for National Research Initiatives
1895 Preston White Drive
Suite 100
Reston, VA 22091

Attn: IAB Secretariat

e-mail: ietf-request@venera.isi.edu.

Internet Society

1895 Preston White Drive
Suite 100
Reston, VA 22091

e-mail: isoc@nri.reston.va.us

INTEROP Conference and TCP/IP OSI/ISO ISDN Internetworking Tutorials

Interop, Inc..
480 San Antonio Road
Suite 100
Mountain View, CA 94040

phone: (415) 941-3399 or
(800) INTEROP
fax: (415) 949-1779.

National Net Conference, and EDUCOM Conference.

EDUCOM
1112 16th Street, NW
Suite 600
Washington, DC 20036

phone: (202) 872-4200.

NREN

By time you read this, NSFNET and similar national Internet networks may have been renamed "The National Research and Education Network" (NREN). In November of 1991, President Bush signed the High-Performance Computing Act which authorized the creation of a permanent NREN. The bill allocated $2.9 billion over the next five years to enhance the United States' high-performance computing and communications infrastructure.

Information on the NREN is available electronically from:

FTP Host:	nis.nsf.net
directory:	nsfnet
files:	all files

There are also online discussion groups dealing with NREN related issues:

Group Name	To Subscribe
nren-discuss@psi.com	e-mail to nren-discuss-request@psi.com
com-priv@uu.psi.com	e-mail to com-priv-request@uu.psi.com