Accessing the Internet

August 1995

IBM

International Technical Support Organization
Raleigh Center

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Accessing the Internet

August 1995

Take Note!

Before using this information and the product it supports, be sure to read the general information under
"Special Notices" on page xiii.

First Edition (August 1995)

This edition applies to the following products:

- IBM Internet Connection for OS/2 Warp
- IBM OS/2 Warp Connect Version 3
- IBM Internet Connection for Windows

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Abstract

This document is unique in its detailed coverage of the Internet. In particular, the reader is given guidance in selecting an Internet service provider, setting up secure access to the Internet and selecting Internet navigation tools.

The document also focuses on IBM's commitment to the Internet. In addition, it provides information about installing and using IBM Internet Connection for OS/2, IBM OS/2 Warp Connect and IBM Internet Connection for Windows.

This document was written for anyone with an interest in accessing and using the Internet. Some knowledge of networking and TCP/IP is assumed.

(207 pages)

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Special Notices

This publication is intended to help Systems Engineers install and use the IBM Internet Connectivity products for OS/2 Warp and Windows. The information in this publication is not intended as the specification of any programming interfaces that are provided by IBM Internet Connection programs. See the PUBLICATIONS section of the IBM Programming Announcement for OS/2 Warp, IBM Internet Connection for Windows and IBM NetSP Secure Network Gateway for more information about what publications are considered to be product documentation.

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Preface

This document is intended to assist users of the IBM Internet connectivity programs. It contains both installation and usage information for the IBM products in this area.

This document is intended for both customers and IBM staff.

Use of the Internet has grown substantially over the last few years. This has been particularly true in the commercial arena where the usage of the Internet has now been realized in terms of the large potential audience that it can reach.

This document will give some insight into the Internet, the communications protocols used and the installation and usage of a number of IBM products that have been announced for accessing the Internet.

How This Document is Organized

The document is organized as follows:

- Chapter 1, "Overview"

  This provides an overview of the Internet.

- Chapter 2, "Internet Networking Overview"

  This provides an introduction to networking and the TCP/IP protocols used when connecting to the Internet.

- Chapter 3, "Connecting to the Internet"

  This chapter covers the installation of the IBM Internet Connection products.

- Chapter 4, "Internet Navigation Tools"

  This chapter covers the usage of some of the Internet connection tools.

- Chapter 5, "IBM on the Internet"

  This chapter covers some interesting details on IBM's commitment to the Internet as well as some interesting IBM Internet sites.

- Chapter 6, "Security and Firewalls"

  This chapter covers some useful details on Internet security. It includes setting up and using a firewall using IBM's NetSP program. Elements of this chapter will use details from the redbook *Building a Firewall with the NetSP Secure Network Gateway*, GG24-2577.

- Chapter 7, "Placing Data on the World Wide Web"

  This chapter covers some details on Web servers.

- Chapter 8, "Useful Internet Sites"

  This chapter covers some interesting Internet information and useful sites. These sites change very rapidly. This chapter will not stay relevant for very long.

- Chapter 9, "Commercial Usage"

  This chapter covers IBM software fix locations and announcement information.

Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

- *The Whole INTERNET: User's Guide and Catalog.*, ISBN 1-56592-063-5
- *Inside OS/2 Warp Version 2.*, G362-0016
- *OS/2 Warp Unleashed.*, SR28-4318
- *The Internet Unleashed.*, SR28-5577
- *TCP/IP Illustrated Volumes 1 and 2.*, SR28-5586
- *Spinning the Web.*, SR28-5646-00 (ISBN 1-850-32141-8)
- *NetSP Secured Network Gateway Guide*, SC31-8113

International Technical Support Organization Publications

- *Using the Information Super Highway*, GG24-2499
- *Building a Firewall with the NetSP Secure Network Gateway*, GG24-2577
- *TCP/IP V2.0 for OS/2 Installation and Interoperability*, GG24-3531

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```
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```

IBM employees may access LIST3820s of redbooks as well. Point your web browser to the IBM Redbooks home page:

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http://w3.itsc.pok.ibm.com/redbooks/redbooks.html
```

Acknowledgments

Chapter 1. Overview

This redbook is intended to be a guide to getting connected to the Internet from IBM workstations. The book has two main purposes: to help you set up connections to the Internet using IBM software and to help you use the Internet for business purposes.

This book is one of a number of IBM redbooks which cover related areas from AIX Internet connections through to general TCP/IP usage.

This chapter will give an overview of the Internet and the rules and Internet etiquette, or *netiquette*, that apply when using the Internet.

1.1 What Is the Internet?

Internet is a catch-all word used to describe a massive worldwide network of networks. The word *Internet* means network of networks. In itself, the Internet is comprised of smaller regional networks that span the globe. To connect information on these networks together, knowledge-linking tools have been developed and implemented. The most current and best known is the World Wide Web. The World Wide Web refers to a body of information linked together to form a network of knowledge.

The Internet was born in the late 1960s out of an effort to create a United States Department of Defense network called the ARPAnet that would connect defense contractors and universities involved in research work to the Department of Defense. To send a message on the network, a computer simply had to put its data in an envelope, called an Internet Protocol (IP) packet, and then transmit this packet on the Internet. At the same time as the Internet was starting, local area networks were being developed. LAN technology matured quietly until 1983, when desktop workstations became available and local area networking exploded. Most of the workstations came with UNIX and included IP networking software. This created a new demand: rather than connecting to a single large site, users wanted to connect the local LAN to the ARPAnet. This would allow the LANs to access the ARPAnet's facilities. At the same time, many large companies starting building on the protocols which ARPAnet and the LANs used, namely IP. It became clear that users of networks based on the IP protocol would all be able to communicate.

Other networks then grew out of the ARPAnet and LAN network interconnect concepts. One of the most important of these newer networks was the NSFNET, commissioned by the National Science Foundation (NSF), an agency of the United States Government. In the late 1980s the NSF created five supercomputer centers at major universities. To be able to connect these expensive systems together, NSF tried to use the ARPAnet for communications. This failed because of bureaucratic and staffing problems. In response, the NSF decided to build its own network, based on the ARPAnet IP technology. They rejected simply connecting the supercomputers together on economic grounds. These connections are paid for by distance. They decided to create a regional network, with smaller workstations at schools that would be connected together on an individually sponsored basis. Each regional site would connect to adjacent regional sites, until eventually the major centers were connected together. This solution was successful. This worked for a while, but eventually the regional

1

sites and telephone lines became overloaded. In 1987, a contract to manage and upgrade the network was awarded to Merit Network Inc, which ran Michigan's educational network, in partnership with IBM and MCI. The old network was upgraded with faster telephone lines (by a factor of 20) and faster computers.

The process of expanding the system is still continuing. Systems are being connected together into redundant multi-connection based networks. Unlike the earlier attempts of the ARPAnet, the NSFNET promoted worldwide access. It promoted universal access by funding connections only if an educational campus had a plan to spread Internet access around its campus.

Numerous additional major networks including CSNET, Bitnet and IBM's VNET comprise this super network.

As stated earlier NSFNET was designed for worldwide educational access. This then raised the question, what about the commercial users on the Internet?

The United States Federal High Performance Computing and Communications (HPPC) program indicated that all the NSFNET-based Internet networks will be absorbed into a National Research and Education Network (NREN). The program includes the exploration of pricing mechanisms for network services and applications and the initiation of a structured transition to commercial services.

The NREN has replaced the NSFNET with a USA-based network core of high-speed network access points (NAPs) and national network service providers (NSPs). The following four NAPs are providing the USA NAP services, and are shown in Figure 1:

- Sprint Corporation based in New York (*)

- Ameritech based in Chicago (*)

- PacBell based in San Francisco (*)

- MFSdatanet based in Washington
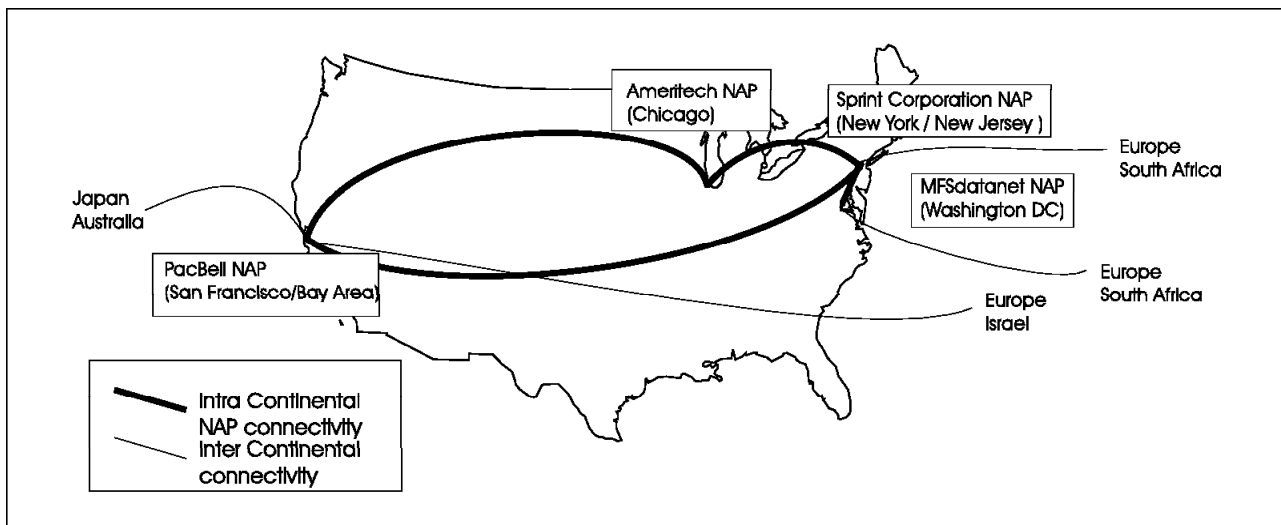
Figure 1. USA National Access Points

Routing information is maintained at each NAP, termed *routing arbiters.* Routing will be described in more detail in Chapter 2, "Internet Networking Overview" on page 11.

The national network service providers provide connections to the three primary NAPs (*) and MFSdatanet. The NSPs include those who receive funding from NREN, and those who don't. The NSPs who receive funding from NREN include:

- ANS (Sprint Centel)
- MCInet
- SprintLink

Each national funded NSP must provide connections at each of the NAPs. As such ANS, MCI and Sprintlink all have connections and routing arbiters at each NAP. These NAPs provide the core of service provider functionality for the Internet. A next level of service provider will connect into this core service.

The unfunded regional service providers include:

- Alternet
- Net99
- PSI
- NetCom
- AGIS
- CERFNET
- Alpha

The IBM/Sears Roebuck jointly owned Advantis has links into both ANS and AlterNET. Advantis is a second-stage service provider to the national NSP ANS.
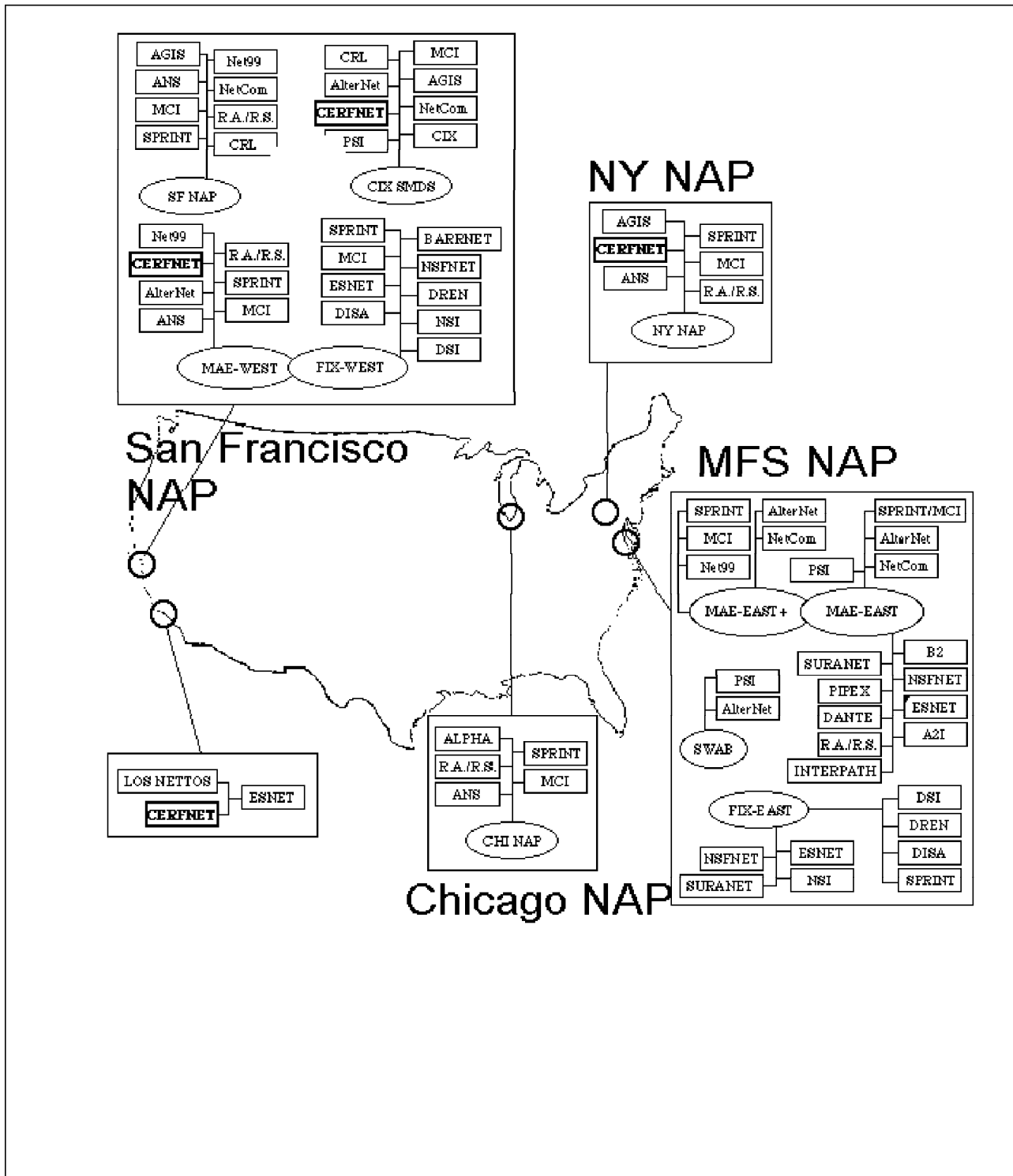
Figure 2. USA National Service Providers

The United States NAP provides the core of all intra-continental Internet communication. Communication to Europe is done mostly through the MAE-EAST and DANTE-USA connections. Connectivity to Australia and Japan uses the San Francisco NAP. Connectivity to Israel occurs through the San Francisco NAP while connectivity to South Africa occurs through the Washington NAP.

The European networking structure is based off six prime network infrastructures, as follows:

- EuropaNET (DANTE)
- NORDUnet
- UKERNA
- WIN (DE)
- Ebone
- INFN/GARR

This network infrastructure provides links to the US, through T-1 links as shown in Figure 3. The network has major services connected to it. The largest network link is EuropaNET which, besides T-1 links to the USA, includes a 64 Kbps link to Korea. The prime European service provider is RIPE. RIPE is the equivalent of the USA NSPs. RIPE is responsible for the European domain and IP registration. This will covered in more detail in Chapter 2, "Internet Networking Overview" on page 11.
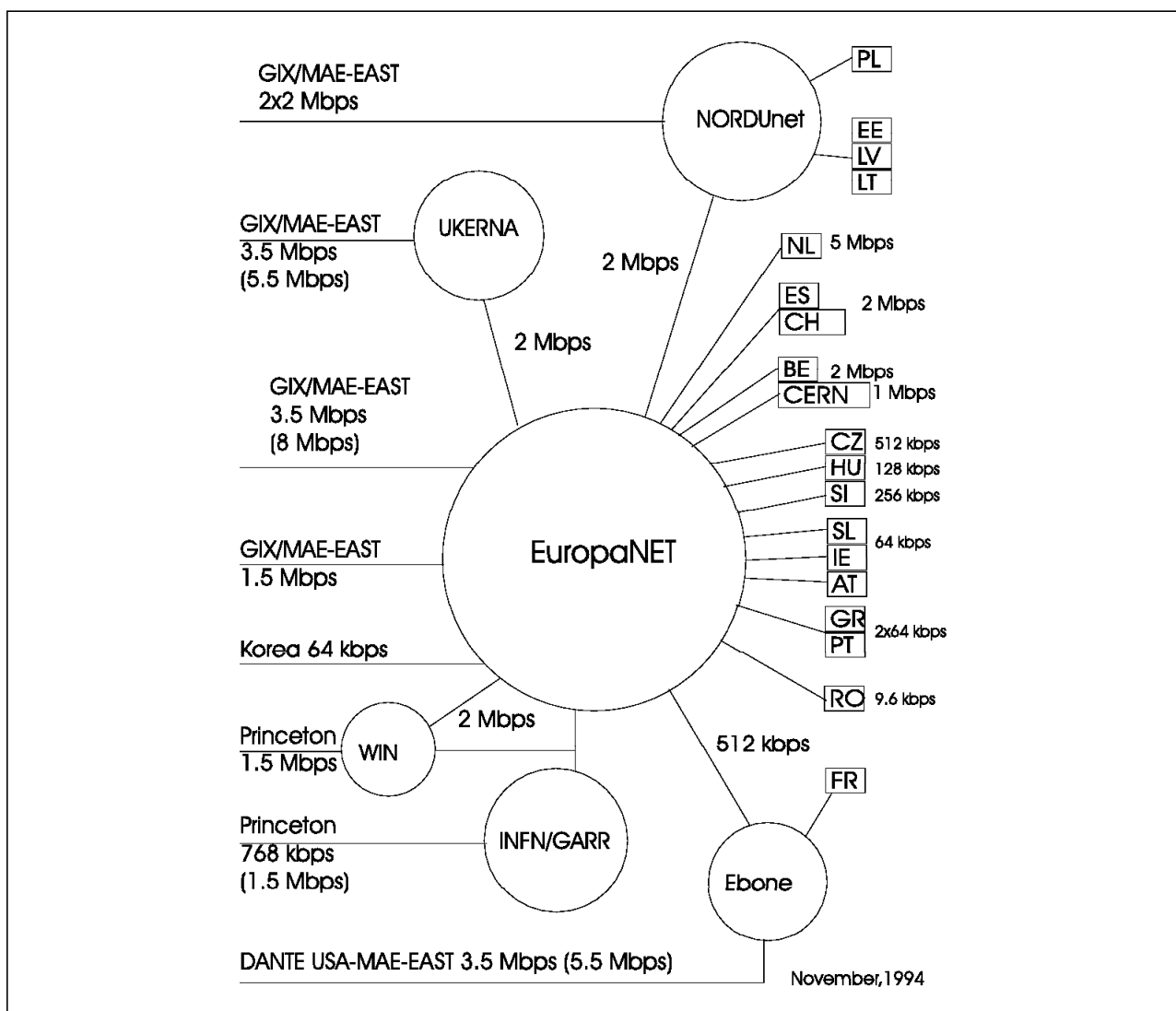
Figure 3. European Internet Connectivity

The growth of the Internet has been substantial. The worldwide growth now covers some 40 countries, as shown in Figure 4 on page 6.
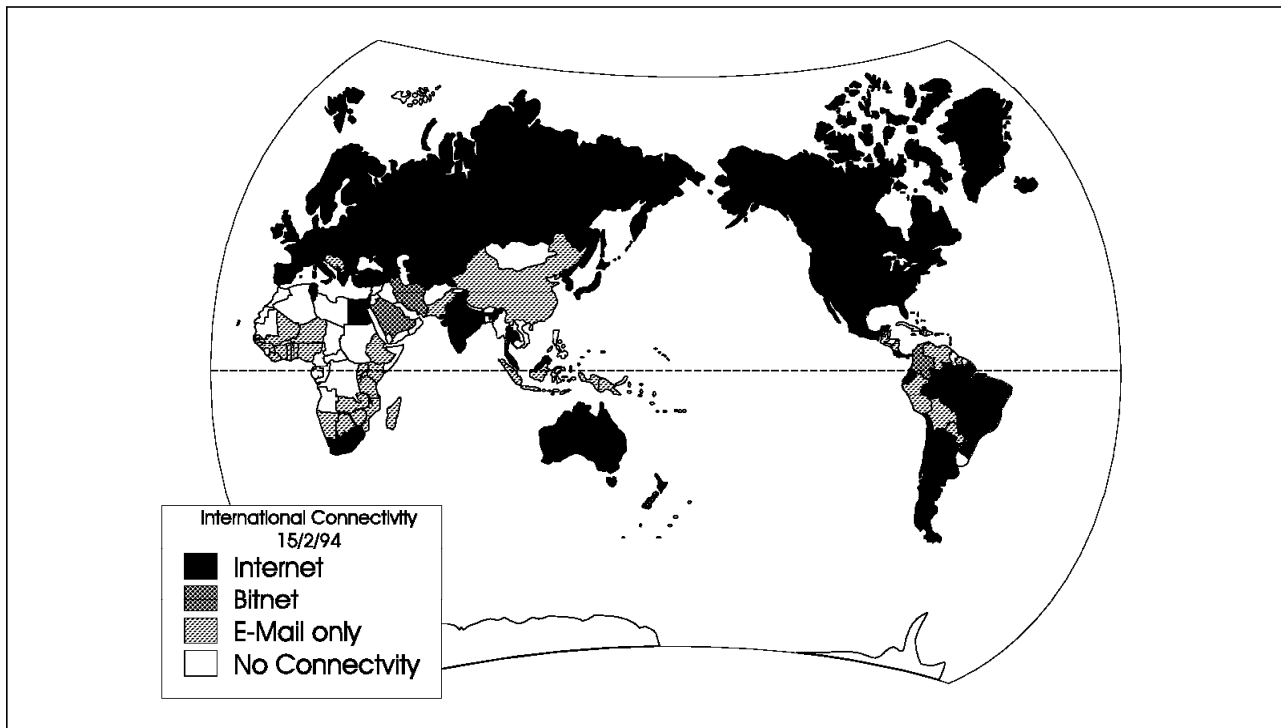
Figure 4. Global Internet Distribution

1.2 Who Owns the Internet?

As a result of the efforts of NSFNET to get each node of the Internet to fund itself and as such maintain control of that node, no one organization owns the Internet. Individual network nodes may have node owners, but there is no one individual owner. The ultimate authority for where the Internet is going rests with the Internet Society (ISOC) and various affiliated organizations. ISOC is a voluntary organization whose purpose is to promote global information exchange through Internet technology. ISOC includes the Internet Architecture Board (IAB) and the Internet Engineering Steering Group (IESG). The IESG is composed of area directors of the Internet Engineering Task Force (IETF) and is responsible for approving RFC standards. The IETF is comprised of numerous working groups that do the actual work involved in developing RFC standards.

The transition and future of Internet network management is controlled by the Internet Engineering and Planning Group (IEPG). The IEPG's responsibilities include the migration from NSFNET to the NAP-based Internet backbone.

The question of who pays for the Internet is often raised. The answer is that everyone on the Internet pays for their part. The NSF pays for the NSFNET, NASA pays for the NASA Science Internet. Individual networks decide how to connect themselves together and who will pay for these interconnections. IBM has its own gateways set up between the IBM worldwide internal network and the Internet. IBM funds the connections to the Internet through its gateway. The NAPs are funded by the United States Government, although each service provider funds and charges for his portion of the Internet.

1.3 Internet Rules and Guidelines

From the previous section you will understand that, as no one owns the Internet, defining what is allowed on the Internet is difficult. There are some who hold the view that anything should be allowed on the Internet. Currently a motion has been raised in the United States congress that the information on the Internet should be policed and restrictions be placed on what data may be passed over the Internet. These restrictions would be difficult to enforce due to both legal and ownership issues. The Internet is not one network, but rather a network of networks. Each network has its own policies and rules. The Internet is not restricted to the United States but spans the globe and enforcing restrictive policies by one country could take on major political implications when accessing other networks located globally.

1.3.1 IBM Policy

However, as a guideline, we have included the IBM rules and regulations regarding Internet access.

General rules when using the Internet for business purposes are as follows:

The Internet is not to be used for:

- Game playing
- Ill-conceived use
- Hateful, harassing, or other anti-social behavior
- Intentional damage or interference with others (for example, hacking and distributing viruses)
- Making publicly accessible obscene files
- Adhere to the Acceptable Use Policy for your Internet gateway
- Always represent yourself - never anyone else
- Solicitation
- Commercial usage of non-company business

Remember that whatever information you put on the Internet is, for all intents and purposes, immediately accessible to millions of users. You should consider the following when submitting information:

- Are you sending company classified material on the Internet, including information on other employees?

- Does the material support your company′s goals to be perceived as a company that is easy to communicate with?

- Is your information of a sensitive nature?

- Is the information or material offensive or disrespectful to others?

- Does the data have a worldwide perspective?

- Will putting the information on the Internet result in a loss of revenue to your company?

- If your material is of a marketing-oriented nature. Is it likely to lead to increased revenue or improved customer satisfaction?

- How frequently is the material going to be updated and who is going to update it?

- Does the material meet your company′s traditional guidelines?

- Does any software you place on the Internet comply with applicable licensing agreements and copyrights?

When you connect to the Internet using an IBM address designation, it should be for IBM business related activity. *IBM Business Conduct Guidelines* states "IBM equipment, systems, facilities and supplies must only be used for conducting IBM's business or for purposes authorized by management."

Electronic mail is the most commonly used facility on the Internet. The following rules should be noted when sending mail:

- Do not send any form of chain letter on the Internet.
- Do not send mail so that it appears to have come from someone else.
- Do not send binary data via electronic mail. You must first encode it into ASCII text, using utilities such as UUCODE.

1.3.2 NSF Policy

The following are general acceptable use policies to be considered when using the NSFNET portion of the Internet:

The Internet permits the transmission and the sharing of information between academic and research organizations. Transmission of any material in violation of any government laws or regulations is prohibited. Users must have appropriate authorization for the host systems they are accessing. Users must act responsibly in their use of the network and avoid actions that cause interference to the network or cause interference with the work of others on the network.

NSFNET Backbone services are provided to support open research plus research arms of for-profit firms to engage in open scholarly communication and research. Use for other purposes is not acceptable.

Specifically acceptable uses are:

- Communication with foreign researchers and educators in connection with research or instruction, as long as any network that the foreign user employs for such communication provides reciprocal access to US researchers and educators
- Communication and exchange for professional development, to maintain currency, or to debate issues in a field or sub-field of knowledge
- Use for disciplinary-society, university-association, government-advisory, or standards activities related to the user's research and instructional activities
- Use in applying for or administering grants or contracts for research or instruction, but not for other fund raising or public relations activities
- Any other administrative communications or activities in direct support of research and instruction
- Announcements of new products or services for use in research or instruction, but not advertising of any kind
- Any traffic originating from a network of another member agency of the Federal Networking Council if the traffic meets the acceptable use policy of that agency
- Communication incidental to otherwise acceptable use, except for illegal or specifically unacceptable use

Unacceptable uses are:

- Use for for-profit activities (consulting for pay, sales or administration of campus stores, sale of tickets to sports events, and so on), or use by for-profit institutions unless covered by the General Principle or as a specifically acceptable use
- Extensive use for private or personal business

This policy statement applies to use of the the NSFNET Backbone only. NSF expects that connecting networks will formulate their own use policies. The NSF Division of Networking and Communications Research and Infrastructure will resolve any questions about this policy or its interpretation.

Chapter 2. Internet Networking Overview

In this chapter we will cover the basics of networking you will use when accessing the Internet.

The Internet network protocols have been based on different hardware and software packages communicating with one another. The Internet has grown out of networking based on the TCP/IP protocol. We will cover some of the basics of the TCP/IP protocol.

2.1 TCP/IP Basics

TCP/IP is a layered networking protocol. The whole TCP/IP suite is comprised of a combination of protocols at different layers, as shown in the following four-layer reference model.

```
4        Application        Telnet, FTP, E-mail, Gopher, SMTP

3        Transport          TCP, UDP

2        Internetwork       IP, ICMP, IGMP, ARP, RARP

1        Physical           Device driver to Interface card
                               for example Ethernet,
                               token-ring, ATM
```
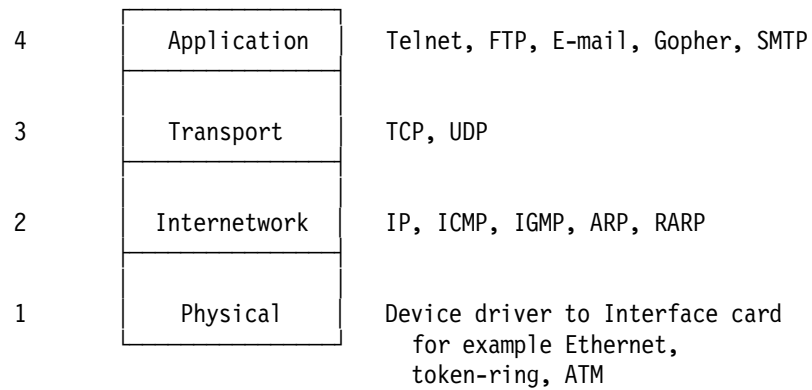
Figure 5. Four-Layer Network Model

Each layer has a different network responsibility. If you have two hosts on a network, each host layer will communicate on a logical basis with its equivalent layer on the other host, as indicated in Figure 6.

```
Telnet  + - - +  Telnet

TCP     + - - +  TCP

IP      + - - +  IP

Ethernet +-----+  Ethernet

   A                 B
```
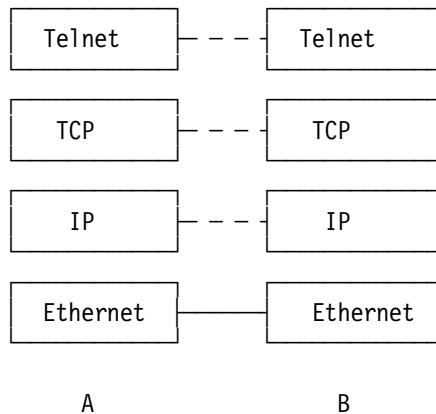
Figure 6. Inter-Layer Communication Model

For example, the IP internetwork layer on host A will communicate logically with the IP internetwork layer on host B across the Internet. The physical communication of data occurs on the physical link layer.

Although the commonly used name for the entire suite of protocols is TCP/IP, TCP and IP are only two of many protocols used on the TCP/IP Internet implementation. Some applications do not have to use all four layers to communicate. For example, the ping command is based on the ICMP protocol (level 2), and only uses levels 1 and 2 to communicate with another host.

The following sections will cover the major components of each layer in more detail.

2.1.1 IP Protocol

The Internet is comprised of both physical wire and software connections. When you try to imagine what the Internet is and how it operates, it is natural to think of a chaotic unmanaged network. How does a single network request know where to go? This is where an Internet address or IP address is used. The IP address is based on a hex numbering system. The clever part of IP addressing is that the numbers are chosen to make the network and routing more efficient. Specifically, an IP address encodes the identification of the network to which an end user is attached within the IP address specified, all at the IP network layer.

Every interface on the Internet must have a unique IP address. This book will not go into the complexities involved in designing an IP network. However, to be able to understand the domain concept which will be introduced later, some of the basics of IP addressing need to be understood. Each host attached to the Internet has an assigned unique 32-bit universal identifier, or IP address. Conceptually, each IP address is made up of a pair of numbers: (network ID (netid) and host ID (hostid)). In practice, this pairing can take one of five classes, as follows:

```
          0         8        16        24        32

Class A   ┌─────────┬───────────────────────────────┐
          │  netid  │           hostid              │
          └─────────┴───────────────────────────────┘

Class B   ┌───────────────────┬───────────────────────┐
          │       netid       │        hostid         │
          └───────────────────┴───────────────────────┘

Class C   ┌───────────────────────────────┬───────────┐
          │            netid              │  hostid   │
          └───────────────────────────────┴───────────┘

Class D   ┌───────────────────────────────────────────┐
          │            multicast address              │
          └───────────────────────────────────────────┘

Class E   ┌───────────────────────────────────────────┐
          │            reserved for future use        │
          └───────────────────────────────────────────┘
```
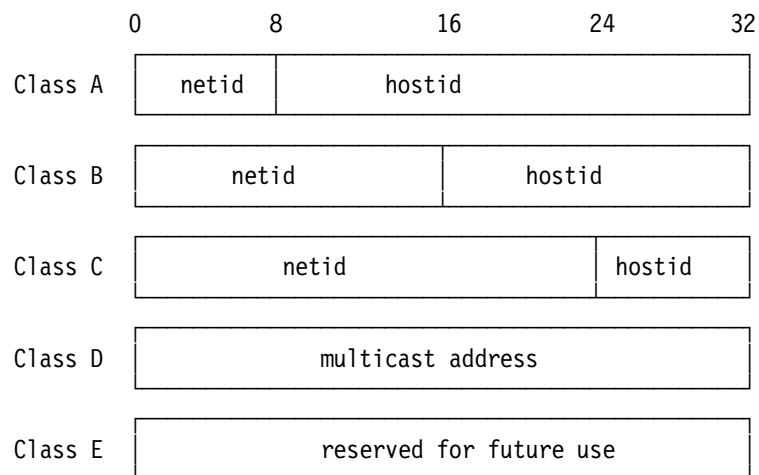
Figure 7. IP Address Classes

Each network class will allow different network and host possibility combinations, as shown in Table 1 on page 13.

Table 1. Class vs. Network and Hosts		
Class	**Number of Network**	**Number of Hosts**
A	less than 256	greater than 65536
B	256 to 65536	256 to 65536
C	greater than 65536	less than 256

For the ease of communicating, IP addresses are written as four decimal integers separated by decimal points, where each integer is given the value of one octet of the IP address. Thus a 32-bit address is written as xx.xx.xx.xx. For example:

The binary network address
```
      8       16      24      32
10000000 00001010 00000010 00011110
```

is written
```
  128     10      2      30
```

or 128.10.2.30.

The classes are distinguished by the high-order bits. Given the addresses, one can distinguish the three primary classes as shown in Table 2.

Table 2. Class vs. Dotted Decimal Notation	
Class	**Dotted Decimal Range**
A	0.0.0.0 to 127.255.255.255.255
B	128.0.0.0 to 191.255.255.255.255
C	192.0.0.0 to 223.255.255.255.255
D	224.0.0.0 to 239.255.255.255.255
E	240.0.0.0 to 247.255.255.255.255

Since every host on the Internet must have a unique IP address, there must be some central authority for allocating these addresses for networks and hosts. This authority is the Internet Network Information Center (InterNIC). InterNIC is responsible for network and domain registration. End-users do not get their IP address from InterNIC. InterNIC normally assigns a range of IP addresses to service providers. To get an IP address, you must approach your service provider, who, depending on your connection type will assign you an IP number from a range of IP addresses which they have been allotted. If you do not want to connect through a service provider, and intend to connect to the Internet directly, you must apply to InterNIC for a domain address and an IP network ID. To apply directly to the InterNIC, you must be either a service provider or a very large global corporation. The assignment of host IDs is then up to the system administrator on your site. InterNIC do not readily provide a direct service, and will in almost every case redirect queries through to a service provider. Two classes of service providers exist. Some service providers operate at a regional level, and are responsible for a wider range of top-level IP addresses. This is covered in more detail in RFC 1466.

The IP address allocation works as indicated in Figure 8 on page 15. When accessing the Internet through either a regional or local service provider, you must not to apply to InterNIC for an IP address. One will be allocated from either a regional or local service provider's range of pre-allocated IP network IDs. Only if you are connecting directly onto the Internet as a global or regional corporation, do you need to apply to the appropriate contact point for an IP and autonomous system number.

```
                    ┌─────────────────┐
                    │ Internet Assigned│
                    │ Numbers Authority│
                    │     (IANA)      │
                    └────────┬────────┘
                             │
                       ┌─────┴─────┐
                       │  InterNIC │
                       └─────┬─────┘
                             │
                 ┌───────────┴───────────┐
          ┌──────┴──────┐         ┌──────┴──────┐
          │   Network   │         │    AT/T     │
          │  Solutions  │         │  Directory  │
          │Registration │         │  Services   │
          └──────┬──────┘         └─────────────┘
                 │
   ┌─────────┬───┴─────┬──────────────┐
┌──┴───┐  ┌──┴─────┐ ┌──┴──────┐ ┌────┴────┐
│ USA  │  │  Asia  │ │European │ │ Global  │
│Geo-  │  │Pacific │ │Geo-     │ │Service  │
│graphic│ │Geo-    │ │graphic  │ │Provider │
│(InterNIC)│graphic │ │(RIPE)   │ │(InterNIC)│
└──────┘  │(ASNIC) │ └─────────┘ └─────────┘
          └────────┘
```
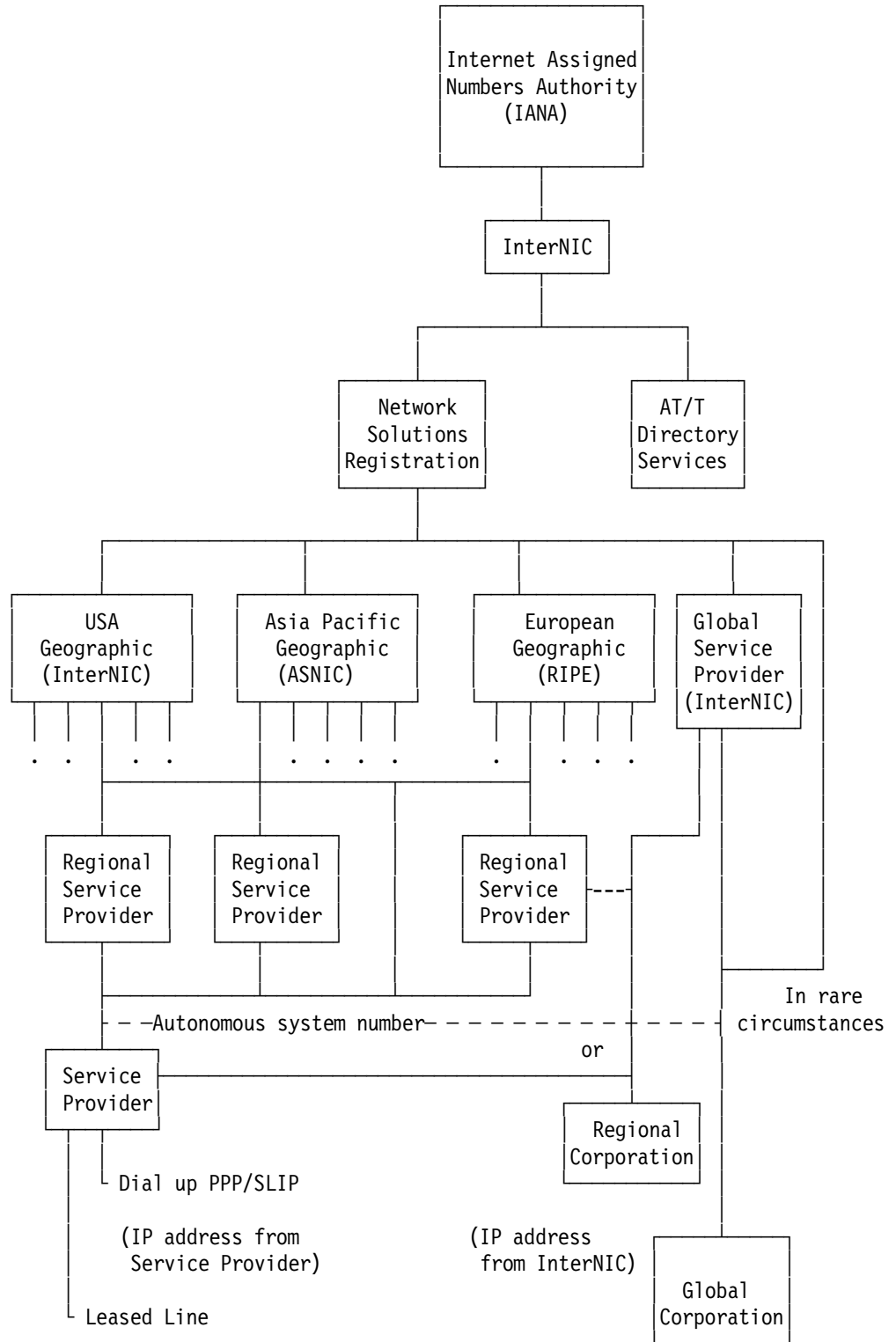
Figure 8. IP Address Assignment

Besides maintaining the network ID domain name and IP addresses, InterNIC
through the ATT directory services are responsible for the whois directory,

which will be described in more detail in Chapter 4, "Internet Navigation Tools" on page 105.

For information on InterNIC, write to:

```
          Network Solutions Inc.
Attention: InterNIC Registration Services
          505 Huntmar Park drive
          Herndon, VA 22070
          United States of America

  Tel. (619)-455-4600
  Fax. (619)-455-4640

 Internet addresses: http://www.internic.net
                   : info@internic.net
                   : ftp.internic.net
                   : archie.internic.net
                   : gopher.internic.net
```

With the proliferation of TCP/IP technology worldwide, including outside the Internet itself, an increasing number of non-connected enterprises use this technology and its addressing capabilities for sole intra-enterprise communications, without any intention to ever directly connect to other enterprises or the Internet itself.

The current practice is to assign globally unique addresses to all hosts that use TCP/IP. There is a growing concern that the finite IP address space might become exhausted. Therefore, the guidelines for assigning IP address space have been tightened in recent years. These rules are often more conservative than enterprises would like, in order to implement and operate their networks.

Hosts within enterprises that use IP can be partitioned into three categories:

- Hosts that do not require access to hosts in other enterprises or the Internet at large.

- Hosts that need access to a limited set of outside services (for example, E-mail, FTP, Netnews, remote login), which can be handled by application-layer gateways and Firewalls. Firewalls will be covered in Chapter 6, "Security and Firewalls" on page 137.

- Hosts that need network layer access outside the enterprise (provided via IP connectivity).

For many hosts in the second category an unrestricted external access (provided via IP connectivity) may be unnecessary and even undesirable for privacy/security reasons. Just like hosts within the first category, such hosts may use IP addresses that are unambiguous within an enterprise, but may be ambiguous between enterprises. Only hosts in the last category require IP addresses that are globally unambiguous.

Many applications require connectivity only within one enterprise and do not even need external connectivity for the majority of internal hosts. In larger enterprises it is often easy to identify a substantial number of hosts using TCP/IP that do not need network layer connectivity outside the enterprise.

Some examples where external connectivity might not be required are as follows:

- A large airport which has its arrival/departure displays individually addressable via TCP/IP. It is very unlikely that these displays need to be directly accessible from other networks on the Internet.

- Large organizations like banks and retail chains are switching to TCP/IP for their internal communication. Large numbers of local workstations such as cash registers, money machines, and equipment at clerical positions rarely need to have such connectivity.

- For security reasons, many enterprises use application-layer gateways (for example, firewalls) to connect their internal network to the Internet. The internal network usually does not have direct access to the Internet, thus only one or more firewall hosts are visible from the Internet. In this case, the internal network can use non-unique IP numbers.

- If two enterprises communicate over their own private link, usually only a very limited set of hosts is mutually reachable from the other enterprise over this link. Only those hosts need globally unique IP numbers.

- Interfaces of routers on an internal network usually do not need to be directly accessible from outside the enterprise.

The Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of the IP address space for private networks:

```
        10.0.0.0      –   10.255.255.255
        172.16.0.0    –   172.31.255.255
        192.168.0.0   –   192.168.255.255
```

An enterprise that decides to use IP addresses out of the address space defined in this document can do so without any coordination with IANA or an Internet registry. The address space can thus be used by many enterprises. Addresses within this private address space will only be unique within the enterprise.

As before, any enterprise that needs globally unique address space is required to obtain such addresses from an Internet registry. An enterprise that requests IP addresses for its external connectivity will never be assigned addresses from the blocks defined above.

In order to use private address space, an enterprise needs to determine which hosts do not need to have network layer connectivity outside the enterprise in the foreseeable future. Such hosts will be called private hosts, and will use the private address space defined above. Private hosts can communicate with all other hosts inside the enterprise, both public and private. However, they cannot have IP connectivity to any external host. While not having external network layer connectivity private hosts can still have access to external services via application layer relays.

All other hosts will be called public and will use globally unique address space assigned by an Internet registry. Public hosts can communicate with other hosts inside the enterprise both public and private and can have IP connectivity to external public hosts. Public hosts do not have connectivity to private hosts of other enterprises.

Moving a host from private network to public network or vice versa will likely involve a change of IP address.

Because private addresses have no global meaning, routing information about private networks shall not be propagated on inter-enterprise links, and packets with private source or destination addresses should not be forwarded across such links. Routers in networks not using private address space, especially those of Internet service providers, are expected to be configured to reject (filter out) routing information about private networks. If such a router receives such information, the rejection shall not be treated as a routing protocol error.

Indirect references to such addresses should be contained within the enterprise. Prominent examples of such references are DNS Resource Records and other information referring to internal private addresses. In particular, Internet service providers should take measures to prevent such leakage.

The obvious advantage of using private address space for the Internet at large is to conserve the globally unique address space by not using it where global uniqueness is not required.

Enterprises themselves also enjoy a number of benefits from their usage of private address space: They gain a lot of flexibility in network design by having more address space at their disposal than they could obtain from the globally unique pool. This enables operationally and administratively convenient addressing schemes as well as easier growth paths.

For a variety of reasons the Internet has already encountered situations where an enterprise that has not been connected to the Internet had used IP address space for its hosts without getting this space assigned from the IANA. In some cases this address space had been already assigned to other enterprises. When such an enterprise later connects to the Internet, it could potentially create very serious problems, as IP routing cannot provide correct operations in the presence of ambiguous addressing. Using private address space provides a safe choice for such enterprises, avoiding clashes once outside connectivity is needed.

One could argue that the potential need for renumbering represents a significant drawback of using the addresses out of the block allocated for private networks. However, we need to observe that the need is only potential, since many hosts may never move into the third category, and an enterprise may never decide to interconnect (at the IP level) with another enterprise.

But even if renumbering has to happen, we have to observe that with Classless Inter-Domain Routing (CIDR) an enterprise that is connected to the Internet may be encouraged to renumber its public hosts, as it changes its network service provider. Thus renumbering is likely to happen more often in the future, regardless of whether an enterprise does or does not use the addresses out of the block allocated for private networks. Tools to facilitate renumbering, DHCP for example, would certainly make it less of a concern.

Also observe that the clear division of public and private hosts and the resulting need to renumber makes uncontrolled outside connectivity more difficult, so to some extent the need to renumber could be viewed as an advantage.

A recommended strategy is to design the private part of the network first and use private address space for all internal links. Then plan public subnets at the locations needed and design the external connectivity.

This design is not fixed permanently. If a number of hosts require to change status later this can be accomplished by renumbering only the hosts involved and installing another physical subnet if required.

If a suitable subnetting scheme can be designed and is supported by the equipment concerned, it is advisable to use the 24-bit block of private address space and make an addressing plan with a good growth path. If subnetting is a problem, the 16-bit class C block, which consists of 255 contiguous class C network numbers, can be used.

Using multiple IP (sub)nets on the same physical medium has many pitfalls. We recommend to avoid it unless the operational problems are well understood and it is proven that all equipment supports this properly.

Moving a single host between private and public status will involve a change of address and in most cases physical connectivity. In locations where such changes can be foreseen (machine rooms, etc.) it may be advisable to configure separate physical media for public and private subnets to facilitate such changes.

Changing the status of all hosts on a whole (sub)network can be done easily and without disruption for the enterprise network as a whole. Consequently it is advisable to group hosts whose connectivity needs might undergo similar changes in the future on their own subnets.

It is strongly recommended that routers which connect enterprises to external networks are set up with appropriate packet and routing filters at both ends of the link in order to prevent packet and routing information leakage. An enterprise should also filter any private networks from inbound routing information in order to protect itself from ambiguous routing situations which can occur if routes to the private address space point outside the enterprise.

Groups of organizations which foresee a big need for mutual communication can consider forming an enterprise by designing a common addressing plan supported by the necessary organizational arrangements like a registry.

If two sites of the same enterprise need to be connected using an external service provider, they can consider using an IP tunnel to prevent packet leaks form the private network.

A possible approach to avoid leaking of DNS is to run two nameservers, one external server authoritative for all globally unique IP addresses of the enterprise and one internal nameserver authoritative for all IP addresses of the enterprise, both public and private. In order to ensure consistency both these servers should be configured from the same data of which the external nameserver only receives a filtered version.

The resolvers on all internal hosts, both public and private, query only the internal nameserver. The external server resolves queries from resolvers outside the enterprise and is linked into the global DNS. The internal server forwards all queries for information outside the enterprise to the external nameserver, so all internal hosts can access the global DNS. This ensures that

information about private hosts does not reach resolvers and nameservers outside the enterprise.

While using private address space can improve security, it is not a substitute for dedicated security measures.

This is covered in more detail in RFC 1597.

The IP address information is used for every data packet transmitted. When sending data on the Internet, the data is not transmitted as one continuous stream of data, but rather as a collection of packets. Each packet is sent, and when an acknowledgement from the destination is received, the next packet is sent. Together with the acknowledgement, a checksum size is sent with the packet. If the datagram size of the acknowledgement message (TCP layer) is not the same, the datagram packet is resent. The datagram will also be resent if no acknowledgement is received (TCP layer). The format of each IP datagram header is indicated in Figure 9.

```
0                            15 16                       31
┌──────┬──────┬────────┬─────────────────────────────┐
│4-bit │4-bit │8-bit   │     16-bit total            │
│version│header│type of │        length              │
│      │length│service │                             │
└──────┴──────┴────────┴─────────────────────────────┘

┌────────────────────────┬──────┬────────────────────┐
│  16-bit identification │3-bit │13-bit fragment     │
│                        │flags │   offset           │
└────────────────────────┴──────┴────────────────────┘

┌──────────────┬─────────┬──────────────────────────┐
│8-bit time    │8-bit    │16-bit header checksum    │
│to live (TTL) │protocol │16-bit header checksum    │
└──────────────┴─────────┴──────────────────────────┘

┌────────────────────────────────────────────────────┐
│         32-bit source IP address                   │
└────────────────────────────────────────────────────┘

┌────────────────────────────────────────────────────┐
│         32-bit destination address                 │
└────────────────────────────────────────────────────┘

┌────────────────────────────────────────────────────┐
│                                                     │
│              options   (if any)                     │
│                                                     │
└────────────────────────────────────────────────────┘

┌────────────────────────────────────────────────────┐
│                                                     │
│                                                     │
│                                                     │
│                    data                             │
│                                                     │
│                                                     │
│                                                     │
└────────────────────────────────────────────────────┘
```
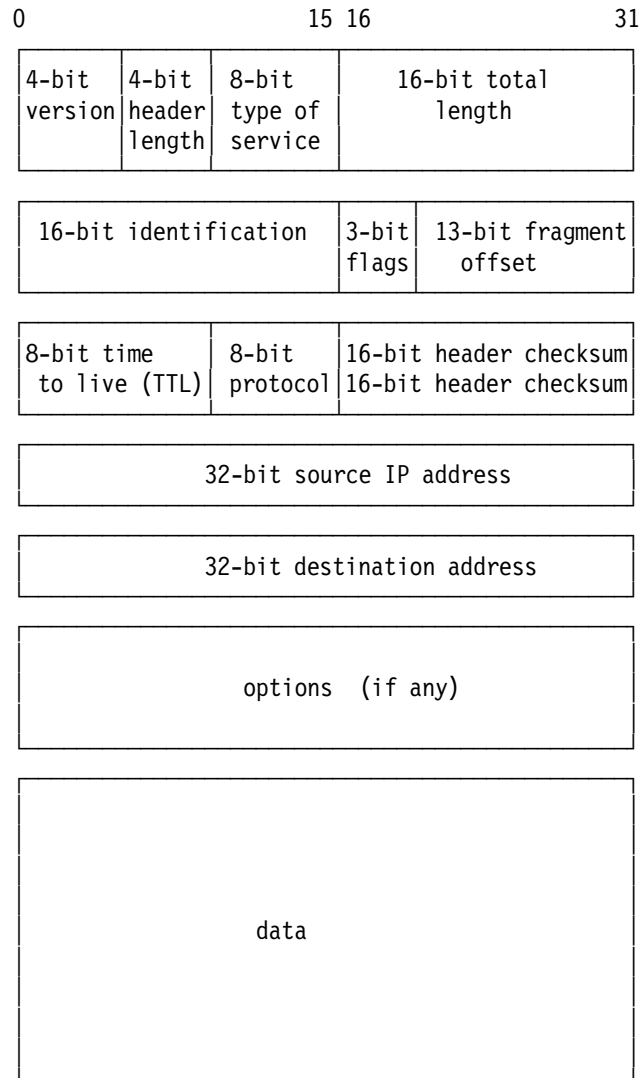
Figure 9. IP Header. IP Header encapsulation includes both IP source and destination as well as the checksum data.

A general user might now be asking, what does IP addressing have to do with me? IP addressing is very important when connecting to a service provider. As you have seen, one cannot simply go and choose one's own IP address at random since it may well belong to someone else already and will most likely not work within the network class into which you are connecting. If it does work, you will most likely cause someone on the Internet to have an IP address that no longer works. You can address host using the IP address or via specific names.

Depending on the protocol used, many service providers use dynamic IP addressing when allocating an IP address to a SLIP or PPP user. To do this the user will set up his initial IP address as either 1.1.1.1 or 0.0.0.0 (depending on the software used). When logging into a service provider with the initial IP address, you will be assigned a dynamic IP address out of a library of available IP addresses. This will most likely be different every time you sign onto the system. Your service provider will have been allocated an IP range which can be allocated to users when they sign onto the system. These IP addresses are released when the user signs off, and can be allocated to new users signing onto the system.

As a result of the phenomenal growth of the Internet over the last few years, the following problems exist with IP:

- Most Class B addresses have already been allocated. Current estimates predict the exhaustion of the Class B address space during 1995, if they continue to be allocated at the same rate as in the past.
- 32-bit IP addresses in general are inadequate for the predicted long-term growth of the Internet.

2.1.2 Subnets

This section discusses subnets of Internet networks, which are logically visible sub-sections of a single Internet network. For administrative or technical reasons, many organizations have chosen to divide one Internet network into several subnets, instead of acquiring a set of Internet network numbers. Background information for a subnetting standard are provided in RFC 940 and RFC 950.

The original view of the Internet universe was a two-level hierarchy: the top level the Internet as a whole, and the level below it individual networks, each with its own network number. The Internet does not have a hierarchical topology; rather the interpretation of addresses is hierarchical. In this two-level model, each host sees its network as a single entity; that is, the network may be treated as a black box to which a set of hosts is connected.

While this view has proved simple and powerful, a number of organizations have found it inadequate, and have added a third level to the interpretation of Internet addresses. In this view, a given Internet network is divided into a collection of subnets. Instead of considering an IP address as just a network ID and host ID, as mentioned earlier, the host portion can be divided into a subnet ID and a host ID. This makes sense because Class A and Class B addresses have a large number of bits allocated for the host ID (see Table 2 on page 13).

The three-level model is useful in networks belonging to moderately large organizations where it is often necessary to use more than one physical LAN to cover a local area. Each LAN may then be treated as a subnet.

There are several reasons why an organization might use more than one physical LAN:

- Different technologies: There may be more than one kind of LAN in use; for example, an organization may have some equipment that supports Ethernet, and some that supports a token-ring network.

- Limits of technologies: Most LAN technologies impose limits, based on electrical parameters, on the number of hosts connected, and on the total length of the cable. It is easy to exceed these limits, especially those on cable length.

- Network congestion: It is possible for a small subset of the hosts on a LAN to monopolize most of the bandwidth. A common solution to this problem is to divide the hosts into cliques of high mutual communication, and put these cliques on separate cables.

- Point-to-point links: Sometimes a local area is split into two locations too far apart to connect using the preferred LAN technology. In this case, high-speed point-to-point links might connect several LANs.

Normally one does not attach many hosts to a single network. After obtaining the IP network ID, it is up to the systems administrator to decide how many bits to allocate to the subnet ID and host ID. For example, if we were dealing with a class B address with 16 bits allocated to the network ID and 16 bits allocated to the host ID, we could split the host ID into eight subnet ID bits and eight host ID bits. This division will allow 256-2 subnets and 256-2 hosts per subnet. (We subtract 2 from 256 because host IDs of all zero or all one bits are invalid).

A host needs to know how many bits are to be used for the subnet ID and how many bits for the host ID. This is specified in a subnet mask. This mask is a 32-bit value containing network ID and subnet ID and zero bits for the host ID.

For example, on a Class B network ID of 141.191 can be subnetted as shown in Figure 10.

```
          0                        15 16        23 24        31
         ┌────────────────────────────┬───────────┬───────────┐
Class B  │      Netid = 141.191       │ subnet ID │  host ID  │
         │         (16 bits)          │   8 bits  │   8 bits  │
         └────────────────────────────┴───────────┴───────────┘
```
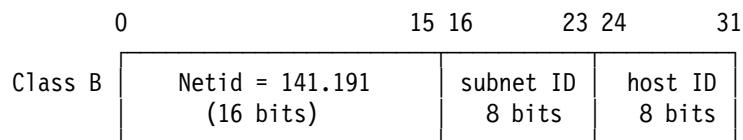
Figure 10. Subnetted Class B Address

Given its own IP address and subnet mask, a host can determine if an IP datagram is destined for:

1. A host on its own subnet
2. A host on a different subnet
3. A host on a different network

2.1.3 TCP Transmission Control Protocol

The IP protocol layer provides an unreliable service. That is, it does its best at getting a packet to its final source, but with no guarantees. TCP, on the other hand, provides a reliable transport layer using the unreliable IP layer. To perform this service, TCP performs timeout and retransmission with end-to-end message acknowledgements. Using both the IP layer and the Transport layer, an end-user message will be sent through the network with the confidence that it

will reach its destination. TCP adopts the role of a datagram manager. Each datagram is managed until acknowledgement of a successful data transmission has been received.

The following pertinent Internet and TCP/IP applications use the TCP protocol:

- Telnet
- FTP
- Finger
- NNTP
- POP
- Whois
- SMTP
- WWW
- Gopher

A more complete list is included in Appendix E, "TCP/UDP Service Protocol Usage" on page 177:

2.1.4 UDP User Datagram Protocol

UDP is an alternative to TCP for applications that prefer to use the datagram service directly, and which do not require the TCP datagram management facilities.

The following TCP/IP and Internet applications use UDP protocol:

- SNMP
- TFTP
- Route
- Domain
- Name Server

A more detailed list is included in Appendix E, "TCP/UDP Service Protocol Usage" on page 177, together with the socket ports they use.

Some client/server applications, such as DNS, consist of very simple exchanges: one query followed by one reply. Managing these connections as TCP would do is wasteful, so the direct approach of UDP is offered. SNMP uses UDP so that it can manage the network depending on the routing conditions it detects, rather than relying on TCP, which would not reroute a datagram if an error were detected.

TCP relies on the final destination to send data acknowledgment and not individual routers, so if data is not received by the final destination, the data has to be resent over the entire route again. This is different from some other protocols, such as IBM SNA, which handles acknowledgement at each router node of the transfer, and only has to resend data from node to node, and not over the entire network. An advantage that TCP has over SNA is that it need not be concerned about the nature of the intermediate routers in the end-to-end connection

2.1.5 Routers

Now that you understand that you can have numerous different networks with different IP address ranges, you might ask, how do these different networks communicate with one another? The easiest way is to connect the networks together with a router. Routers come in different forms, covering different protocols, including IP. The most common form of router you will encounter on the Internet is the IP router. IP routers will for the rest of this document be referred to simply as routers. Historically routers have also been called gateways. A gateway connects different protocols together, for example, a TCP/IP and SNA gateway.

When sending an IP datagram, the IP layer will search an ARP table for an entry that matches a datagrams complete destination address. If found, IP will send the datagram to the indicated interface. If not found, IP sends the datagram to the router function, which will handle the next-hop in the route. Using this methodology, the IP layer will attempt to deliver the datagram packet to its final destination, as shown in Figure 11.

```
 ┌─────────────┐                      ┌─────────────┐
 │ Application │─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─│ Application │
 └─────────────┘                      └─────────────┘

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

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

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

     Network A                            Network B
                    IP Router
```
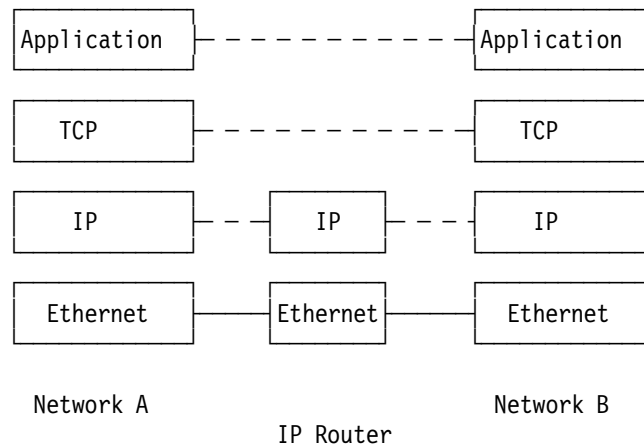
Figure 11. Internet Routing

Two interchangeable routing methodologies exist: static and dynamic routing. In static routing, the route to any IP address is fixed and pre-mapped in routing tables. If one of the predefined routes were to fail, the whole route would fail. The advantage of static routing is that the routing of traffic is controlable although the actual route itself might not be the most efficient. Dynamic routing involves dynamically determining the shortest route to a host each time routing is required. If one of the routes had collapsed, dynamic routing would always determine another route to that host if one were available. The shortest route is not necessarily the fastest route. The shortest route might be based on the least number of hops from router to router. As will be discussed later, this may not take into account the bandwidth of the line, as shown in the Figure 12 on page 25.

Figure 12. Dynamic Routing. If the hop count were used to determine the best route, the best dynamic route between source and destination would be through Router A. However this is not the fastest route, which would be through Router B and Router C.
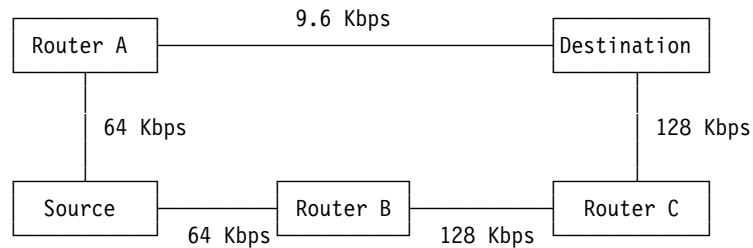
To understand routing on the Internet, one has to understand the concept of interior and exterior routing. The Internet is comprised of a collection of smaller autonomous networks. Each of these individual smaller networks would be viewed from the inside the network as an autonomous network. Such a network would use interior routers. A collection of routers with the same Interior Gateway Protocol (IGP) number are said to belong to one IGP system. The Internet, as a network of networks, requires routers which would function as routers outside the IGP networks, using an exterior routing protocol. One example is exterior gateway protocol (EGP) routers. Exterior routers require an autonomous system number as indicated in Figure 8 on page 15. This autonomous system number is assigned by a regional service provider. The EGP protocol is being replaced by the border gateway protocol (BGP). BGP Version 3 is defined in RFC 1267. BGP is not widely implemented yet.

Software dynamic routing protocols are implemented using one of two mutually exclusive daemon types:

- **RouteD** Routed is a basic interior routing daemon supplied with the majority of TCP/IP applications. Routed uses a RIP routing protocol. Routed is an IGP protocol only.
- **GateD** Gated is a more sophisticated daemon used for both interior and exterior routing. It can support multiple routing protocols.

The most widely implemented IGP routing protocols are:

- RIP

  This is a simple routing protocol, based on the use of a vector distance algorithm or, to put it simply, a hop count. It determines the most efficient route based on the minimum number of hops to a destination, even if this is not the fastest transmission route. The routing table is updated every 30 seconds. The official specification for RIP is RFC 1058. There are a large number of IGP routers on the Internet based on the RIP technology. Each passage through a router is termed a hop. RIP allows for a maximum of 15 hops and is not suitable for large exterior networks that compromise whole Internet. If a hop count is greater than 15 before the destination can be found, RIP considers the network unreachable and flags the route as such. Two versions of RIP exist, RIP V1 and RIP V2. RIP V1 is supported by IBM TCP/IP V2.0 for OS/2 and IBM LAN Connect, AIX V3.2 and V4.1, and IBM TCPIP for DOS V2.1. RIP is implemented in both the routed and gated daemons.

- OSPF

This is more complex routing methodology that determines the quickest route based on the actual transmission time of IP packets, this is termed the link state algorithm. Being more complex than RIP, it places a higher workload on both the router and the network bandwidth. OSPF is a TCP/IP routing protocol. IBM supports OSPF in its dedicated routers, such as the 6611. AIX V4.1 supports OSPF using the gated daemon. OSPF is not supported by TCP/IP for OS/2 and TCP/IP for DOS. OSPF Version 2 is described in more detail in RFC 1247.

• Hello

This was used in LSI/11 microcomputers, which were widely used in Internet experimentation. It is not an Internet standard, but was used by the NSFNET as their second backbone IGP. IBM supports Hello in its dedicated routers, such as the IBM 6611. AIX V4.1 supports Hello using the gated daemon. Hello has very little usage outside NSFNET. NSFNET has replaced the Hello protocol and have upgraded to a T-1 backbone using the IS-IS protocol.

• IS-IS

This is an Intermediate System to Intermediate System protocol similar to OSPF. It uses the a link state algorithm to determine the optimum route. Unlike OSPF, IS-IS is an OSI (Open Systems Interconnection) protocol. As with OSPF, it is better suited to larger networks with a large number of routers. It is not widely implemented yet. Unlike OSPF, IS-IS allows mixing of the OSI and IP protocols.

Based on experiences gained from the EGP protocol, the border gateway protocol (BGP), was developed. Unlike IGP and EGP, which are connectionless protocols dependent on origin-destination communication for error detection, BGP protocols are connection-oriented so that one would only have to resend a datagram from BGP to BGP in the case of a datagram error. As such BGP routers operate at the TCP layer. BGP treats the Internet as a single set of autonomous systems arbitrarily connected together.

ARPAnet is based on EGP and IGP routing. Unlike ARPAnet, which requires routers to be connected to the ARPAnet core system, NSFNET's T-3 backbone usage of BGP and IGP removes NSFNET from acting as a core routing system.

The BGP protocol is implemented in the gated daemon. This is supported by AIX V3 and V4. The IBM 6611 also implements BGP.

2.1.6 ARP

Address Resolution Protocol is used to to dynamically map IP addresses to physical hardware addresses on an IEEE 802 network. IEEE network cards have a unique physical hardware address. These physical addresses are mapped to the IP address using this address resolution protocol. IEEE 802 networks cover Ethernet and token-ring network types. ARP is not used in serial-line connections. More details on ARP are included in RFC 826. If an application sends out data to a certain IP address, the IP routing mechanism first determines the IP address of the next hop of the packet to be used. It then needs to map the known IP address to a physical hardware address. IP first checks a local ARP cache to see if it can map the required IP address to any known physical connections. If it can, it sends the IP packet to the hardware address specified in the ARP table. If it cannot map the IP address to a hardware address, ARP sends out a network broadcast request of an ARP request. Each host receiving the ARP broadcast request then returns its IP and physical

hardware address to the broadcaster. The application which requested the IP information then updates its local cache for later use, and sends out the now mapped IP packet.

Another concept using in determining hardware address mapping, is Proxy-ARP. In the case of the single LAN above, every host on the LAN can see every other host on the LAN; a simple ARP broadcast will yield all the hardware addresses on this LAN. If, on the other hand, a router is used to connect two LANs together, sending out an ARP broadcast will only return the physical addresses of those on one of the LANs. To get the hardware address of a LAN card on the other LAN, Proxy ARP is used, where the router can see both LANs, and can send a proxy ARP broadcast to the other LAN. The router can then return a proxy-ARP hardware address the LAN card on the other LAN. Proxy-ARP is covered in more detail in RFC 1027.

2.1.7 Domain Name System

Although the network interfaces on a host, and therefore the host itself are known by IP addresses, humans tend to be more comfortable when using the name of a host. In the TCP/IP world the *Domain Name System* (DNS) is a distributed database system that provides the mapping between IP addresses and hostnames. We use the term *distributed* because no single site on the Internet knows all the information. Each site will maintain its own database and runs a database or name server that other systems across the Internet can query. The DNS provides a protocol that allows clients and servers to communicate with each other.

The DNS name space is hierarchical, as shown in Figure 13.
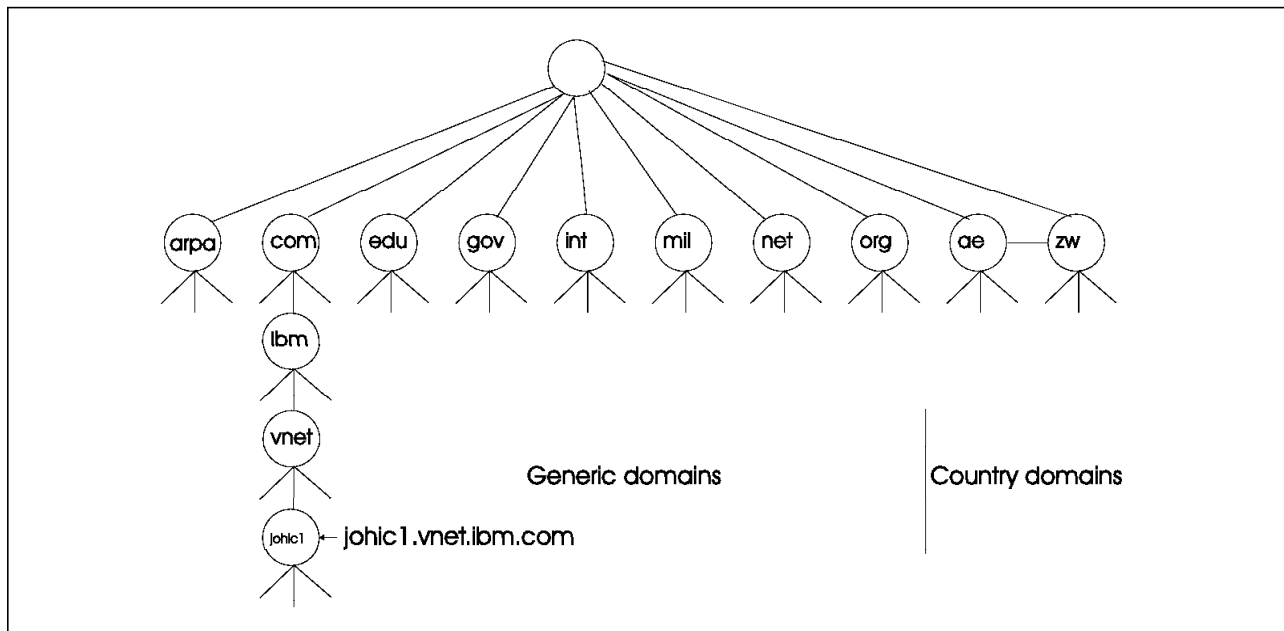
Figure 13. Domain Name Space Hierarchy

The top-level domains are divided into three categories:

1. Arpa, which is a special domain used for address-to-name mappings

2. Seven three-character domains called the generic domains

3. Two-character country domain codes. The country codes are listed in Table 3 on page 28. The end user would use these to know where they are accessing. Your end user top-level domain name will be one of these country codes if it is not a generic domain.

Table 3. Internet Top-Level Country Domain			
Domain	**Country or Organization**	**Domain**	**Country or organization**
AG	Antigua and Barbuda	**JP**	Japan
AL	Albania	**KM**	Comoros
AQ	Antarctica	**KN**	Saint Kitts and Nevis
AR	Argentina	**KR**	Republic of Korea
ARPA	ARPA Internet	**LC**	Saint Lucia
AT	Austria	**LK**	Sri Lanka
AU	Australia	**LU**	Luxembourg
BB	Barbados	**MIL**	Military
BE	Belgium	**MY**	Malaysia
BG	Bulgaria	**MX**	Mexico
BO	Bolivia	**NA**	Namibia
BR	Brazil	**NATO**	North Atlantic Treaty Organization
BS	Bahamas	**NET**	network entities
BZ	Belize	**NI**	Nicaragua
CA	Canada	**NL**	Netherlands
CH	Switzerland	**NO**	Norway
CL	Chile	**NZ**	New Zealand
CN	China	**ORG**	organizations
CO	Colombia	**PE**	Peru
CR	Costa Rica	**PG**	Papua New Guinea
CS	Czechoslovakia	**PH**	Philippines
DE	Germany	**PL**	Poland
DK	Denmark	**PR**	Puerto Rico
DM	Dominica	**PT**	Portugal
DO	Dominican Republic	**PY**	Paraguay
EC	Ecuador	**SE**	Sweden
EDU	education	**SG**	Singapore
EG	Egypt	**SR**	Suriname
ES	Spain	**SU**	USSR
FI	Finland	**TH**	Thailand
FR	France	**TN**	Tunisia
GB	Great Britain	**TR**	Turkey
GOV	government	**TT**	Trinidad and Tobago
GR	Greece	**TW**	Taiwan
HK	Hong Kong	**UK**	United Kingdom
HU	Hungary	**US**	United States
IE	Ireland	**UY**	Uruguay
IL	Israel	**VC**	Saint Vincent and the Grenadines
IN	India	**VE**	Venezuela
INT	international entities	**YU**	Yugoslavia
IS	Iceland	**ZA**	South Africa
IT	Italy	**ZW**	Zimbabwe
JM	Jamaica		

Table 4 on page 29 lists the normal classification of the seven generic domains.

Table 4. The Three-Character Generic Domains	
Domain	**Description**
com	Commercial Organizations
edu	Educational Institutions
gov	Other U.S. Governmental Organizations
int	International Organizations
mil	U.S. Military
net	Network Provider
org	Other Organizations

Many countries form second-level domains beneath their two-character country code similar to the top-level generic codes. An example of such a combination of country and generic domains is.co.za where a top-level country code of za is used and a commercial organization of .co is used. The InterNIC maintains the top level domains and delegates responsibility to others for third and fourth sub-levels.

Using this type of domain naming we might end up with a domain name of:

johic1.vnet.ibm.com

where:

- johic1 is the system name and fourth level domain code.
- vnet is the domain name and is the third level domain code.
- ibm is the second level domain code.
- com is the top level generic domain code.

For example, using this domain resolution, my user ID would be classified as guyd@johic1.vnet.ibm.com.

2.1.8 SLIP

SLIP (Serial Line Interface Protocol) is a simple form of encapsulation for IP datagrams on serial lines. SLIP has become popular for connecting home computers to the Internet through the RS-232 serial port. SLIP is a simple framing method. The IP datagram is terminated by an END (0xc0) character. To prevent noise from being interpreted as part of the datagram, the END statement is also transmitted at the beginning of the datagram. If a byte of data in the datagram equals the END character, a two-byte sequence 0xdb, 0xdc is transmitted instead. This simple framing allows datagram packets to be transmitted over a simple serial line link.

SLIP has the following deficiencies:

- Each end must know the other's IP address.
- A serial line cannot be shared between SLIP and another protocol.
- There is no checksum added to the SLIP datagram. SLIP relies on error-checking modems or on the higher network layers to detect errors.

The IBM global network uses SLIP as its serial connection standard. Most UNIX systems include SLIP support in their base operating software. Another form of SLIP is compressed SLIP, which is better at handling small datagram packets.

2.1.9 PPP

PPP (Point-to-point protocol) is a serial line protocol similar to SLIP. PPP corrects the deficiencies in SLIP. PPP provides the following advantages over SLIP:

- Support for multiple protocols across a single serial line, not just IP datagrams
- A cyclic redundancy check on each datagram frame
- TCP and IP header compression similar to CSLIP, making it potentially faster than SLIP

PPP provides distinct advantages over SLIP and is recommended when starting up a serial-line based IP network from scratch. When connecting into a service provider, you need to know which protocol they support. You cannot connect into a SLIP line using PPP and vice versa.

Many service providers provide dynamic SLIP and PPP IP address resolution. That is, you enter your default address as 1.1.1.1 or 0.0.0.0, depending on the software, connection and service provider you are using, and the provider will then allocate you an IP address from a pool of addresses which are available at that time. Connecting into the IBM Global Network using a SLIP protocol connection, you need to specify your default IP address as 1.1.1.1.

The gated daemon is required to support SLIP in a dynamic routing environment. Routed does not properly support SLIP. If given the option, PPP is a better protocol than SLIP, although it is not as widely implemented.

2.1.10 Example of TCP/IP Usage

We have included an example of how some of the TCP/IP protocols are used when you connect to another host on the Internet.

We typed the command:

```
ftp tollbooth3.cwp.ibm.com
```

In simple terms, the following steps took place:

1. The application FTP called a function to convert the host name to an IP address at the application layer, in this case, tollbooth3.cwp.ibm.com.
2. The local host could not resolve the IP address, so the host then looked at its defined DNS (9.19.141.242). This DNS attempted to resolve the name to an IP address. The DNS looked at its resolve tables and resolved tollbooth3.cwp.ibm.com to the IP address of 198.74.69.100 through router 9.24.104.1.
3. Once the application layer resolved the IP address, the application layer communicated with the TCP layer. The TCP layer encapsulated the data with an TCP header record and passed the data onto the IP layer.
4. The IP layer compared the datagram size with the MTU (Maximum Transmission Unit) and performed data fragmentation as necessary. The IP layer encapsulated each MTU size packet of data with the IP header data.
5. The IP layer passed MTU size datagram down to the link layer. The link layer encapsulated the MTU size unit with a token ring header and trailer record.
6. Using the ARP function, the IP layer function has determined the physical hardware connection to which the datagram must be sent. This physical

connection being the router hardware address for the segment of the Internet.

7. The hardware link layer then sends the datagram via the LAN to the router hardware address specified by the ARP function.

8. The router then looked at the IP record in the header layer and then resent the data to its final destination at 198.74.69.100.

9. The datagram then passes back up the stack to the TCP layer, which sent a data acknowledgement packet by the reverse route back to the original sender.

10. The original sender received the acknowledged data and continued to send more data packets.

11. If the datagram had not been received, the TCP layer would have resent the datagram packets until acknowledgement was received.

12. Once the acknowledgement was received, the remove system responded at the application layer with the FTP login sequence.

2.1.11 WinSock

Microsoft Windows network software was built around NetBIOS network protocols. It does not support native TCP/IP calls internally. There is an interface specification standard for communicating with TCP/IP via Windows that is termed WinSock (Windows Sockets). This standard is based on TCP/IP sockets and specifies a set of calls that Windows applications can make to the TCP/IP software. WinSock has been developed as an external library call to communicate between Windows and TCP/IP, as shown in Figure 14.

```
┌─────────┐      ┌─────────┐      ┌──────────────┐
│ Windows ├──────┤ WinSock ├──────┤ TCP/IP layer ├───────Internet
└─────────┘      └─────────┘      └──────────────┘
```

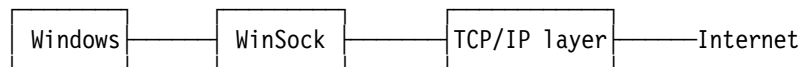*Figure 14. WinSock Operation*

The IBM Internet Connection for Windows relies on WinSock. There are a number of WinSock applications on the market for connecting Windows applications to the Internet. An application must support the WinSock protocol to be able to use WinSock libraries correctly.

The WinSock library can be obtained via anonymous FTP from:

```
ftp.cica.indiana.edu/pub/pc/win3/winsock
```

Chapter 3. Connecting to the Internet

This chapter describes connecting into the Internet, selecting a service provider. It also includes setting up of a number the IBM Internet client connection packages. Setting up Internet server packages is covered in detail in the redbook *Using the Information Super Highway*, GG24-2499 and in Chapter 7, "Placing Data on the World Wide Web" on page 143.

Connecting to the Internet depends on where you are and who you are. If you are a university student or work at a company with its own Internet connections, the chances are you can gain access simply by asking your system administrator for instructions on how to get connected to your already networked computer. Otherwise, you need the following to access the Internet:

- Computer and operating system software, such as OS/2 Warp V3.0
- Telecommunications software, such as Internet Connection for OS/2
- An asynchronous modem, preferably supporting 9600 bps or higher
- An analog phone line
- A service provider

To take full advantage of the Internet, you should spend a few minutes understanding the basics of communications protocols. These are covered in Chapter 2, "Internet Networking Overview" on page 11.

After purchasing your system, one of the most important decisions which you need to make prior to signing onto the Internet is who to use as your service provider. This choice will influence which attachment software you are going to use. The service providers vary from country to country. The final decision on which service provider to use is up to the reader of this book. The IBM global network provides one of the best service provider connections. Included in their service are features such as worldwide access. That is, if you travel around the world, and wish to sign onto the Internet, you need only dial your nearest global network contact point, as listed in Appendix B, "IBM Global Network Service Provider Telephone Numbers" on page 163. You do not have to dial back to your home country to gain access though a locally based service provider. You will use your home logon ID and account details. You will be billed at similar rates as if you were signing onto the system from your local host. The connection telephone fees will be billed at preferential rates.

Some USA local and national service providers that you can contact are as follows:

```
CERFnet (800-876-2373)
Colorado Supernet (303-273-3471)
Connect.com.au (800 818 262 or 03 528 2239)
CR Laboratories Dialup Internet Access (415-381-2800)
Cybergate (305-428-GATE or 800-NET-GATE) (Florida only)
Demon Internet Systems (081 349 0063)
The Direct Connection (081 317 0100)
Global Enterprise Services, Inc. (JvNCnet) (800-358-4437)
Internet Express (800-592-1240)
Netcom On-Line Communications Services (800-501-8649)
Vnet Internet Access, Inc. (704-374-0779)
```

Check your area for other local and national service providers. By listing these providers here, we are in no way endorsing these companies or guaranteeing the quality of their services.

A reasonably detailed list of worldwide service providers is available on the Internet at:

http://www.earth.org

3.1 Service Providers

A service provider is a company with a dedicated Internet gateway which they share between many companies and individuals. Service providers sell several different kinds of service, each with its own advantages and disadvantages. Many people already have access to the Internet through a service provider and don't even know it. Your company may provide a corporate access into the Internet through a corporate gateway. Some of these corporate gateways only provide mail access. To access the Internet properly, you need a TCP/IP network connection. The following different types of connections are available from service providers:

- Dedicated Internet access. Corporations can get a dedicated phone line at a speed of your choosing and have a dedicated Internet router set up to handle protocol switching and TCP/IP packet routing onto the Internet. Dedicated Internet access tends to be costly.

- SLIP and PPP protocol connections. In the past few years, some less expensive techniques for almost-dedicated access have appeared. These are called SLIP and PPP. SLIP and PPP allow fully fledged connections to Internet network access using dial-up modem connections. The advantage of using these protocol connections are that you are not using someone else's system as an access point to the Internet; you are part of the Internet itself. SLIP and PPP are appropriate for connecting from a home computer or a small office network to a service provider network who can give full Internet access. The PPP and SLIP programs are normally included with the TCP/IP package.

- ISDN. ISDN stands for *Integrated Services Digital Network.* In essence, it means using a digital telephone line between your office and the telephone companies switching office. This technology is common in Europe. It is not used as widely in the United States. The advantage of ISDN is that it uses very high-speed access at relatively low cost. Unlike conventional public access telephone lines, which are based on inefficient analog communications, ISDN uses digital connections only. Conventional lines have been developed for the ear and work well within this environment. They transmit analog data down standard telephone wiring. This form of data transfer is cheap but inefficient. To transmit conventional digital computer data down these analog lines, the data needs to be converted from a digital form to an analog for using a modem (modulator/demodulator). Analog data is very susceptible to data losses. This results is a very inefficient form of data transfer. When the analog data reaches its final destination, it need to converted back to a digital format using another modem. The speed of data transfer therefore depends on the speed that the modem can convert digital data to analog data and the quality of the phone line transferring the analog data resulting in as few errors as possible. Each error requiring data to be re-transmitted or re-connected end points. ISDN on the other hand uses only

digital lines throughout the whole connection. Modems are not used within an ISDN network. This allows for a far more efficient form of data transfer and faster speeds of data transfer. Dedicated ISDN needs to be installed on each end of the the connection. The conventional UART serial ports cannot sustain fast enough transmission speed. These serial ports currently support up to 18 Kbps using standard UART chips. A standard ISDN connection includes two 64 Kbps data channels and one 18 Kbps connection channel. The two ports can be used as separate connections or combined to form a single 128 Kbps high speed channel. The connection channel is used for monitoring the connection status. You need to have your telephone company install a dedicated digital ISDN line, as you cannot use regular phones over ISDN lines. ISDN equipment is specialized. You need ISDN-specific communications cards on your local workstation. As mentioned above, your conventional serial communications ports will not work. A service provider needs ISDN specific hardware to be able to handle incoming ISDN calls. You will need ISDN device driver software. In the United States ISDN linked service providers are pretty scarce, although this is changing.

- Dial-up access. What if you don't want to use PPP or SLIP?

  - You can get an account on a computer that already has dedicated access.
  - You then can log into this computer as a remote user.
  - You do not become part of the Internet in the true sense.
  - You can access the news groups and receive mail with this service.
  - You cannot run graphical user interface (GUI) applications using this type of access.
  - You normally need to have UNIX skills to use this type of access, as most service providers use dedicated UNIX hardware platforms.
  - You cannot use the TCP/IP FTP file transfer program to transfer files down to your local workstation.

  We do not recommend taking the dial-up access as, although the costs are normally lower, the Internet usage functionality is substantially reduced.

- UUCP Access. We will mention UUCP, or UNIX-to-UNIX Copy Program, in passing. All UNIX systems support a set of services called UUCP. Setting up UUCP is not trivial. UUCP was used some years ago between remote UNIX systems to transfer files between the systems. If you are connecting to a service provider using UUCP from a UNIX workstation you can use UUCP. However, we do not recommend using this method. Using the TCP/IP PPP and SLIP protocols are a preferred options for on the same platforms.

- Access via other networks. Commercial network services companies, such as Prodigy and Compuserve, have set up gateways that allow you to exchange mail with systems on the Internet. Prodigy has also set up a gateway to allow you to browse the Internet. This type of connection may be all you need, but it is definitely not an Internet connection. You only have access to a few services. If you only need Internet access, do not use this type of connection, rather link up with a dedicated Internet service provider and connect via PPP or SLIP onto the Internet.

When the Internet was reserved for educational purposes, the idea of paying for network traffic was odd. Once the hardware had been funded, the transmission of the data was essentially free. This concept has since vanished. Each service provider, besides charging individual users for connectivity to the Internet, is charging other service providers for carrying each others traffic. These network

costs are unseen to the general user. What has occurred is that service providers are finding ways of bypassing this by forming consortiums of service providers. These consortiums would not charge those within the consortium for each other's traffic. They would charge for traffic outside the consortium. Two of these consortiums are the IBM/Advantis and the Commercial Internet Exchange (CIX). The Commercial Internet Exchange offers full commercial connectivity to their associated networks including AlterNet, ANSnet, CERFnet, Eunet, JANET/JIPS, NSFnet , PSInet and SprintNet.

Different levels of service provider exist. There are level 1 service providers who provide a service to other service providers. Level 2 service providers connect to these level one service providers. Advantis is a level 2 service provider. Level 3 service providers connect to level 2 service provider to provide local service functions. The general public will normally not connect into a level one service provider. The service provider structure is shown in Figure 15. A comprehensive list of level 2 USA service providers is included in Appendix K, "NSP/AS Service Provider Connectivity" on page 193.

An example of the tiered service provider connectivity is shown in Figure 15.

```
 _____              NAP level
        |                  |
   +---------+        +----------+
   |   ANS   |        | AlterNet |             Level 1
   +---------+        +----------+
     |                    |
  +-----+-------+    +------+-------+
  |     |       |    |      |       |

+----------+ +-----+ +----------+
| Advantis | | IBM | | Advantis2 |           Level 2
+----------+ +-----+ +----------+
    |          |        |
  +---+      +---+    +---+---+
  |          |        |       |
+--------+ +----------+ +--------+
|  Warp  | |   IBM    | |  IBM   |            Level 3
| Client | | TOLLBOOTH| |  VNET  |
+--------+ +----------+ +--------+
```
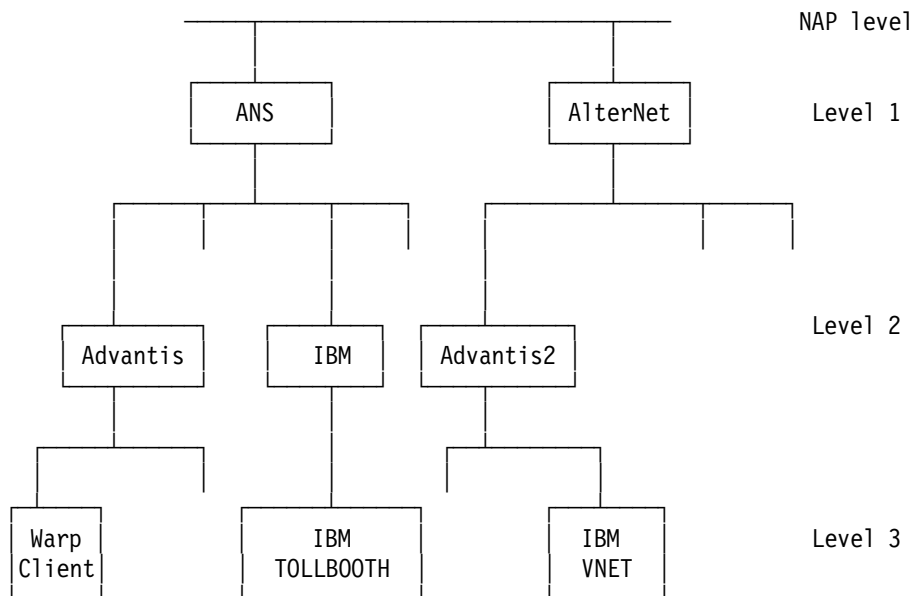
Figure 15. Service Provider Structure Example

The following section covers some details you should consider when choosing a service provider.

3.2 How To Select an Internet Service Provider

Buying an Internet connection is a lot like buying a computer. As with buying a computer, your choice of Internet providers should be driven by your intended use. If you are looking for a minimum cost, bare-bones computer for your kids, you might seek out the lowest-priced system in the back of a magazine or even assemble something yourself from parts bought at a flea market. However, if you are buying something for your company that your business will depend on, you would probably choose differently.

For your business, you might consider buying the most expensive solution, exercising the theory that you get what you pay for. However, once you have really studied the question, the right choice might well turn out to be a mid-range system from a stable, nationally recognized provider.

There are some low-cost IP service suppliers who claim to be just as good as the others, but may not be in business next year to prove it. Conversely, there are other suppliers who will attempt to justify providing the same level of services as their competitors, at many times the price.

This guide suggests a set of questions to pose and evaluation criteria against which you can compare and contrast the different Internet service companies you have to choose from. In this exciting but still maturing market, the lure of Internet connectivity and Enterprise Wide Area Network outsourcing will require many companies to evaluate service providers within the next couple of years. The intent of this guide is to stimulate your thinking on the subject while challenging you to challenge your provider.

3.2.1 Selection Criteria for Choosing Internet Service Providers

Network Topology: Network topology is one of the most important criteria to consider when choosing a provider. Looking at the network topology can help you understand how vulnerable the network is to outages, how much capacity is available when the network is loaded more heavily than usual, and most importantly, how well the provider understands network engineering.

Any competent provider should be happy to show you their network topology. This is a good way for them to demonstrate how well they understand their business.

Look closely at what they show you. Some providers will give you a virtual backbone map. Virtual networks are meaningless. Your data does not travel on a virtual network; it travels on a physical network. A virtual network map is merely a representation of all the theoretical paths that could be implemented by the supplier's virtual circuit switching equipment and is an attempt to side-step the issue of physical capability. Your supplier needs to understand the physical network to understand what is important for serving their customers. If they tell you that the physical topology is unimportant, they either don't understand how to engineer a network or they are trying to disguise something. Remember, there is nothing inherently wrong with using frame relay, or other technologies that use virtual circuits as part of the backbone. However, your provider must understand the physical topology on top of which their virtual (logical) network is running.

Network Link Speeds: Now that we are evaluating the physical topology, let's look closely at the speeds of the backbone links. If they won't show you the speeds, then they are really hiding something. The first thing to understand is that your network connection can only be as fast as the slowest link in the path.

It doesn't matter if you are connected to a T-3 node if there is a 56 Kbps link between you and your destination. This is like hooking a half-inch garden hose to a fire hydrant. The limit is the garden hose, not how much water the hydrant can put out.

Next, ask if the topology you are being shown is operational now. Some providers like to show links that are not operational as part of their backbone

infrastructure. Some even go as far as to label the planned links with solid lines and the operational links with dashed lines. You are in for a big surprise if you don't notice this switch. Similarly, don't confuse the press release about a new high-speed network link with that link actually being operational.

External Network Links: Now look at the external links of your candidate's backbone. Do they have a single connection to the rest of the world? This is a potential single point of failure. Look for multiple, direct connections to other network providers. The more of these connections the better. This shows that the provider is concerned about external connectivity and does not want to be dependent on some third party for interconnection. If they have a single connection to the outside world, ask them how often it fails and how long they usually are isolated. If they can't give you these statistics, are they managing their own network well enough to manage yours?

High-Speed Backbone: If they claim to have a high-speed backbone, check to see if it is that speed now or if it is just planned. Some providers claim to have a T-3 (45 Mbps) backbone, but if pushed, will admit that what they really mean is T-3 capable. A 2400 bps dial-up modem is also T-3 capable because tomorrow it is capable of being replaced with T-3. If they are misleading you about something as fundamental as their network capacity, what else are they trying to sneak past you?

The next thing to ask yourself about high-speed backbones is if you can actually connect to it for a reasonable cost. All service providers require you to buy the local loop segment from your facility to their closest point of presence, or POP. You will have to buy this directly or indirectly from one of the telephone companies serving your local area. Some providers offer their service in such a way that the local loop cost is greater than their fee to provide you with the service in the first place. Think of the hose analogy again. If you're limited by the local loop speed because the price of a high-speed loop is not cost effective, then how useful is a high-speed backbone?

Many providers will claim some impressive number of POPs. Find out what constitutes a POP by their definition. Some providers claim a POP anywhere they deliver service. Find out if many of their POPs are single customers at the tail end of low-speed lines or if those POPs house high-end routers linked by physically redundant high-speed connections. Network POPs should be designed to scale with additional customers who themselves have growing requirements.

Technology: The technology being used to operate the network is also critically important. Today, there is plenty of commercial quality router, switch, and modem technology available from companies whose business is to make that equipment. Any provider still relying on their own internally developed equipment is doing you a disservice. You deserve the benefits of leading-edge production technology, not aging hardware that has been contorted into a use never intended by its designers.

Sometimes a provider can have a bad case of the *not invented here* syndrome. This is a sure sign of long-term problems. Remember, you are buying a service. The provider of this service should be using the best available technology to deliver this service. They should not use the service as an excuse to use surplus equipment and technology. The recent popularity of Internet connectivity has some strange bedfellows offering connectivity services. Again, ask yourself who you think has the better incentive to make a network connection work and keep

working: the researcher who gets paid regardless of whether it actually works or the commercial supplier who only gets paid if it's working?

Build or Buy?:   Another worrisome syndrome to watch out for is the control freak. Some providers claim that they need to run even the lowest layers of their network to deliver quality service. This is simply not true. The truth of the matter is all Internet service providers rely on one or more telephone companies to assemble their network. The only way for any company to build their own network is to physically dig their own trenches and lay their own fiber into the ground.

The only real question is at which physical link or transport level your potential service provider buys from the much larger phone companies. If the lower-level infrastructure and service (such as T-1, T-3, frame relay or ATM needed to support an Internet service provider's value added service is offered by a phone company, it's not cost effective or in the best interest of the provider's customers for the provider to even think about building and operating it. The provider simply cannot match the economy of scale that comes with being a phone company. If your provider has chosen to build something when they could have bought a more reliable service more cheaply, why should you have to pay for their misplaced priorities? (If they can do it better and cheaper than the phone companies, why aren't the phone companies buying it from them?) The job of an Internet service provider is to manage and maintain your IP-level connectivity. Look for strong relationships and partnerships between your Internet service provider and the nation's host of WAN data carriers.

Technical Staff: Probably the most important aspect to consider when choosing a provider is the quality of their technical staff. The technical staff are the ones who will get your connection running to begin with and then keep it and the network running in the future.

Check the experience of their staff in TCP/IP data networking. They should have several people who have been running TCP/IP data networks for close to 10 years. The average experience is also relevant, as it is likely that you won't usually deal with their most senior people. However, it is reassuring to know that the very senior people are available if you need them. Make sure that their technical staff consists of people who are experienced with TCP/IP and not of people whose previous assignments were networking related and have now been assigned to this new project.

Make sure the provider has adequate staffing to cover the usual situations. If they send people to trade shows for a week, how many people are back at the office running things and how skilled are they? If they only have a few technical people and they all go to shows, then what happens if your network connection breaks while they are gone for a week? (Be suspicious if they say they can handle it by dialing back in.)

Find out what their technical staff turnover is. If people are leaving, find out why and who is left to keep your connection operational. Many suppliers of service have single points of failure in their staff capacity as well.

Network Operations Center: Check out their network operations center (NOC). It should be staffed by at least one person at all times. This includes nights, weekends, holidays, and during important sporting events. If they are quick to claim 7x24 operations, you might ask them what they provide the other 358 days of the year. An amazing number of providers claiming 7x24 operations really

mean that someone will answer the phone all the time, not that they will have someone capable of dealing with your problem. An answering service or beeper number is no substitute for a trained network engineer. Insist on one being always available and not just on call, as you can never tell when your connection will fail and what critical project it will have an impact on.

Ask how the NOC is staffed. While it is normal to have only junior people on duty at odd hours of the night, it is critical that senior personnel be on site at least 8 AM-8 PM, Monday through Friday. If your connection fails during normal business hours, you deserve to have very senior people immediately available to work on it.

Organization: Find out how long the company has been in the IP business. Determine if they are going to be in business for the long run. Maybe that deal is a bit too good to be true for a good reason. Quality networks are not built on a shoestring budget. The pricing may look attractive now, but the passage of time often reveals hidden costs and price increases, the greatest of which can be having to switch providers.

Ask about their financial stability. While you don't need to see copies of their audited financial statements, you should at least be comfortable that they have a positive cash flow and are going to be in business next month to provide your connectivity. Determine if they have one or two major accounts that provide a disproportionate amount of revenue and what impact losing those accounts would have on their ability to maintain your quality of service.

Are they an independent operating unit with its own staff and facilities or are they run out of the back door of a larger organization that doesn't know they exist? How critical do you think having the support of the parent organization is to their long term viability?

At this stage of the market's development, some providers are operating from behind questionable non-profit cloaks. Some may be subjecting their sponsoring organizations to questionable legal and/or tax risks by selling commercial services in competition with for-profit corporations. Tax offices require that non-profit companies keep track of all revenue that is unrelated to their non-profit charter and pay the tax on it just like a for-profit corporation. Why should you care about your provider's tax troubles? It's all about selecting a provider that can supply you with the highest quality, best price performing, reliable Internet and Enterprise WAN network services. Legal or tax problems can provide a major distraction to the provider. As these services become more and more an integral component of your successful business, your choice is more critical and all dimensions of your supplier are integral to your decision. There will be a shake-out in the Internet service business and only the strong will survive.

Is the company rapidly growing and expanding or is it a stagnant anachronism and merely resting on its laurels and remembering the good old days when they were the only provider in the area? How long do you think they will survive in competition with healthy, growing companies?

Is the group you're dealing with actually providing the network service or are they fronting, merely acting as a local aggregator for some larger entity? If so, what is the health of the larger provider and why should the larger provider give your connection the same attention that they are giving their directly connected customers?

Does the provider have a straightforward internal business model or do they have a series of sub-contracts of sub-contracts and shell games with wholly owned subsidiaries? Why are they adding unnecessary levels of complication and expense, and why should you pay for it?

Commercial Activity: Is the provider a member of the Commercial Internet Exchange Association (CIX)? This is a necessity if you are considering making commercial use of the Internet. If they are a member, see if they are really connected to the other members or have they just joined the association without interconnecting. Some groups advertise membership in the association but have never interconnected. Some go as far as implying that they are connected to CIX members when they merely serve as a transit network for providers who are really members and are really interconnected. Don't let them confuse you. Insist on a straight answer.

Does the provider require you to abide by an Appropriate Use Policy? Do you understand it? Is it ever enforced? Do you need to worry about it suddenly being enforced capriciously?

Full Range of Services: Does your provider have a full range of services, from low end to high end, or is it just filling a niche? If you need to increase or decrease your service level, will you need to switch providers?

Does your provider offer true one-stop shopping? Can they supply equipment, manuals, training, consulting, etc., as well as basic service? Can they provide connectivity throughout the country (and the rest of the world) or do they just serve a small region? Can they provide service in other countries through established partnerships with international suppliers and bill you on the same invoice as your domestic service?

Customer Base: Find out how many customers the provider has. Don't be mislead by the total number of customers the provider may brag about having. Some like to claim all of the individuals they have connected, while most others only count the organizations they have connected. The number of organizations willing to pay $1,000 per month for connectivity is a lot better indicator of the service quality than the number of individuals willing to pay $10.

Comparison Shopping: Do a price/benefit analysis. Some providers may appear to be priced less than others. Make sure you do an apples-to-apples comparison. Don't compare one provider's no-frills service with another's full-service offering. Don't be confused by the names of the products. What one provider thinks is basic may be minimal or useless to you.

Don't be afraid to ask for customer references and talk to them. See what issues current customers have. They will likely be similar to yours. If you get a reference, make sure there is no insider relationship with the provider such as an investor or a member of the board of directors.

Find out where their new customers come from. The most interesting statistic is how many of their customers have switched from other providers.

Conclusion: The astonishing, worldwide growth of the Internet as a public access computer network has all kinds of new users, large and small, investigating the virtues of getting on the Internet. Today, more and more companies are using the Internet to conduct their business, communicate with and support their customers, exchange electronic mail with hundreds of

thousands of users, and seek and find valuable information leading to competitive advantage. This resource is indispensable once obtained. The choice of the service provider to be responsible for ensuring this vital business tool is the most important decision you will make when embarking on the Internet.

Hopefully this section has provided assistance in examining some of the issues and raising some of the questions that will lead to a long and trusted relationship with your full-service, professional Internet service provider.

3.3 IBM as a Service Provider

IBM has set up networks and communication connections to service providers all around the world. These service provider connections have been combined with IBM's vast network resources to form the IBM Global Network. This global network provides network access to some 90+ countries and 700 cities. In the USA, the largest IBM linked service providers are Advantis and Prodigy. Each offer different types of services. Both the Advantis and Prodigy companies are joint ventures formed by IBM and Sears, Roebuck and Co.

Internally IBM has access to the Internet through 177 gateways in 21 countries via the IBM Global Network. IBM intends expanding this to about 450 local access points in 40 countries by the end of 1995. IBM's internal/external proxy and socks gateways are managed by tollbooth machines.

IBM provides different services for users accessing the Internet. IBM offers the following company service provider options:

- IBM Global Network
- Advantis network offerings
- Prodigy service offerings

3.3.1 IBM Global Network

To provide international support for users wishing to access the Internet, IBM set up the IBM Global Network. This is a commercial service which provides end users with the advantage of IBM's worldwide networking resources. With the IBM Internet Connection and the IBM Global Network, users have at their finger tips a complete set of dial access and navigation tools designed to simplify and enhance interaction with the Internet. This service includes:

1. Local dial access numbers
2. Low-cost Internet connectivity
3. Gopher, News and World Wide Web servers that assist you in navigating the Internet
4. World wide customer support
5. Integrated connectivity support with the OS/2 Warp operating system

The IBM Global Network is the enabler of the IBM network central computing strategy. This involves knitting together the assets of the Advantis company in the US and Canada together with the IBM information networks around the globe to provide a seamless backbone covering nearly a 100 countries.

3.3.2 Advantis

Advantis is a network service provider, as it provides the physical connectivity on the Internet. End users can register with Advantis as their Internet connection provider. As such, Advantis is responsible for setting up all the high-speed network connections, SMTP and POP servers, domain name servers, routing, Internet IP administration, etc. Advantis forms part of the IBM Global Network as the USA and Canadian Internet service provider of the IBM Global Network service. Advantis provides SLIP and dedicated leased lines as connection options. The Advantis leased line connections range from 56 Kbps to 1.544 Mbps.

Advantis offer fixed cost connection fee options depending on the line speed for those with leased lines.

Optional features include higher security options, higher speed options , and specialized connection options.

Advantis is comprised of a series of network service points, termed Advantis and Advantis2. Advantis has links into the NSP ANS. The ANS has high speed links at each NAP point. Advantis has a second network service point Advantis2, which has links into AlterNet NSP. The IBM VNET link occurs through Advantis2 and AlterNet link into the Washington MFSdatanet.

3.3.3 Prodigy

The Prodigy company is a consumer-oriented online information service company. It provides services over and above simple Internet information management. Prodigy assimilates vast amounts of information gained from numerous sources and brings it together in a usable form. Internet users cannot access the Prodigy data directly. Users must first sign onto a Prodigy account, which will enable them to send mail to Internet users. The Prodigy company announced in April 1995 that it will be providing more complete Internet access to its users in the future. The new version will offer a full E-mail access and subject index links for easier search capabilities. The four major competitors in this area are:

1. Prodigy
2. Compuserve
3. America Online
4. BITNET

Prodigy users connect via a dial-up connection to a Prodigy server using dedicated Prodigy software. The user does not connect into the Internet and is not part of the Internet. While accessing the Prodigy system, the user can use a Web browser provided by prodigy for accessing the Internet through a gateway. The user can send and receive E-mail on the Internet. A Prodigy user cannot telnet or FTP into the Internet and, as such, is by no means a complete Internet user.

Prodigy uses Advantis as its link into the Internet.

Prodigy announced that starting June 1995 it will let members create their own Web pages at no extra charge. No other major online service offers this exciting Internet feature. Prodigy's Windows-based Home Page Creator requires no computer programming knowledge or special skills. Members choose from a variety of fill-in-the-blanks templates and type in the information. Within a few

weeks of launch, Prodigy will add the capability for members to include their own photos, graphics and personal sound clips.

Anyone connected to the Internet using a graphical browser can search the home page directory by state, name or letter of the alphabet, and view the pages.

Prodigy will launch its Home Page Creator with four different templates:

- Basic: Using this template, members talk about themselves, including their interests, favorite Web home pages (which are all done with hyperlinks, so viewers can immediately go to them with the click of a mouse) and E-mail address.

- Business Card: This template lets members list their company, title , business description, address, phone number, fax number, E-mail address and URL (also a hyperlink) if their company has a home page on the Web.

- Out On The Town: Here, members can offer a guided tour of their hometown, or any other favorite place, listing all the best restaurants and fun things to see and do.

- Top Ten List: Either by subject category, or in a cyberspace potpourri, members list their top ten Web sites. Here too, the sites are all published as hyperlinks, so they can be accessed at the click of a mouse.

Once they've created their home page, members can revise or delete them at any time. Additional templates will be added in the future. A Macintosh home page creator will be available when Prodigy releases its Mac Web browser at the end of 1995.

3.4 Telephone Connections

Whatever connection alternative you use, you are going to have some kind of telephone connection - whether a very expensive T-3 line or a standard voice line. A summary of the common service grades has been summarized in Table 5.

Table 5. Telephone Line Options

Service Grade	Speed	Notes
Standard Voice	0 to 28.8 Kbps	SLIP,PPP, or dial-up connections.
ISDN	56 or 64 to 128 Kbps	Digital phone line required; worldwide availability sporadic; common in Europe; dedicated or dial-up.
Leased	56 or 64 Kbps	Small dedicated link to a service provider. Full TCP/IP access.
T-1	1.544 Mbps	Dedicated link with heavy use.
T2	6 Mbps	Not commonly used in networking.
T-3	45 Mbps	Major networking artery for a large corporation or university.

3.4.1 Costs

Internet service providers are participating in a competitive environment. When connecting to a service provider, you will be allocated at point to contact. This is termed a service provider POP (point of presence). Many service providers have sites at multiple locations, in multiple towns and countries.

Costs vary from service provider to service provider. The following different aspects need to be considered when deciding on a service provider:

- Connection fees
- Flat rate fees
- Initial fees and hourly rates
- Type of connection (PPP, SLIP or Terminal access)
- Speed of connection
- Dial-up or dedicated line
- Storage usage
- Call tariffs
- Services provided

Some service providers provide no user interface at all. When you connect into such service providers you can log into a native UNIX operating system, which although very powerful, does not offer an intuitive interface to the inexperienced user.

The IBM Global Network allows users to sign up online with a credit card. Examples of the IBM Internet Connection fee schedules can be found on the Internet at:

http://regsvr01.fl.us.ibm.net/prices

When you initially register through the IBM Global Network, you will be presented with a pricing schedule, as shown in Figure 29 on page 59.

3.4.2 Service Provider Solutions

Examples of connecting to a service provider are included in the following section wherein the IBM Advantis company is used as the recommended service provider.

For those wishing to use more than simple SLIP and PPP connections to the Internet, and wishing to provide their own Internet server, they can register with a service provider as a Web server. You can use an existing Class B or C Internet address or ask the service provider to arrange address(es) for you. You can use an existing mail domain or ask them to register one for you.

Many service providers provide a Domain Name Service. The DNS controls the link (mapping) between your domain names and your Internet (IP) addresses. The InterNIC will not allocate any class B addresses to a service provider. Service providers have a block of Class C addresses from which you can be allocated an IP address under a supernetting agreement.

Many service providers provide security services for accessing the Internet, These including setting up a firewall at the service provider's site.

Once you have set up your own company connections to the service provider, you can connect your Web server to the services provided by the service provider, such as:

- Mail (SMTP)
- News (NNTP)
- Time (NTP)
- Other WWW (HTTP) page connections

If you wish to register a domain name for your site, you need to take into account the following:

- Domain names can be of any (reasonable) length and a general guide is that they should reflect the company name or services in some way. Very short names (3 characters or less) are normally only registered in exceptional circumstances.
- You should take note of the domain classes in Chapter 2, "Internet Networking Overview" on page 11.
- Domain names must be registered through your service provider.

Some points which should be noted when applying for a domain name are as follows:

.co.ctry   Company, country domain code. Applications are put to a Naming Committee and if not opposed within five working days, the name is delegated. The whole process should therefore take a maximum of 10 working days.

.com   Commercial. No geographic location is implied by it and lots of companies use a .com mail address. A form has to be filled out by your service provider and submitted to the Internic. Simple details, such as an administrative contact and a short description of your business are required. The InterNIC is currently taking 3 to 4 weeks to process these applications.

.org   For organizations rather than private companies. Details as per .com

.org.ctry   Description as per .org and the allocation process will be the same as .co.ctry

.ac.ctry   Reserved for academic institutions

.gov.ctry   Reserved for government

Service providers provide news server connections. USENET is the set of machines that exchange articles tagged with one or more universally recognized labels, called newsgroups (or groups for short). The articles consist of discussions and files on a vast array of topics. It is the biggest bulletin board with an estimated 20,000,000 readers at 80,000 sites worldwide.

Service providers collect all newsgroups together. These are stored on an open news server from which you can read news items. It is also possible to post news items to the server. Thus you can build your own local news base and perhaps run some private newsgroups. You can use a news reader to interrogate the news base and read online.

3.5 Internet Connection Software

This section describes how to set up your connection to the Internet using IBM OS/2 and Microsoft Windows products.

The following scenarios are presented:

- IBM Internet Connection access via the IBM Global Network using SLIP protocol under OS/2 WARP using IBM Internet Connection software
- IBM Internet Connection access via PPP protocol under OS/2 Warp using IBM Internet Connection software
- IBM Internet Connection access using IBM TCP/IP V2.0 under OS/2 Warp
- IBM Internet Connection access using IBM TCP/IP V3.0 under OS/2 Warp Connect
- IBM Internet Connection access for Microsoft Windows
- Prodigy access for Microsoft Windows

3.5.1 OS/2 Warp V3.0 Internet Connection

This section describes how to set up the IBM Internet Connection for OS/2.

3.5.1.1 Product Overview

OS/2 Warp V3 comes with a single user application interface package to the Internet. The OS/2 Warp package supports both SLIP and PPP access. The Internet Connection for OS/2 provides full access to the Internet. This software is easy to install and use.

By using the IBM Internet Connection for OS/2, in conjunction with a service provider such as the IBM Global Network, you can gain full access to the ever-expanding Internet.

You can use the graphical programs provided in the Internet Connection for OS/2 to:

- Send electronic mail (UltiMail Lite)
- Access online bulletin boards (NewsReader/2)
- Explore the Internet (Gopher)
- Explore the World Wide Web (WebExplore)
- Transfer files between remote computers (FTP-PM)
- Sign onto remote computers (TelnetPM)

The Internet Connection for OS/2 also provides the commands that allow you to access functions and perform trouble-shooting. The commands supplied are:

- ARP
- BOOTP
- EXPLORE
- FINGER
- FTP
- FTPPM
- GOPHER
- HOST
- HOSTNAME
- IFCONFIG
- IPFORMAT

- IPTRACE
- NETSTAT
- NR2
- NSLOOKUP
- PING
- PMANT
- TELNET
- TELNETPM
- TN3270
- WHOIS

Later chapters will go into details on the functionality and usage of these applications, as pertinent to the Internet.

The TCP/IP functionality of the Internet Connection software does not provide for daemon support and print spooling. These are included in both the TCP/IP V2.0 and the OS/2 LAN Connect packages.

3.5.1.2 Hardware Prerequisites

To run Internet Connection for OS/2, you need:

- A modem supporting 9600 bps or better is recommended, as listed in Appendix C, "Internet Connection for OS/2 (Modem Support Telephone Numbers)" on page 169.
- A 256 Color SVGA monitor and card are recommended.
- All other requirements of OS/2 Warp.

3.5.1.3 Memory and Disk Space Requirements

The Internet Connection for OS/2 occupies 10.5MB of disk space.

The default segment swap space is adequate for most functions. The swap space is dynamically allocated as the applications require more memory.

3.5.1.4 Installation

The installation of the Internet Connection program should follow the path indicated in Figure 16 on page 49.
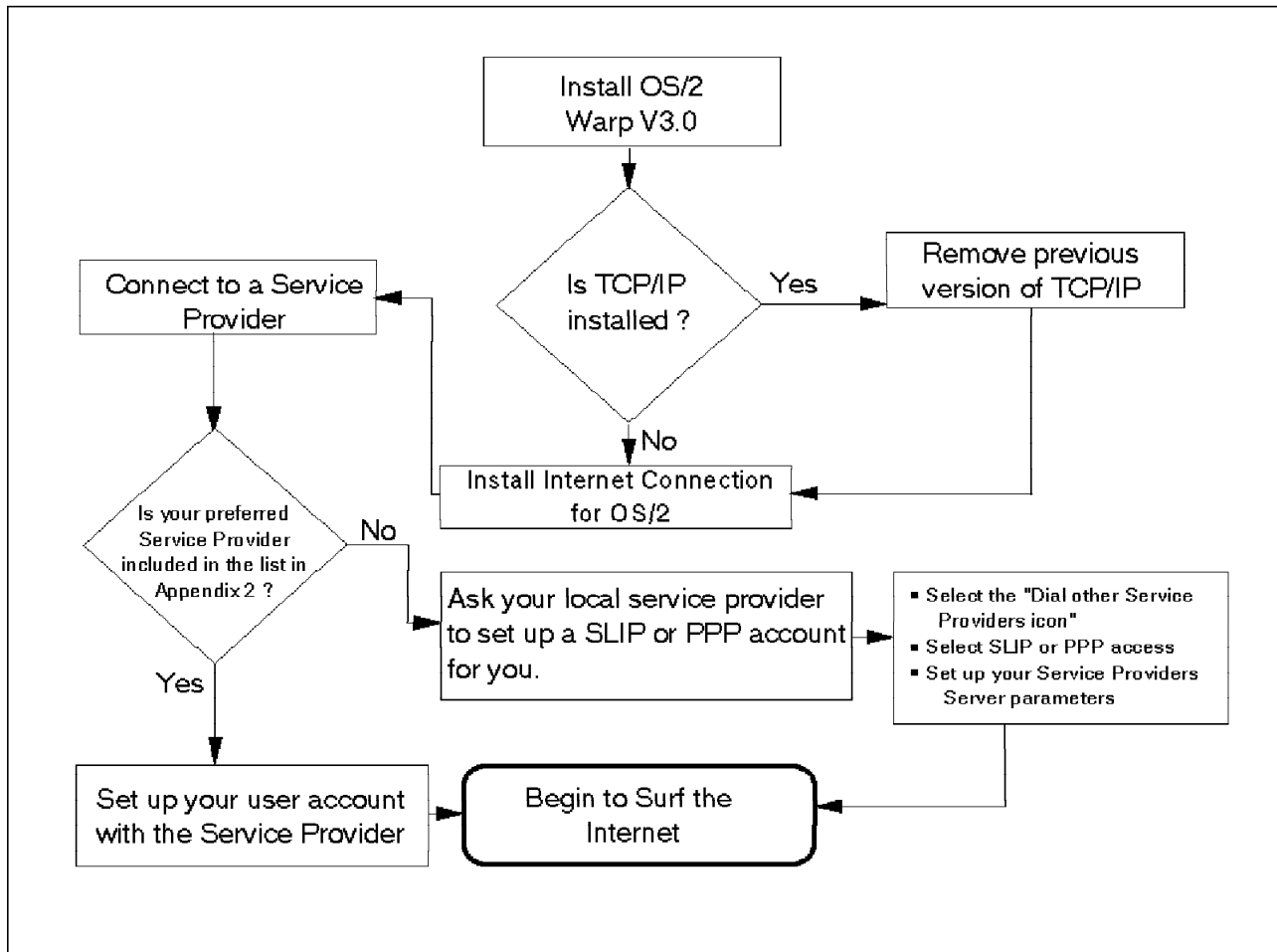
Figure 16. The IBM Internet Installation Flow Chart

First install the OS/2 Bonus Pack Internet Connection software. You should either have Version 1.2 or 1.3. Run the install.exe program located on the first disk. This will show you a screen as shown in Figure 17.
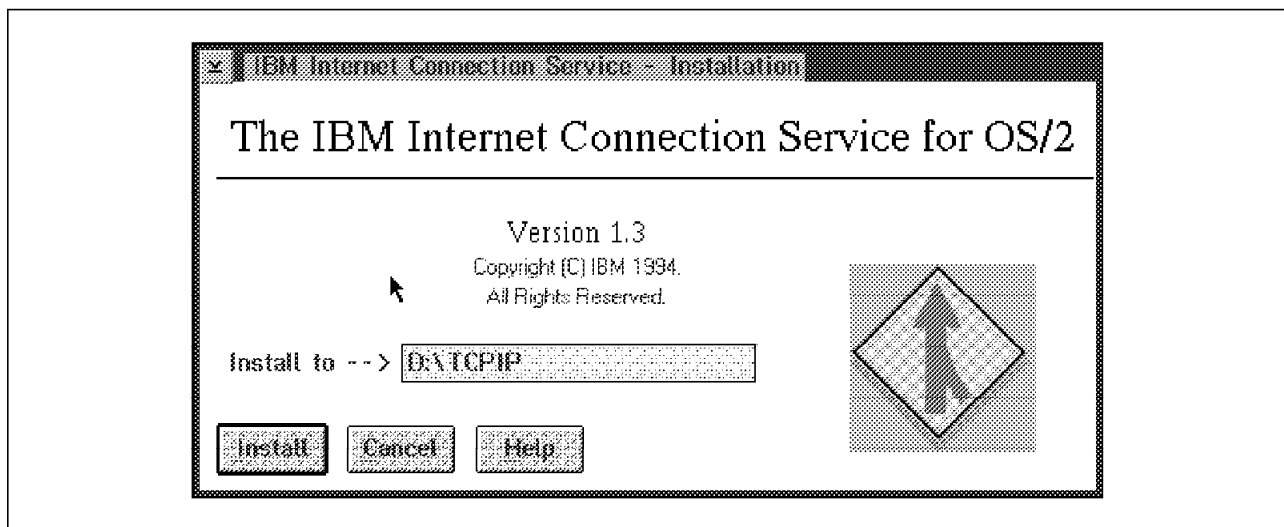

Figure 17. The IBM Internet Connection Service - Installation. When you begin installation, the software will ask you to specify a directory into which it should install the software.

While installing the software you will be presented with the screen shown in Figure 18 on page 50.

If you have a version of TCP/IP prior to V2.0 you may need to remove this previous version, as detailed in Appendix A, "Removing a Prior Version of TCP/IP for OS/2" on page 161. TCP/IP V2.0 and the Internet Connection for OS/2 can coexist on the same workstation if you take the precautions listed in Appendix D, "Coexistence of TCP/IP V2.0 and Internet Connection for OS/2" on page 175, although you may still encounter some problems.

The Gopher and IBM WebExplorer applications use external viewing programs for viewing image and audio support. By default, Gopher will use the viewing programs that are part of the Multimedia Viewing package in the BonusPack. Therefore in order to get Multimedia support, you will need to install the Multimedia Viewer package.
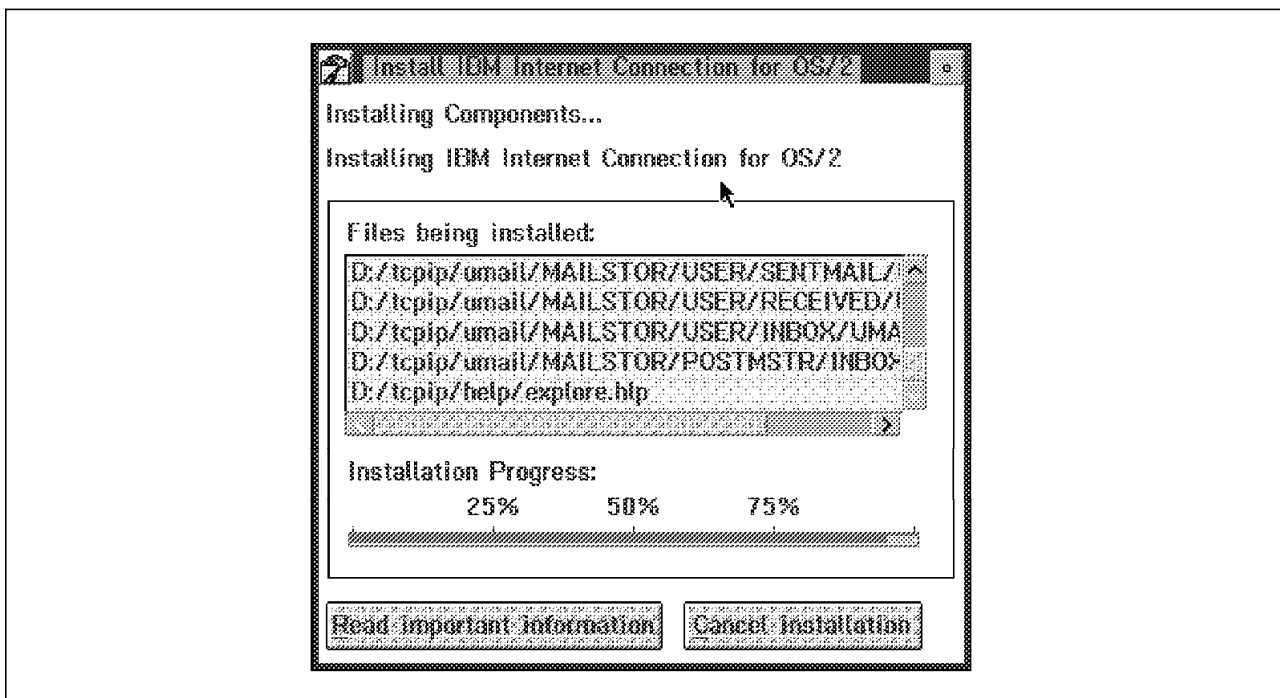

Figure 18. The IBM Internet Connection Service - Unpack Software. After you start the installation, the software will unpack your files into the directory you specified.

At the end of installation, you will be presented with the screen shown in Figure 19 on page 51. Note that you must now shut down the computer and then restart OS/2 to be able to register with a service provider.
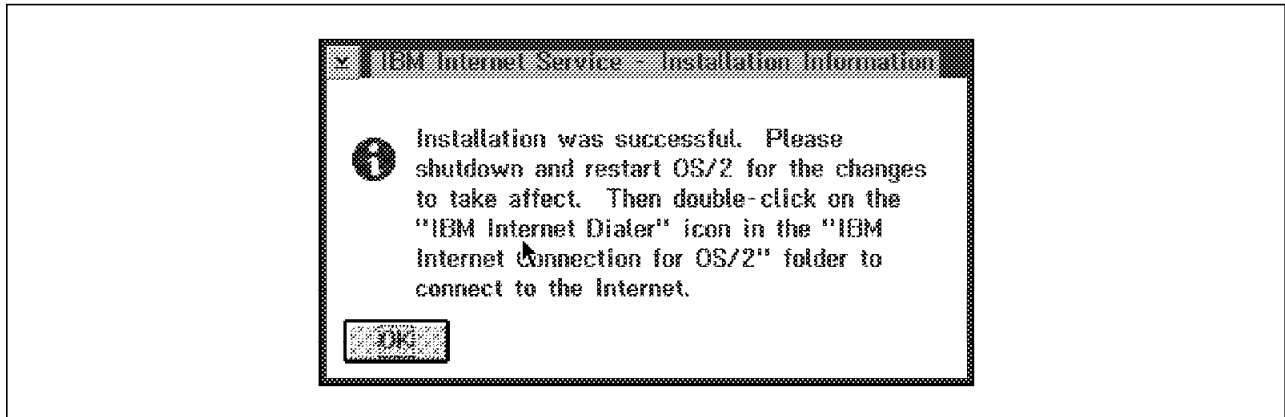
Figure 19. Installation Information.   Completed installation.

3.5.1.5 Setting Up an Internet Connection Protocol Connection to an IBM Global Network Service Provider

The OS/2 Internet package provides by default for a connection into the IBM Global Network using the SLIP protocol.

To use the default IBM Global Network service provider, select any application icon in the Internet Connection for OS/2 folder, shown in Figure 20. For example, we selected the NewsReader/2 icon.
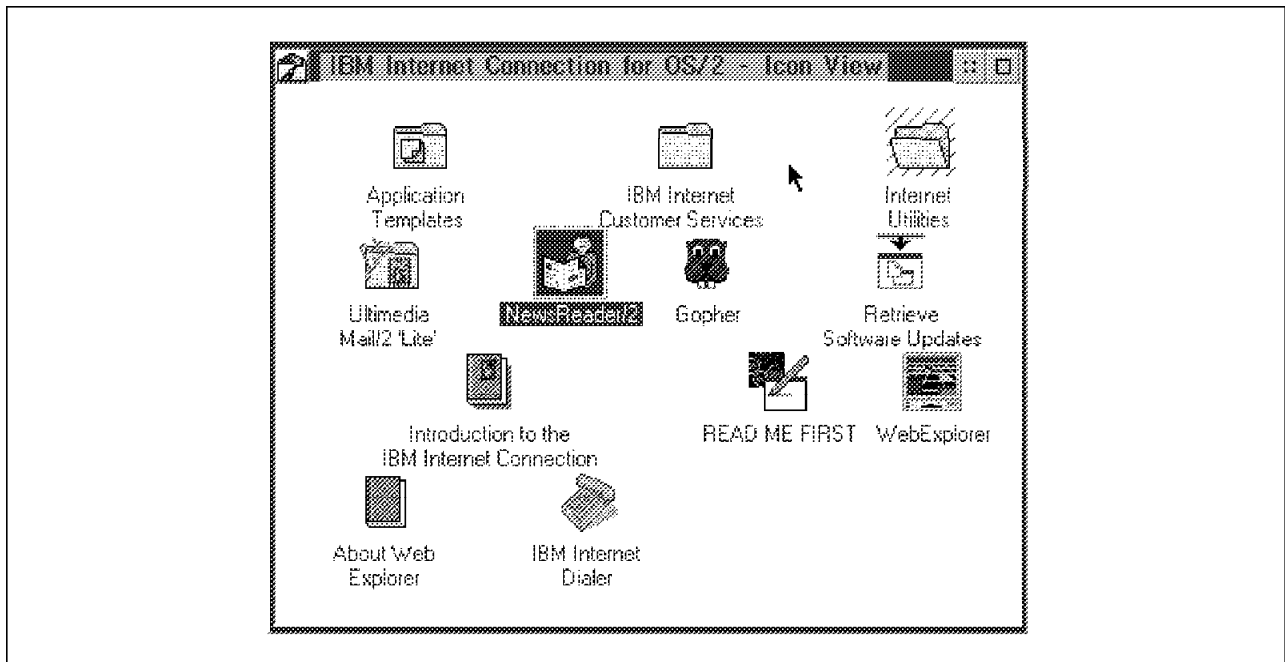
Figure 20. Internet Connection for OS/2 Folder

To set up a user ID with a service provider, you should ensure that you are not using the modem for any other applications at the same time as setting up your logon ID. After selecting the NewsReader/2 icon, you will see the screen shown in Figure 21 on page 52. We chose the IBM Internet Service Provider. To do so, select the **Dialer (IBM Internet)** radio button, then click on the **Connect** icon.
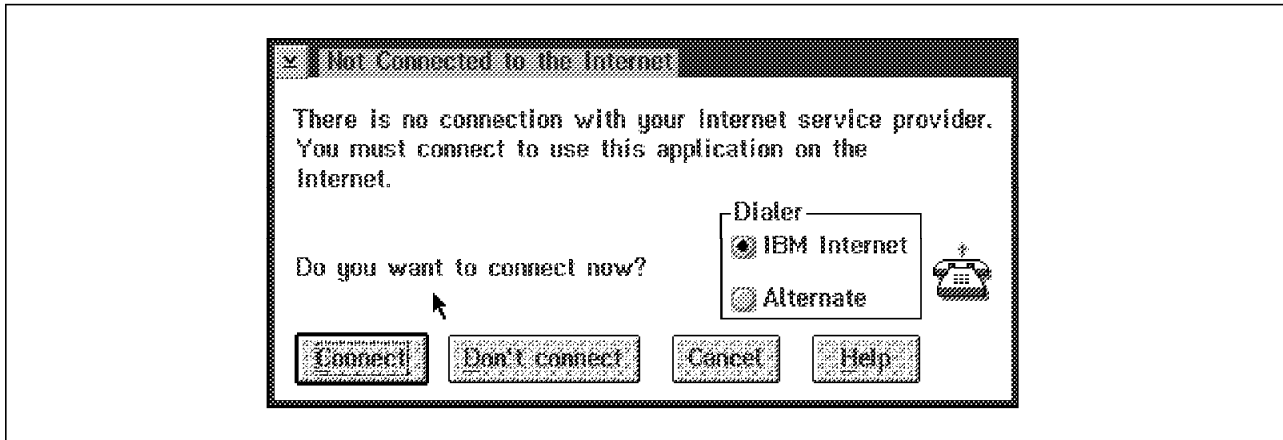
Figure 21. Not Connected to the Internet

The system will now indicate that you do not have a logon ID on an IBM service provider system. To get a logon ID, you need to open a personal account with the service provider. You will see the IBM Internet Registration menu as shown in Figure 22 on page 53. Click on the **Open a personal account** button. Note that you need one of the following credit cards to register with the IBM Global Network:

- American Express
- Visa
- Diners Card
- Discover
- JCB
- MasterCard

If you do not have one of the listed credit cards, please contact one of the IBM Global Network help desks listed in B.3, "IBM Global Network Help Desk Telephone Numbers" on page 166.
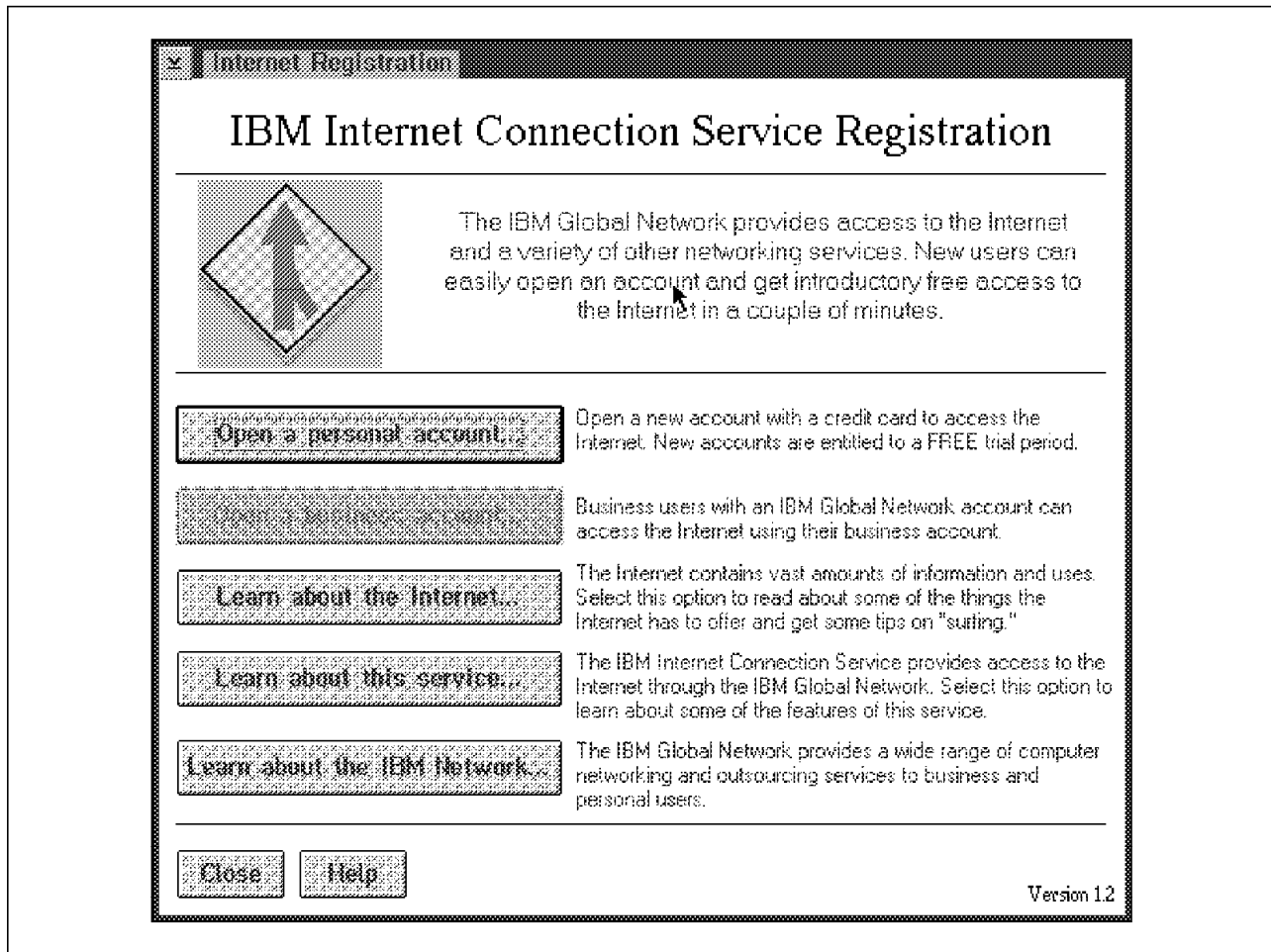
Figure 22. Internet Registration. The IBM Internet Connection Service Registration Global Network registration menu is shown.

The system will now provide you with the IBM Internet Service Terms and Conditions shown in Figure 22. Please read these carefully before you proceed. When you have finished, click on the **OK** icon. The Terms and Conditions cover the USA terms and conditions and may not be valid in your country. Contact your local IBM representative if you have a question about your local terms and conditions. (See B.3, "IBM Global Network Help Desk Telephone Numbers" on page 166).

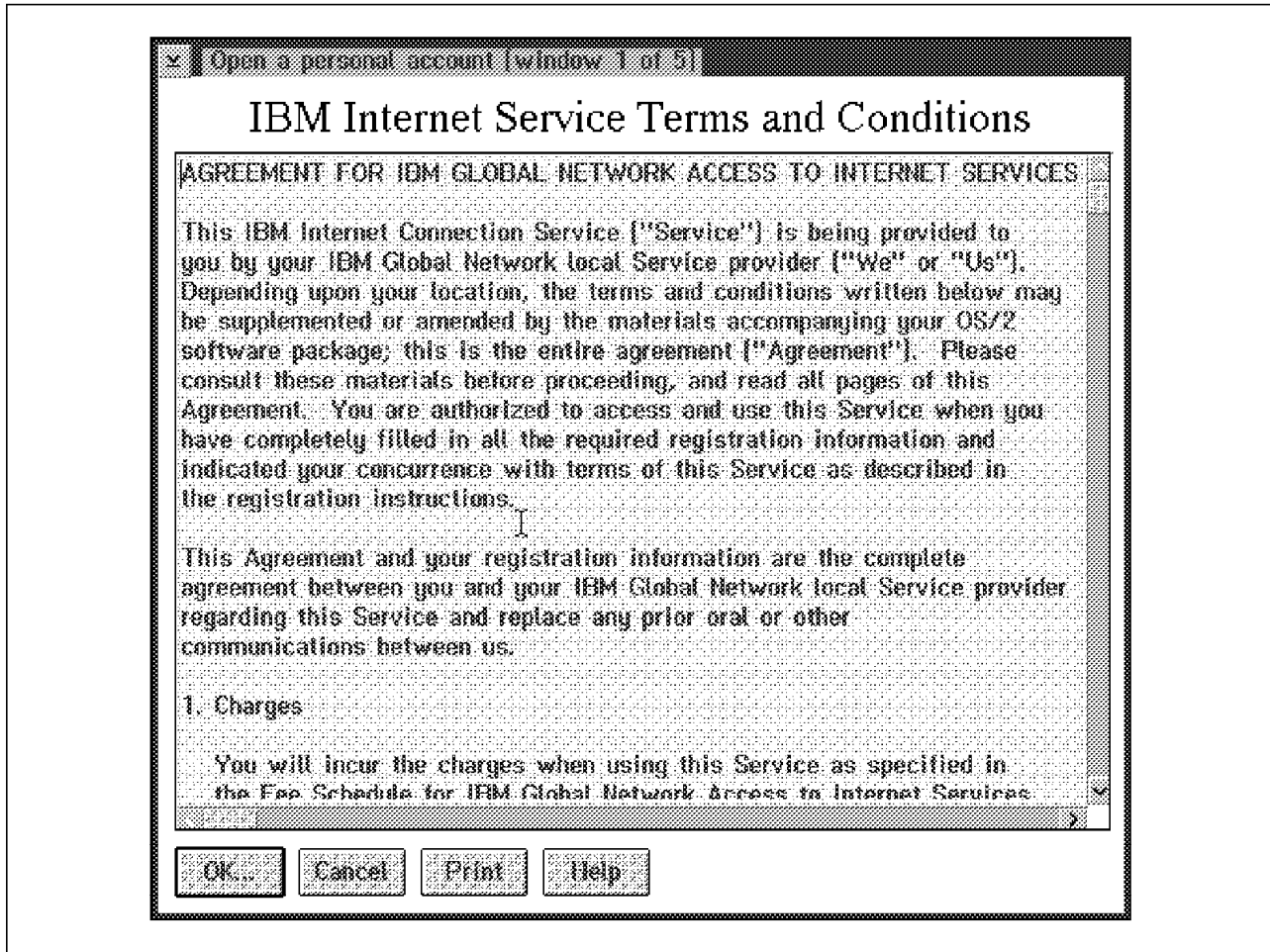*Figure 23. Terms and Conditions. IBM Internet Connection Service Registration Global Network registration terms and conditions are shown.* **These will vary from country to country. Please contact your local IBM office if your country is not specifically listed.**

You will be presented with an Account Owner Information screen, where you must enter your own personal account details, as shown in Figure 24 on page 55.

Account Owner Information

Personal accounts for the IBM Internet Connection Service are charged to a credit card. Please enter the billing information below and press the OK button or the Enter key.

Name (as on the credit card) and address

Country [United States] ▼

First name Initial Last name
[   ] [ ] [   ]

Street address
[   ]
[⊤   ]
[   ]

City   State   Zip code
[   ] [NC ▼] [27614]

Telephone number ([919]) [846] - [7736]

Credit card

Type
[Diners Club (TM)] ▼

Number
[   ]

Expiration date
[   ] / [   ]
(month) (year)

[OK...] [Cancel] [Help]

Figure 24. Account Owner Information

The system will check details such as credit card numbers for their validity. Ensure that you have selected the correct country details. Your credit card details are not sent around the currently insecure Internet. The telephone number which you dial when registering is a direct dial telephone specifically used for registering. It does not use the Internet. You will be assigned a logon account number by this registration account. The next time you dial into the system as a registered user, a different telephone number will be used, as specified when you register. You must then select the **OK** button. The system will present you with the modem and dialing details as shown in Figure 25 on page 56. This screen will allow you to choose the modem which you have connected to your system. The current list of supported modems is shown in Appendix C, "Internet Connection for OS/2 (Modem Support Telephone Numbers)" on page 169. The screen shown will allow you to choose your communications port settings as well as your phone line characteristics. We selected the IBM 7855 9600 bps modem.
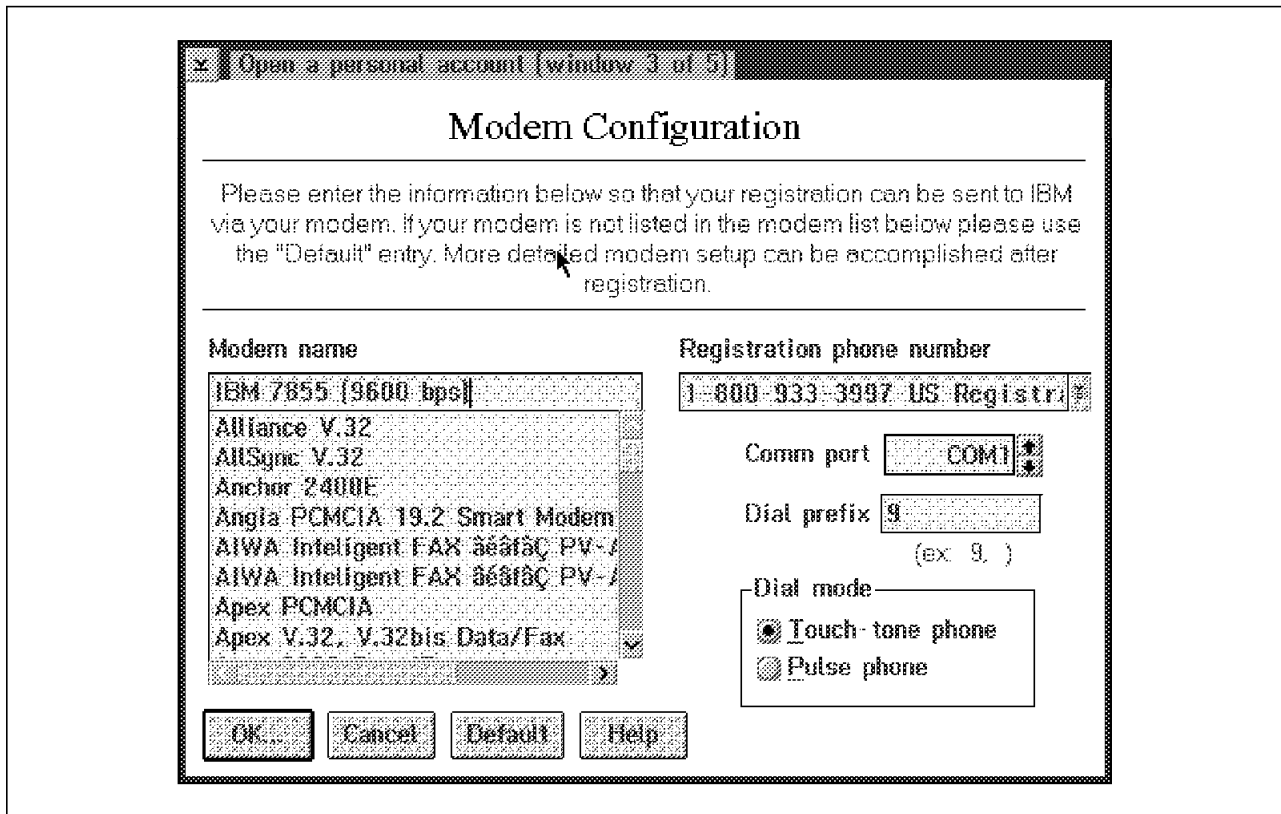
Figure 25. Modem and Dialer Information

The system will assign you a default user ID as shown in Figure 26 on page 57. To allow you to receive mail and be identifiable to the Internet, the system will allow you to specify your user ID. Commonly, someone else on the system may have already chosen your preferred user ID. The system creates three user ID choices. You will be assigned one of these when your registration is accepted. The priority of assigning user IDs starts with your first choice of user ID. If three alternatives are not sufficient, you will be registered with a number suffix after your first ID choice.
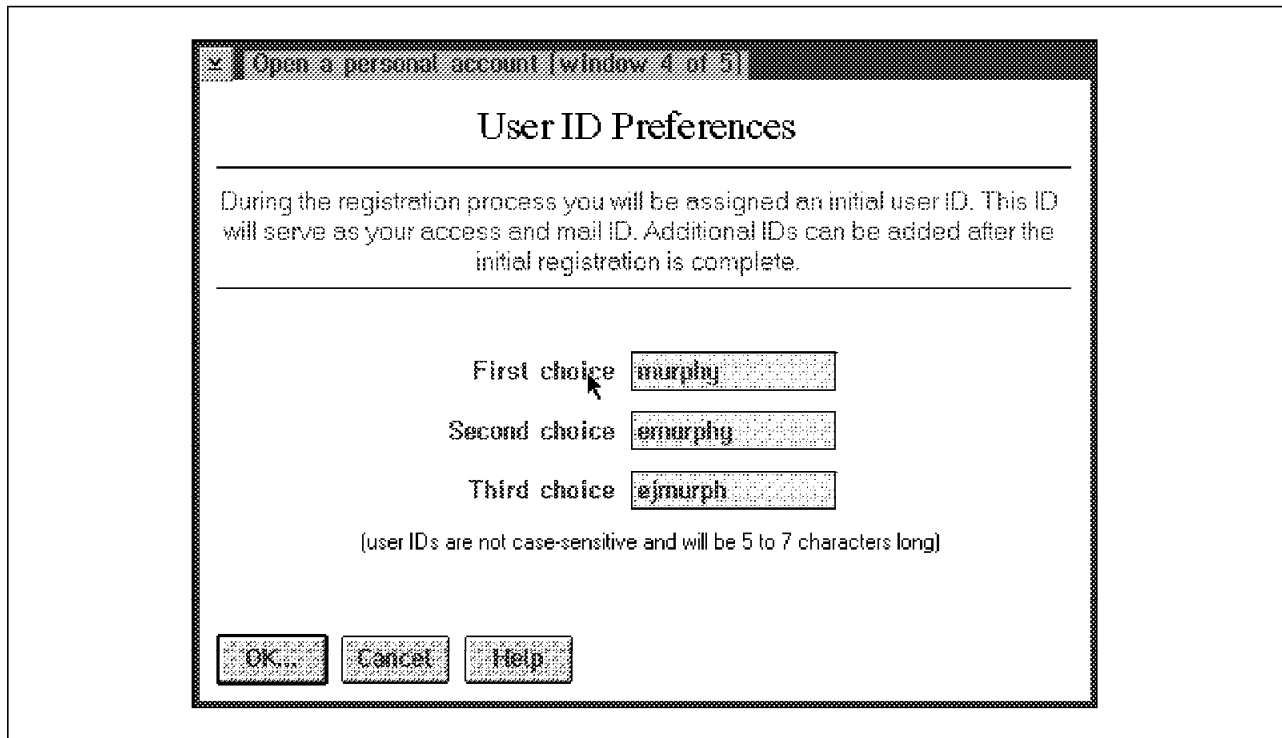
Figure 26. User ID Preferences

Select the **OK** icon. You will be able to submit your registration to the IBM Global Network, as shown in Figure 27. Select **Send Registration to IBM.**
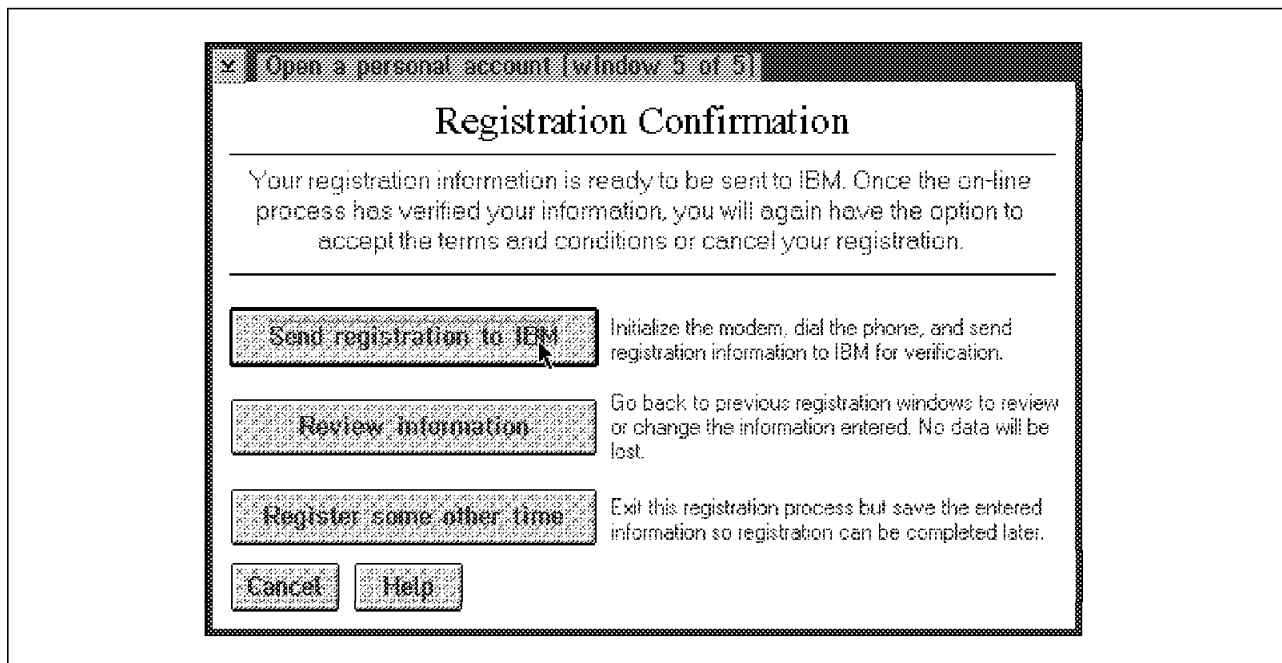
Figure 27. Registration Confirmation

This system will dial the registration telephone number, as shown in Figure 28 on page 58. If you receive an error, check your telephone characteristics and modem type. The telephone number may be busy.
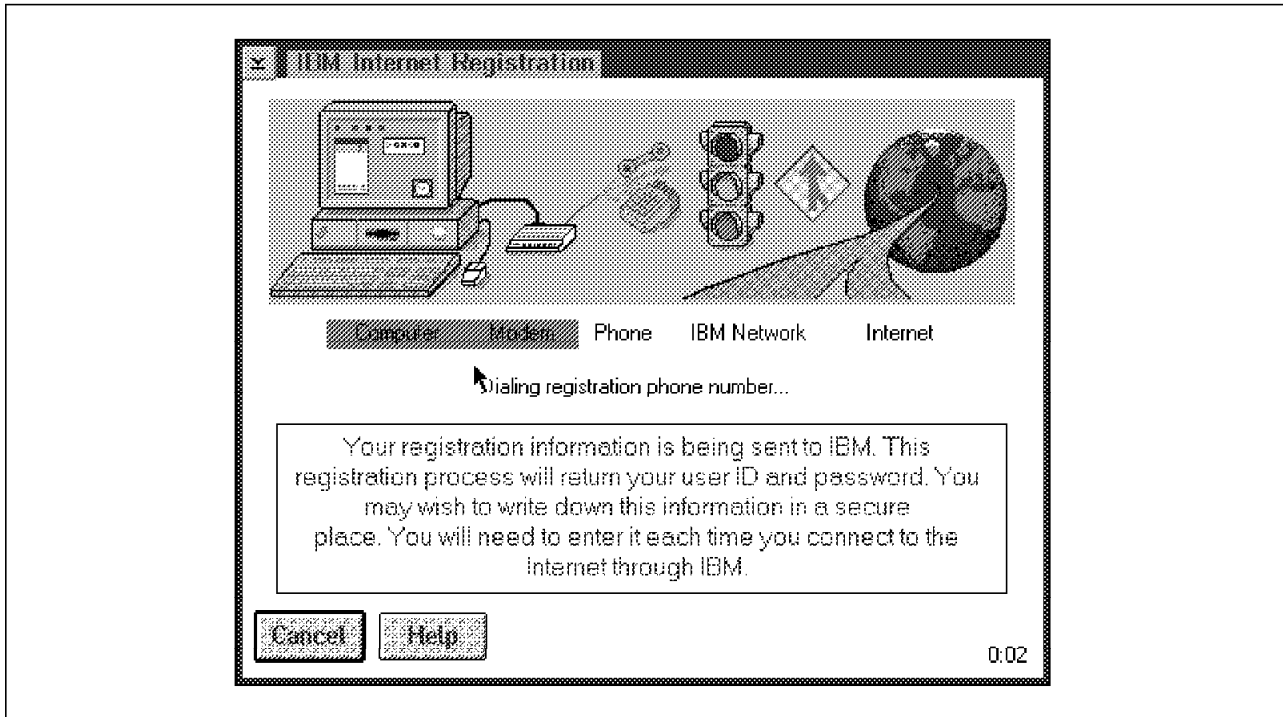
Figure 28. Internet Registration

Once you have signed onto the system, you will see your personal agreement price schedule, together with the service fees, as shown in Figure 29 on page 59. **Please read the terms and conditions carefully.**
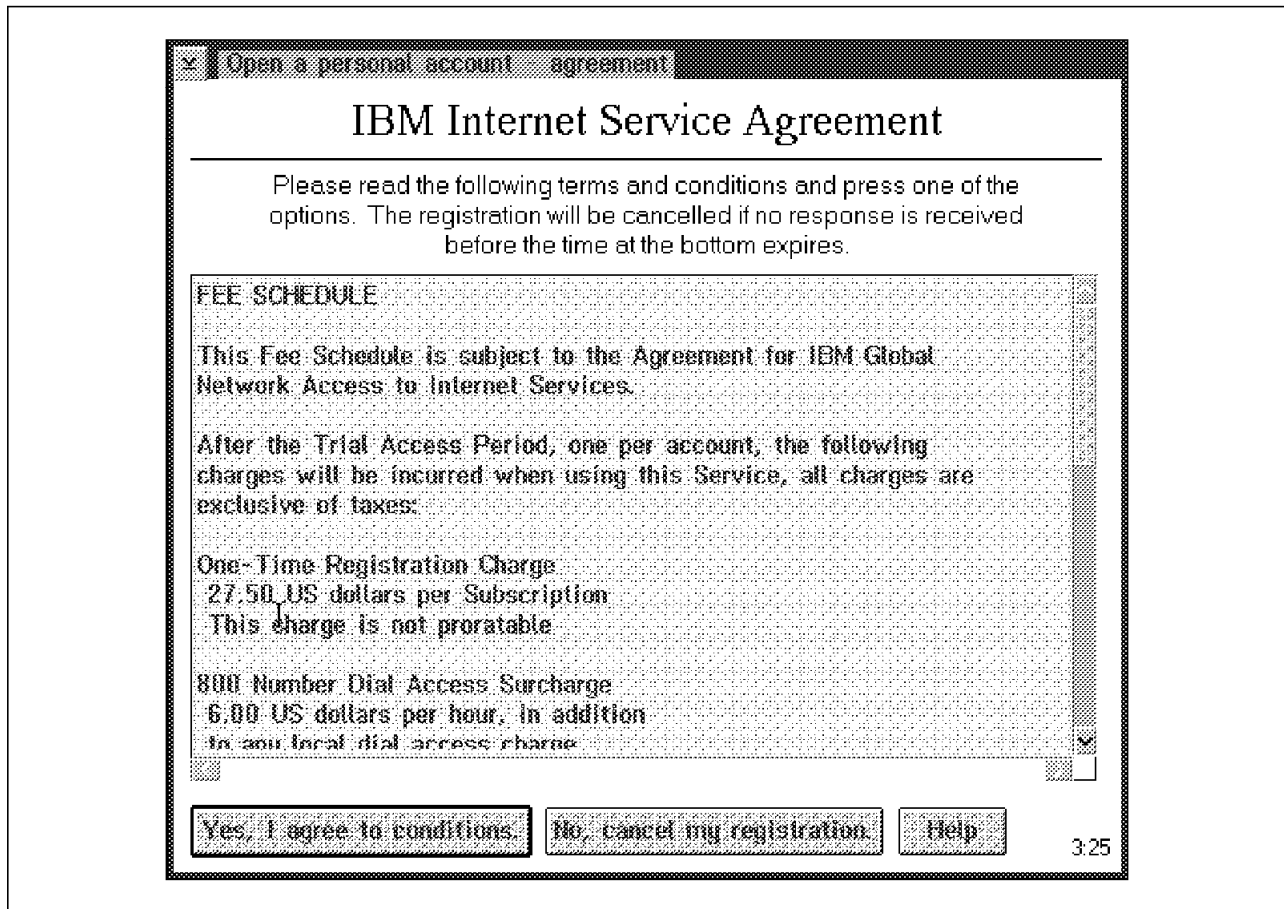
Figure 29. Fee Schedule

After registration is complete you will be assigned a logon account number by the IBM Global Network service provider as shown in Figure 30.
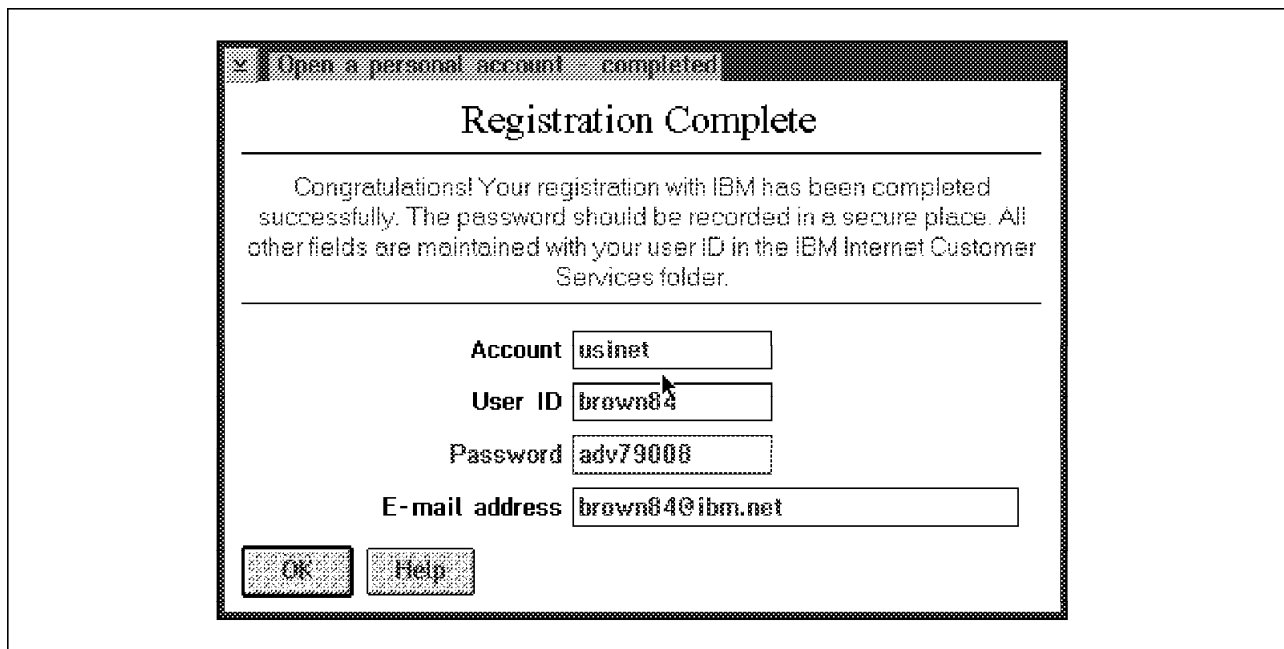
Figure 30. Registration Complete

You should now be signed onto the system successfully. Take note that you have a free trial period to be able to test the system. This might vary from location to location. In the US, Advantis provides you with a free trial period for three hours of use or 30 days, whichever occurs first. You will now see the screen shown in Figure 31 on page 60.
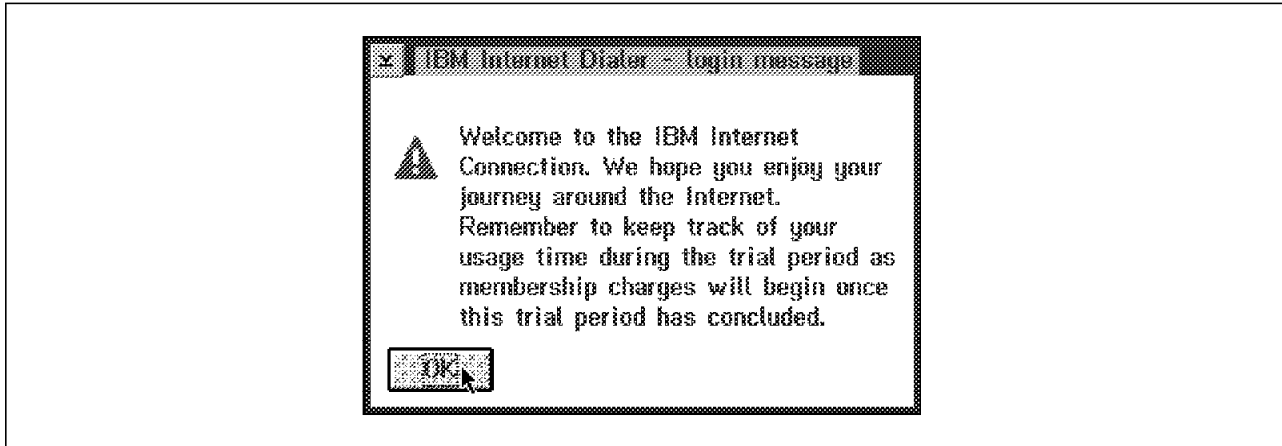
Figure 31. Welcome to the Internet

Now that your registration is complete, a connection will be established automatically and the application you originally selected will start. In our case, the NewsReader/2 product will start up.

You only need to register once. The next time you select an Internet application, before a connection has been established with the service provider, you will again be asked if you want to sign onto the Internet; however, the application will use your previous registration details, and you will not have to register again.

3.5.1.6 Updating the IBM Internet Connection System Software through the IBM Global Network

To ensure that you have the most current version of software, you should download the latest version. The IBM Global Network will allow you to do this. To do this, go to the **IBM Internet Customer Services** icon view (Figure 20 on page 51). Select the **Customer Assistance** icon as shown in Figure 32.
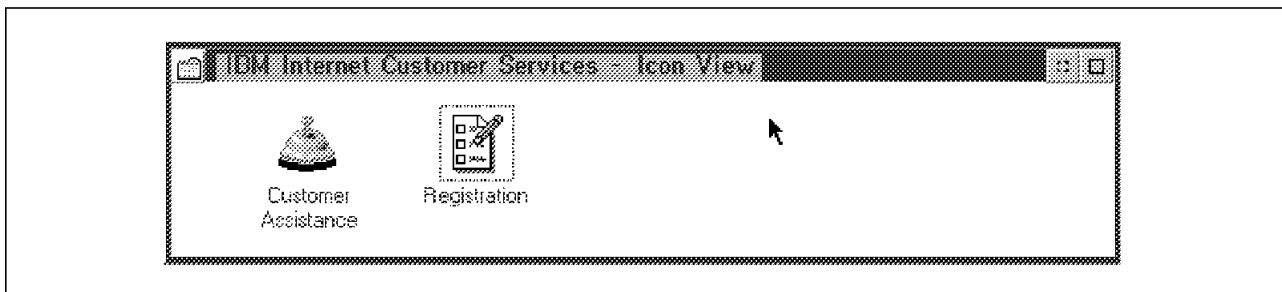
Figure 32. IBM Internet Customer Services Folder

You will see the menu shown in Figure 33 on page 61. This must not be used if you are not using an IBM Global Network service provider. Select **Update Software** as shown in Figure 33 on page 61.
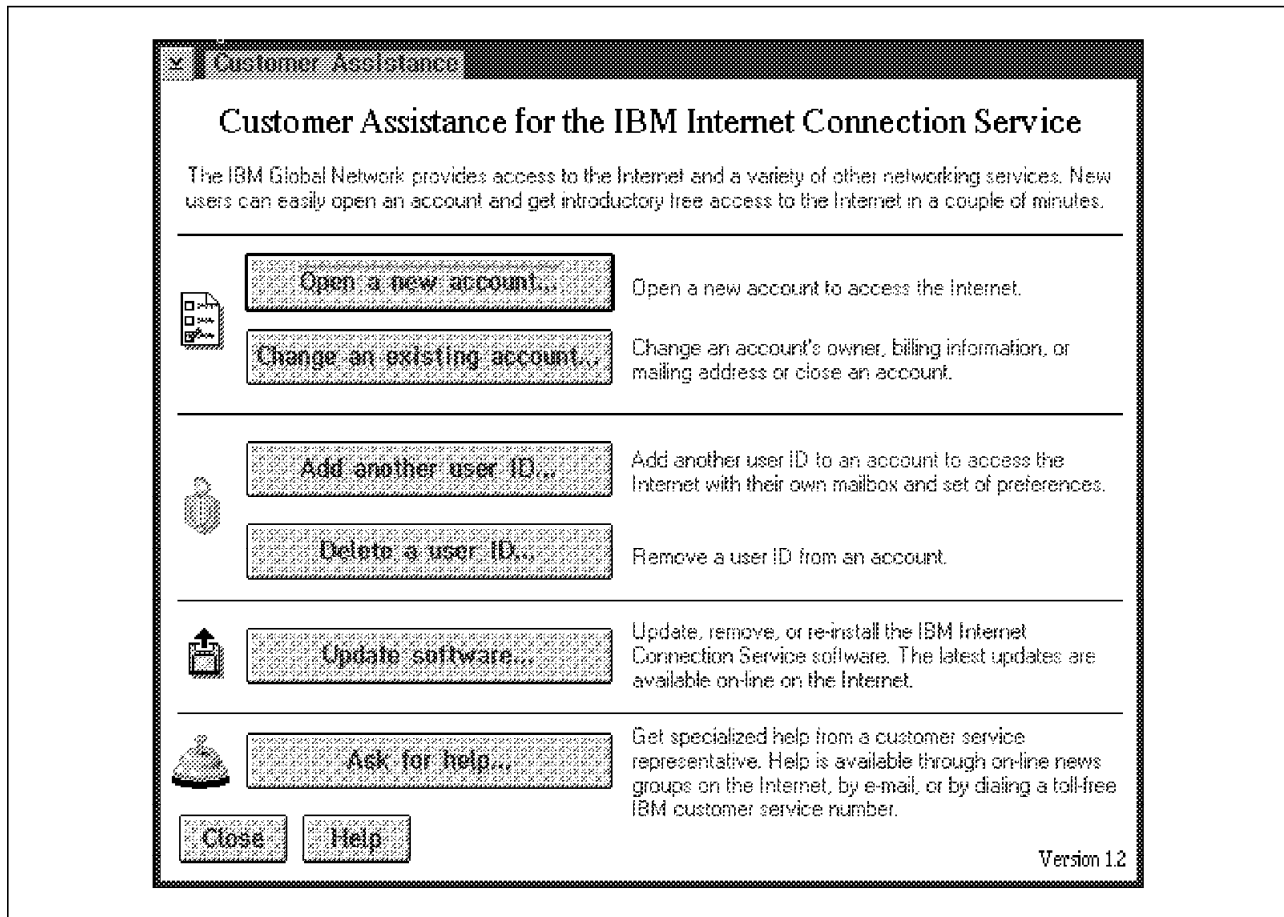
Figure 33. Customer Assistance for the IBM Internet Connection Services

You will now see **Update IBM Internet Connection Service Software,** as shown in Figure 34 on page 62.

On this screen you will see a number of user-selectable icons. You must select the **Download latest software...** icon.
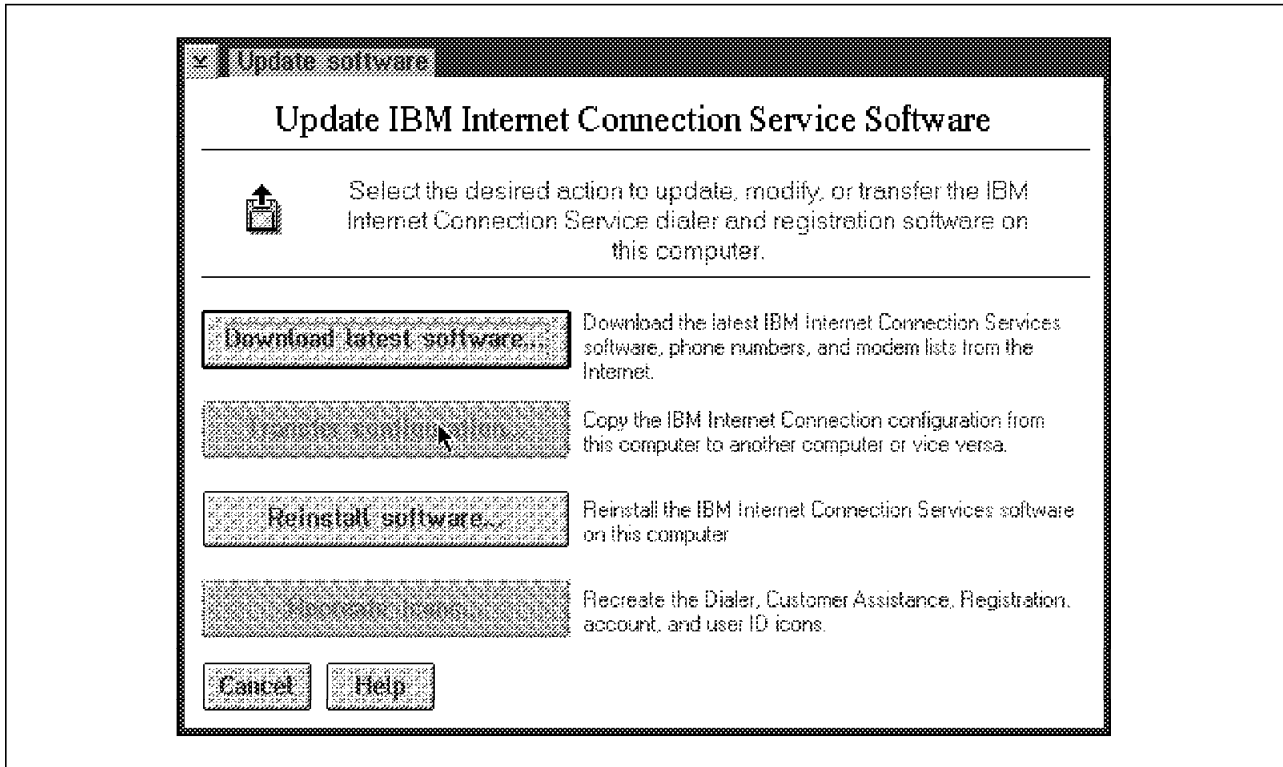
Figure 34. Download Latest Software

The Internet Connection version level will now be checked on your system. The program will advise you which version of the Internet software is present on your system, as well as which version of software is available from IBM, as shown in Figure 35. This takes a couple of minutes to check. Select the **Dialer & Customer Assistance programs** (includes the phone and modem list) box. Select **Download**. This process takes a few minutes to complete.
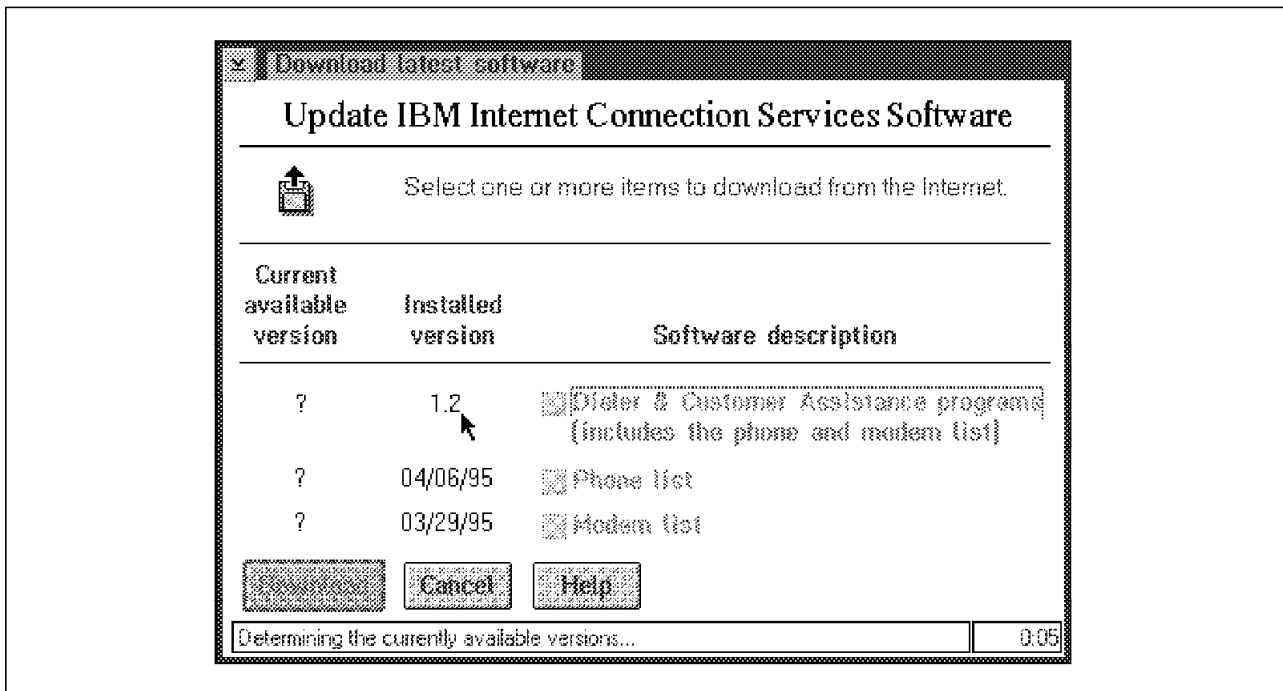
Figure 35. IBM Internet Connection Services Software Version Check

When the software has been downloaded, you will have the option of installing the latest version of software on your system. You must select **Reinstall software,** as shown in Figure 34. The system will run the INSTALL.EXE program, as shown in Figure 36 on page 63. This will be loaded from your TCPIPtmp directory.
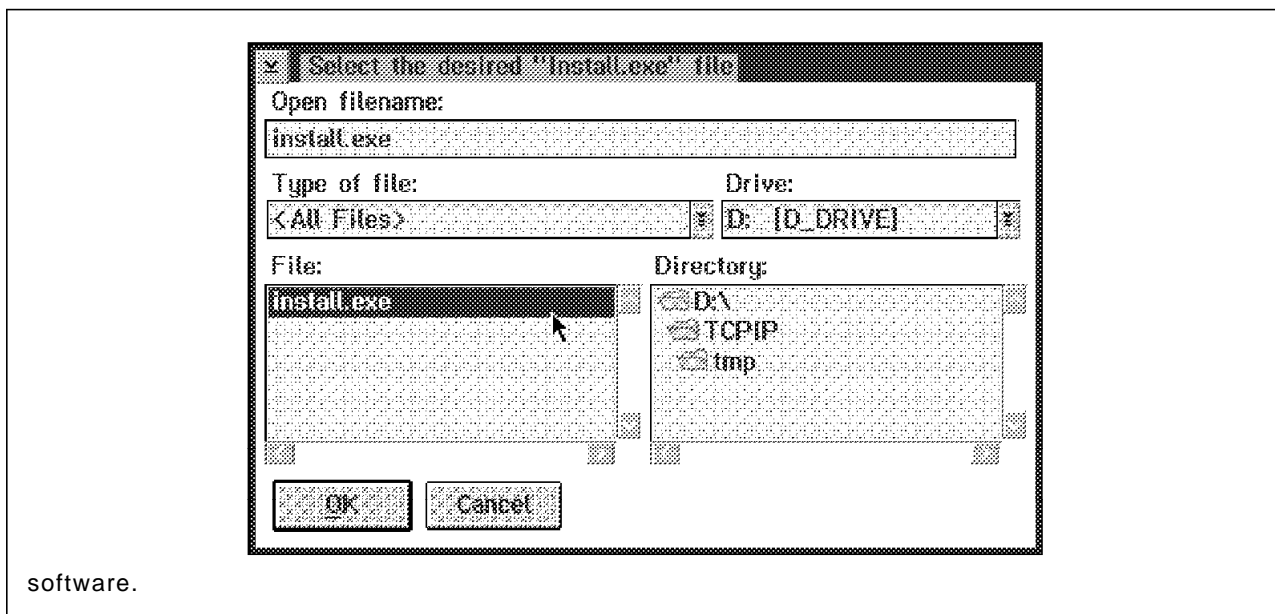
software.

Figure 36. Installation of Latest IBM Internet Connection

You must shut down and reboot your workstation for the latest version of the software to work correctly.

software on the system
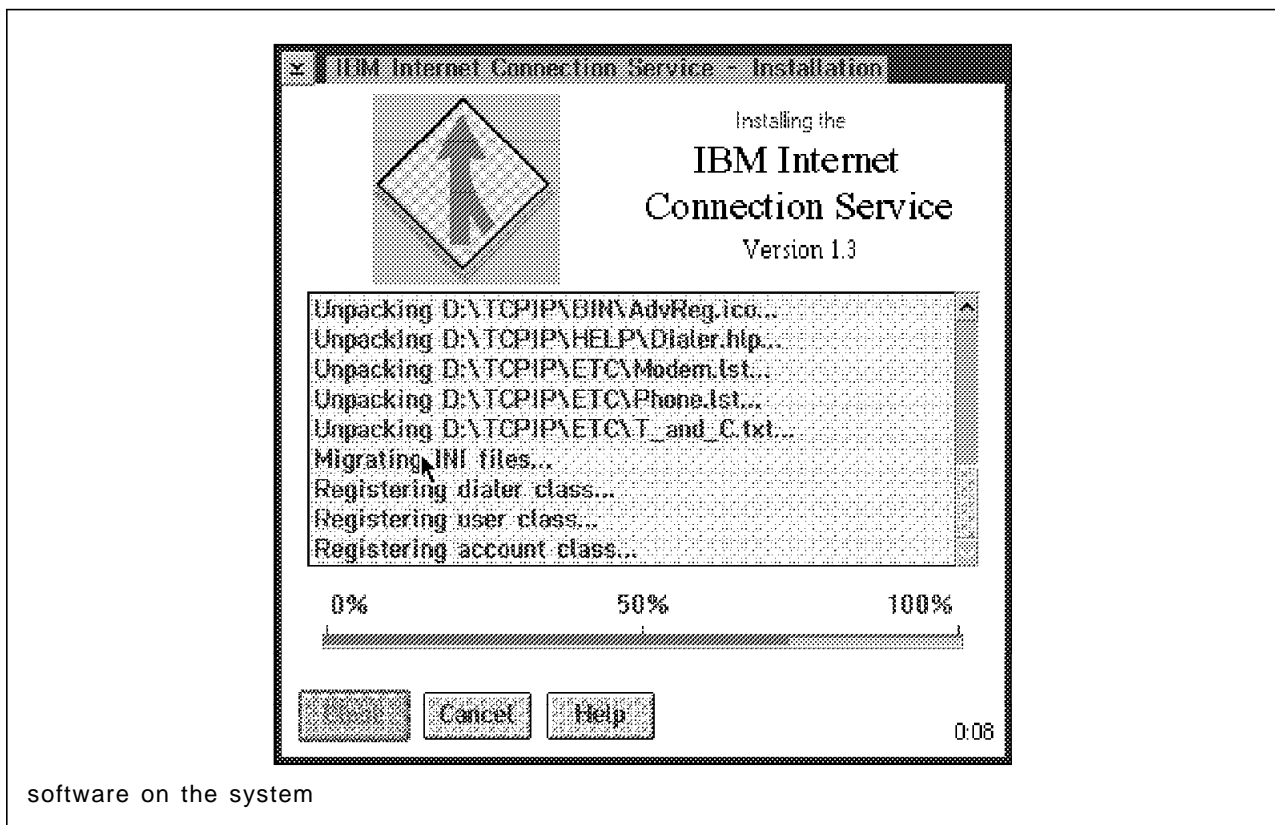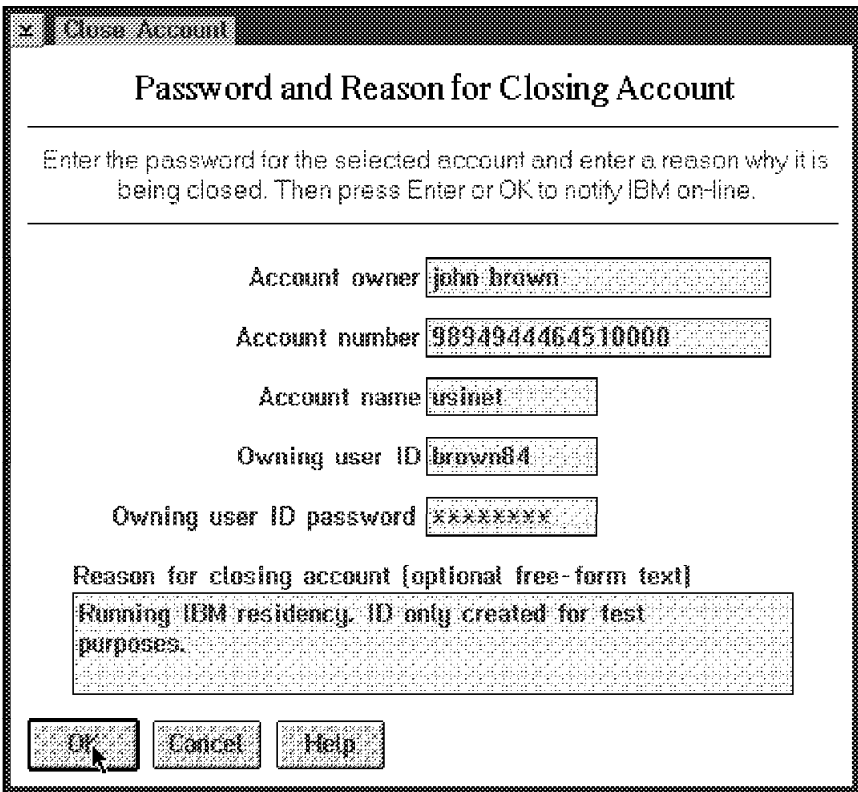
Figure 37. Installing Latest IBM Internet Connection

3.5.1.7 Deleting a User ID Through the IBM Global Network

To delete a user ID, you need to first set up your Internet connection as normal. Sign on as the user you wish to modify. Select the IBM Internet Customer Service icon (Figure 20 on page 51). Select the Customer Assistance icon (Figure 32 on page 60). You will see the menu shown in Figure 33 on page 61. This must not be used if you are not using an IBM Global Network service provider. Select the **Change an existing account** icon. You will see the screen shown in Figure 38. The account number information will be entered automatically by the system. You need to re-enter your password and an optional reason for closing the account. Select **OK**. When next accessing the Internet system, the dialer program will automatically access this last user when trying to sign on, even though the user does not exist anymore. You will need to manually enter another user ID.

Figure 38. Deleting a User ID

3.5.1.8 Setting Up an Internet Connection with Another Service Provider

As mentioned earlier, numerous service providers abound in the marketplace. If you wish to set up a connection with another service provider, you need to set up your configuration correctly.

Select the **Dial Other Internet Providers** icon, as shown in Figure 39 on page 65. You will use this icon every time you connect to your service provider.
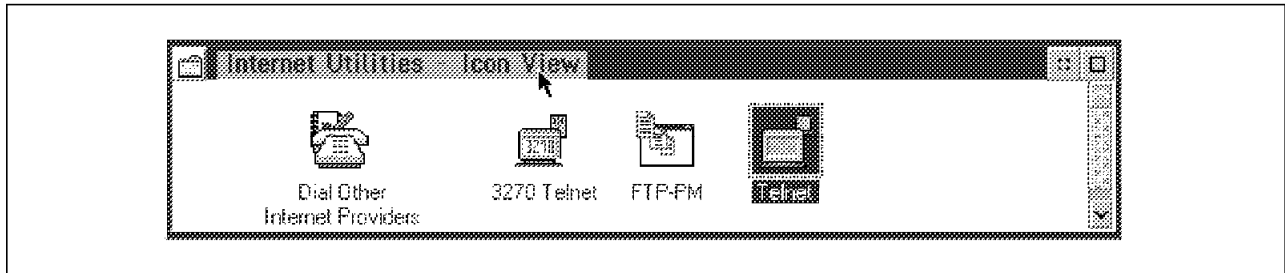
Figure 39. Internet Utilities Icon View

You will be presented with the IBM Dial Up for TCP/IP panel, as shown in Figure 40. Select the **Add Entry** icon to add a new service. When you have set up your entry, you will see your name, login ID and description. You then only have to click on the entry to dial your service provider.
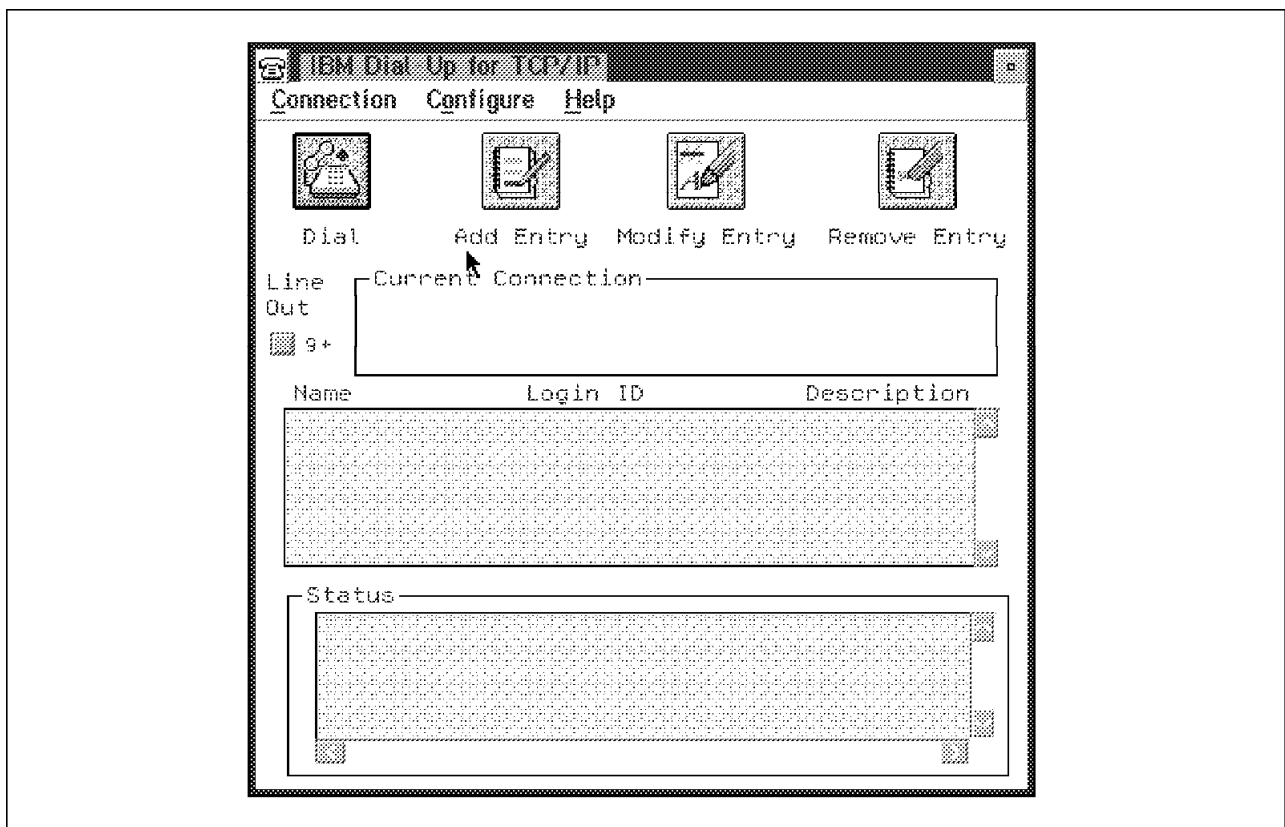
Figure 40. IBM Dial Up for TCP/IP

You must contact your service provider for the following details:

- Type of connection (SLIP or PPP).
- Your IP address (If dynamic you might have to enter 1.1.1.1).
- Your login ID and default password. You will have to change this password after you log in for the first time.
- The service provider's destination IP address.
- Netmask parameters (or leave empty if the default of no netmask will do). This will specify who you can contact on the local IP network.
- Your domain nameserver.
- Your host name (you can give this your own name).
- Your domain name, for example, ibm.net.
- Your news server.

- Your Gopher server.
- Your World Wide Web server.
- Your POP mail server, if your mail server supports the POP protocol.
- Your reply domain, if different from your domain name.
- Your mail reply ID, for example, emurphy@vnet.ibm.com.
- Your POP login ID and password. These are normally the same as your connection ID and password.

The login configuration screens are shown in Figure 41 through to Figure 44 on page 69.
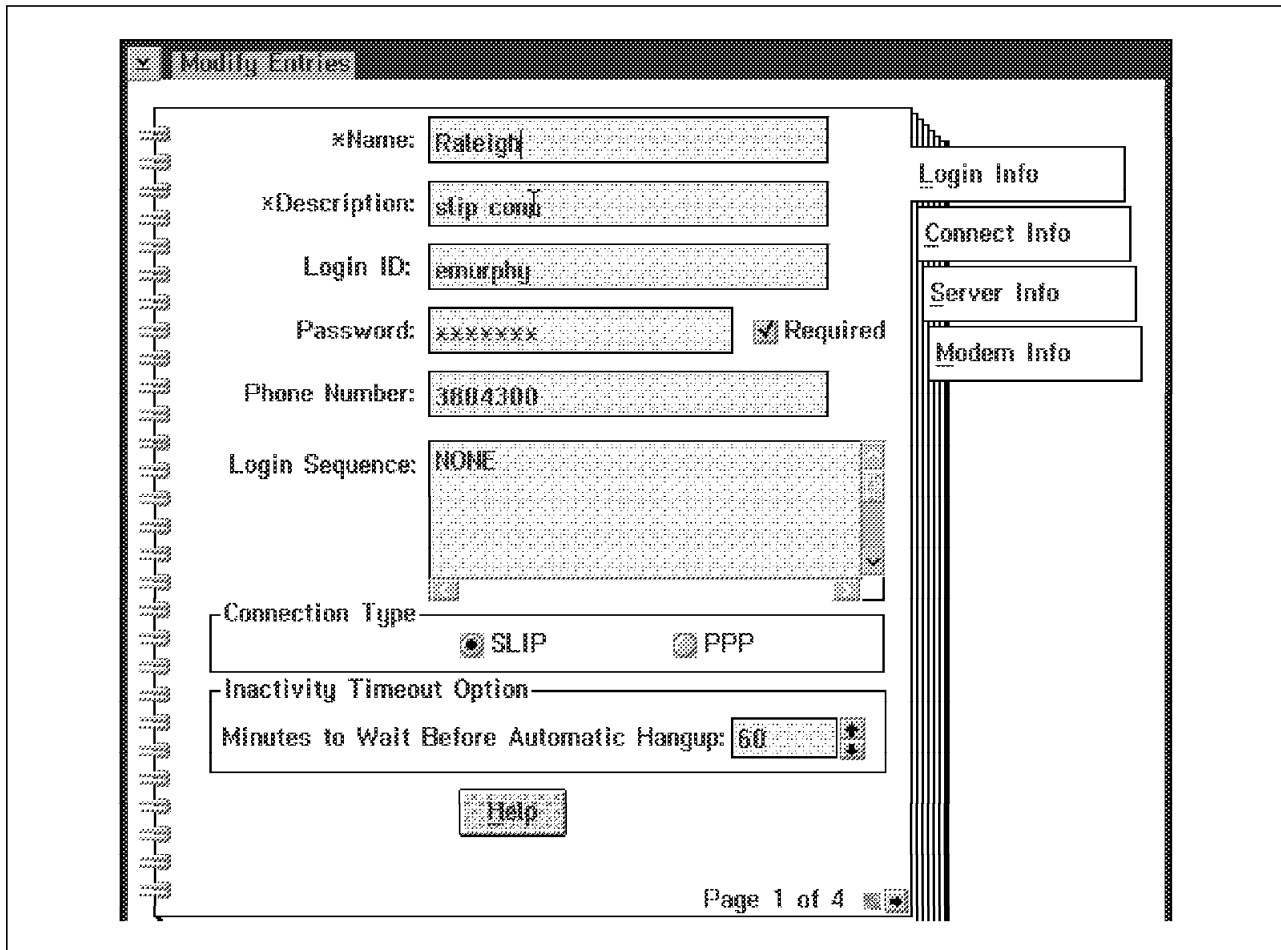
Figure 41. Login Info Configuration Screen
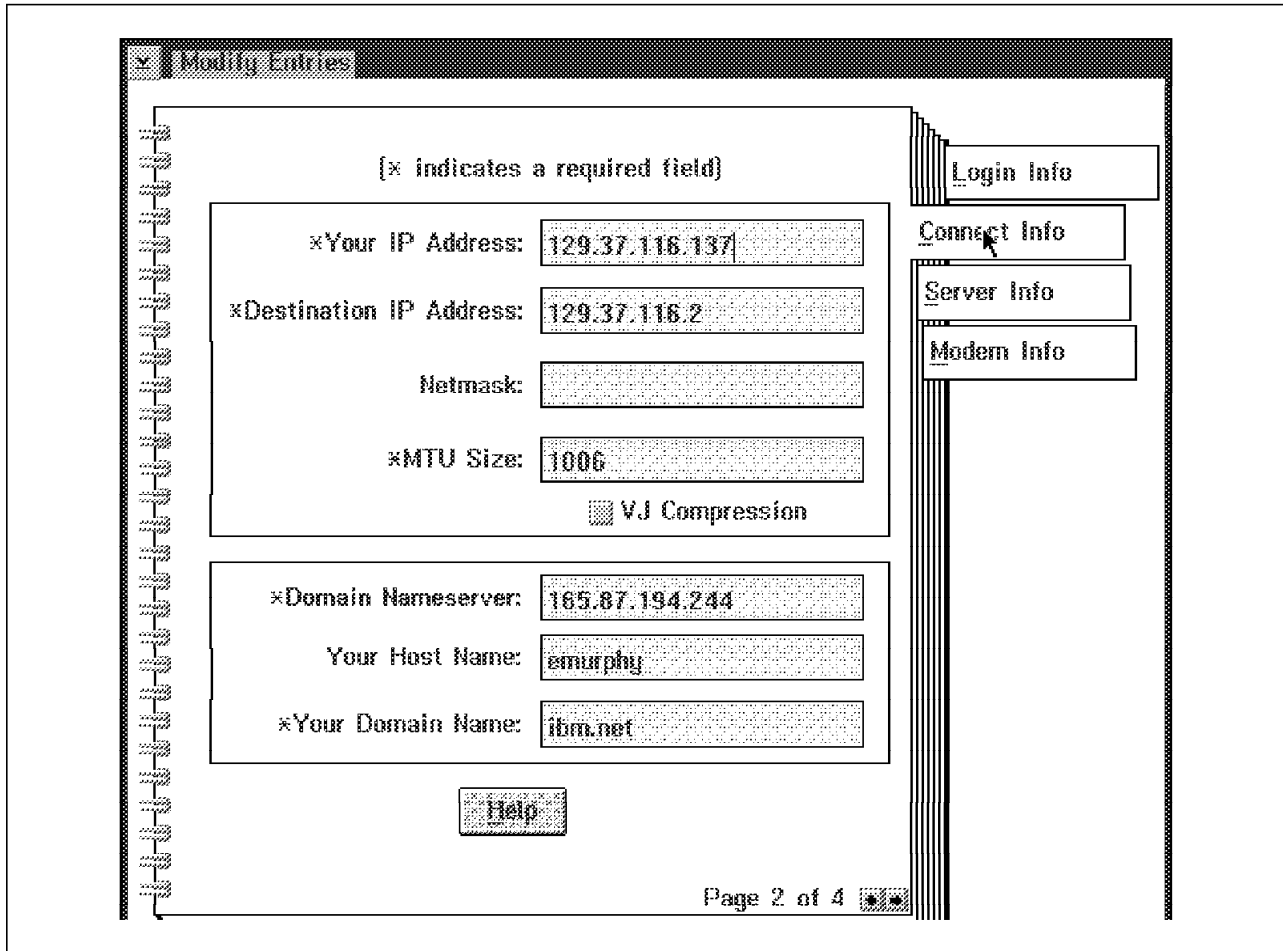
Figure 42. Connect Info Configuration Screen
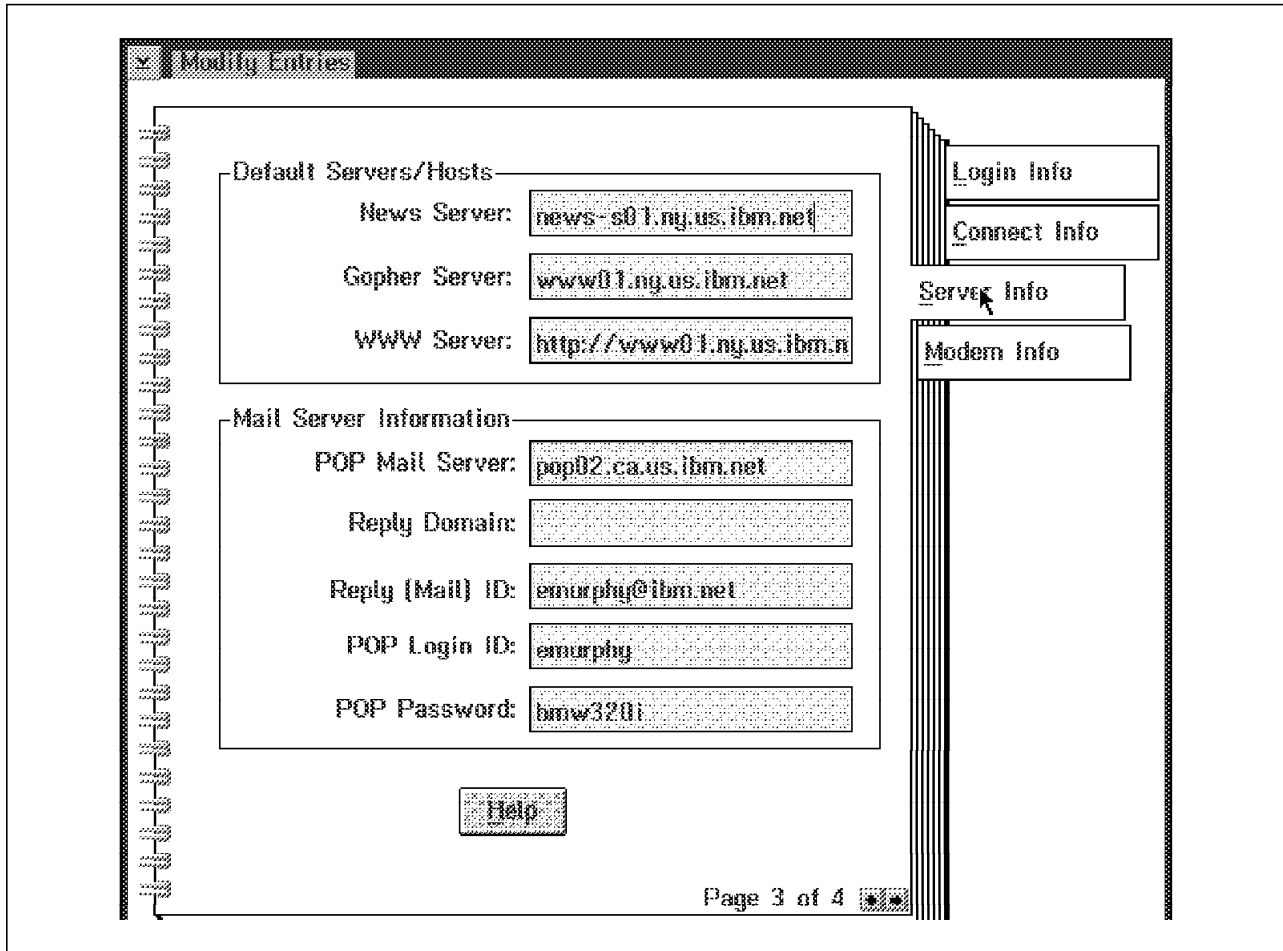
Figure 43. Server Info Configuration Screen
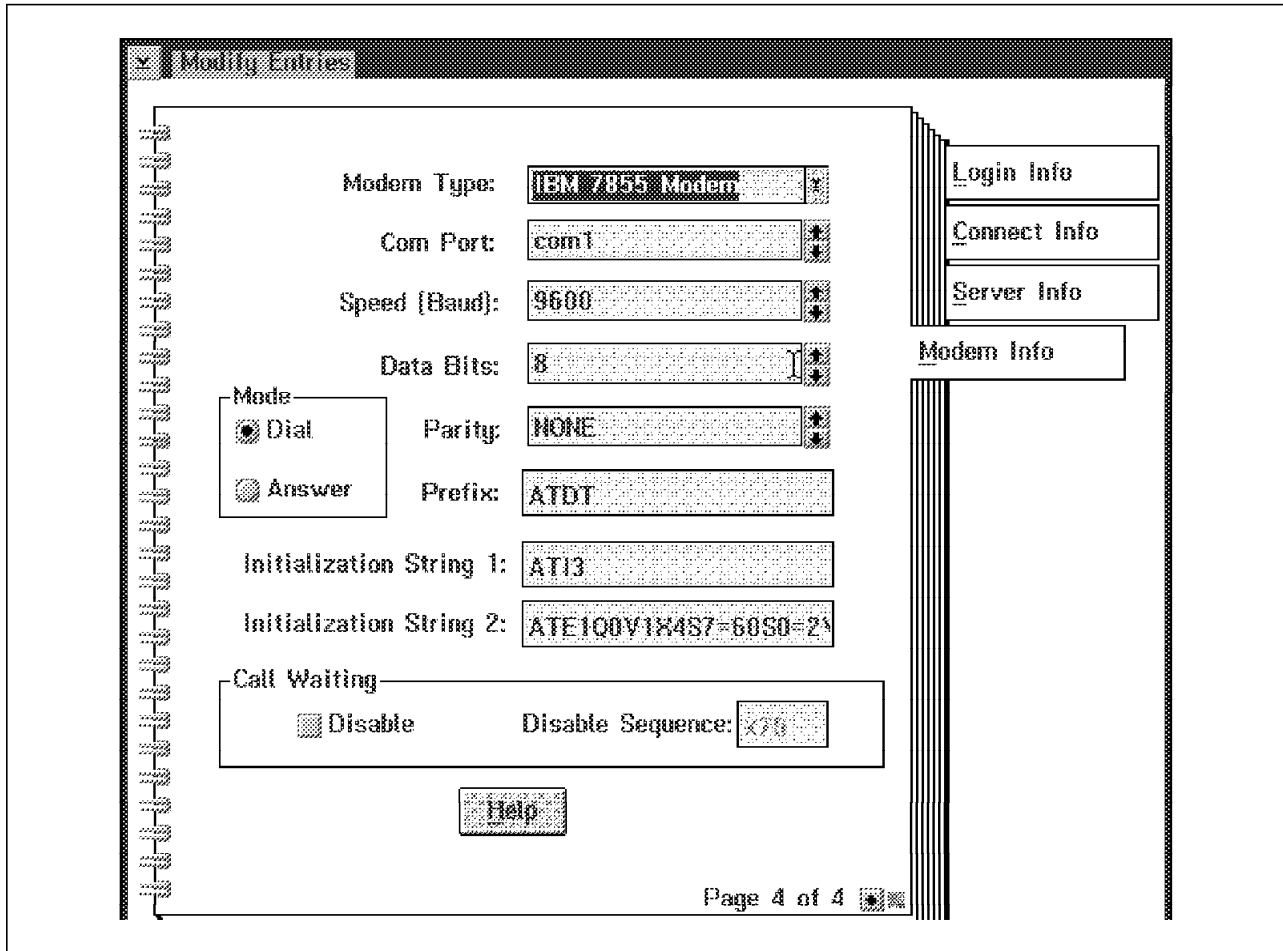
Figure 44. Modem Info Configuration Screen

The next time you log onto your service provider, you need only select the application you want to run, for example, IBM WebExplorer. You will see the screen shown in Figure 45. To connect to the Internet using another service provider select the **Dialer - IBM Internet** radio button. Then click on the **Connect** icon.
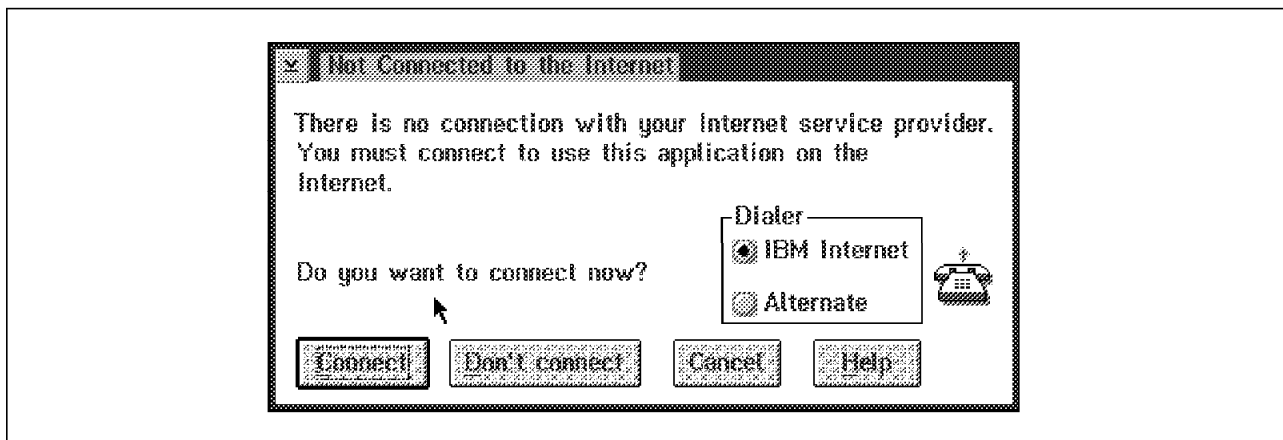
Figure 45. Connect to the Internet, Using Another Service Provider

You can now use the Internet connection tools. Refer to Chapter 4, "Internet Navigation Tools" on page 105 for more details on using these tools.

If you need to remove the Internet connection for Windows software, you will need to make changes to the windows startup files, autoexec.bat and config.sys files. Refer to Appendix M, "Removing IBM Internet Connection for Windows" on page 201 for more details.

3.5.1.9 Setting up an Internet Connection using TCP/IP V2.0
This section will describe connecting to the Internet using the IBM TCP/IP V2.0 for OS/2.

3.5.1.10 Product Overview
TCP/IP V2.0 for OS/2 gives an OS/2 user the following components:

- FTP, both client and server
- TFTP
- NewsReader/2
- ARP
- Telnet
- Tn3270
- Remote execution using REXEC and RSH
- Mail, both client and server and LaMail
- LPR client and LPD server for network printing
- SNMP Network management
- Routed IP routing
- Bootp, both client and server
- Talk, both client and server
- Ping
- Netstat
- Finger

To provide ordering flexibility, TCP/IP Version 2.0 for OS/2 is packaged in several kits. Following is a list of currently available kits:

- Base kit including LaMail
- Network File System kit
- Domain Name Server kit
- DOS/Windows Access kit
- Extended Networking kit
- NetBIOS kit
- Programmer's Tool kit
- X Window System Server kit
- X Window System Client kit
- OSF/Motif kit
- Applications kit

3.5.1.11 Memory and Disk Space Requirements
The memory and disk requirements are shown in Table 6 and Table 7.

Table 6. Fixed Disk Requirements for TCP/IP V2.0	
Functions	**Required Disk (MB)**
Base Kit	7.39
Online documentation	1.40
LaMail	1.90
NFS Kit	1.10
NFS TCP/IP CID	0.25
Library Reader	1.32
DOS/Windows Access Kit	0.56
WinSock Documentation	2.00
Extended Networking Kit (X.25 and SNA)	0.96
Programmer′s Toolkit	0.85
X Window System Server Kit (PMX)	11.36
X Window System Client Runtime Services	2.34
X Window System Client Programmer′s Kit	1.44
Domain Name Server Kit	0.75
NetBIOS Kit	0.11

Table 7. Memory Requirements for TCP/IP V2.0	
Functions	**Memory (MB)**
Base Kit	2.0
LaMail	1.30
NewsReader/2	1.50
SNMP	0.40
NFS Client	1.10
NFS Server	0.40
X Window System Server (PMX)	8.0
Domain Name Server	1.0
NetBIOS Kit	0.60
Each additional client accessing your workstation	2.0

The base OS/2 Warp system requires a minimum of 4MB of RAM to run.

3.5.1.12 Installing TCP/IP V2.0 for OS/2

If you are upgrading to TCP/IP V2.0 from a previous version you should make a backup of your ETC directory. If you are installing TCP/IP after installing the Internet Connection for OS/2, you will have to re-install your Interconnect software, as indicated in Appendix J, "OS/2 and Internet Connection Frequently Asked Questions (FAQ)" on page 191, Appendix A, "Removing a Prior Version of TCP/IP for OS/2" on page 161 and Appendix D, "Coexistence of TCP/IP V2.0 and Internet Connection for OS/2" on page 175.

The installation is covered in detail in the redbook *TCP/IP V2.0 for OS/2 Installation and Interoperability*, GG24-3531.

The following procedure should be followed:

1. Insert the first diskette of the Base kit in the disk drive.

2. Type the following command from an OS/2 window command prompt and press Enter.

   `a:>tcpinst`

3. Select the components for installation. For connection into the Internet, you need Base only. If you intended using WinSock-based applications from the WIN-OS/2 windows, you will need to install the DOS Box Kit and, optionally, the WinSock documentation.

4. You will be required to enter the following:

   • Base directory for installation
   • Hostname
   • IP address
   • Subnet mask

5. Click on **Install** to start the installation.

6. You will be prompted to check the installation directory.

7. The next step covers the installation process involved with the LAN Adapter and Protocol Support (LAPS). If you do not have the appropriate LAPS software installed, you will be requested to insert the LAPS disk which came with your TCP/IP software. The default LAPS software installed on OS/2 does not support the TCP/IP driver stack. You will need to install the LAPS software included with the TCP/IP software which includes the LAPS TCP/IP stack.

8. The LAPS software will be started. You must select **Configure LAN Transports** and select **Continue**.

9. Add the IBM TCP/IP protocol. Click on **OK** to continue.

10. Click on **Exit**.

11. Update the CONFIG.SYS and select **Continue**.

12. The software will now install. Click on **OK**.

13. You must now shut down your machine and reboot it.

14. You will have a TCP/IP directory structure as shown in Figure 46 on page 73.

15. You must set up TCP/IP to start automatically.

16. Click on TCP/IP configuration icon.

17. Set up your name servers as appropriate.

18. Shut down your workstation and reboot it.

```
                                  TCPIP
                                    │
       ┌──────┬──────┬──────┬──────┼──────┬──────┬──────┬──────┬──────┐
       │      │      │      │      │      │      │      │      │      │
      dll    etc    tmp    bin  samples  dos   help   umail  lamail doc dos
```
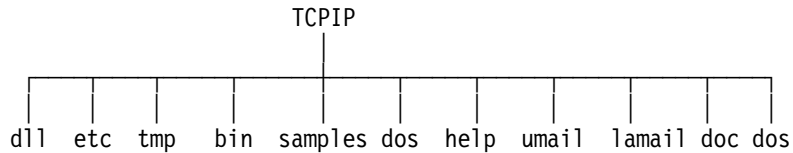
Figure 46. TCP/IP Directory Structure

Follow the steps listed in Appendix D, "Coexistence of TCP/IP V2.0 and Internet Connection for OS/2" on page 175 and 3.5.1, "OS/2 Warp V3.0 Internet Connection" on page 47 to install the Internet connection for OS/2.

You will be able to communicate on a LAN and Internet via your SLIP connection. You must connect on your LAN via IP addresses as the Internet Connection will override your default name servers.

3.5.2 Setting up an Internet Connection using IBM OS/2 Warp Connect

This chapter will describe setting up the IBM OS/2 Warp Connect software, which includes TCP/IP V3.0, to connect to the Internet as well as using TCP/IP to access a LAN concurrently.

3.5.2.1 Product Overview

TCP/IP for OS/2 V3.0 allows you to configure and enable a LAN interface or point-to-point (SLIP or PPP) connection to a TCP/IP network. Once connected, you can make use of the numerous client/server programs provided with TCP/IP for OS/2.

Once you have established a connection (either via a service provider or a LAN), you can use the programs provided to:

- Explore the Internet using the Internet Connection for OS/2

- Send electronic mail (UltiMail Lite)

- Access online bulletin boards (NewsReader)

- Access information on other computers (Telnet)

- Transfer files between your computer and other computers (FTP)

- Create quick-access icons (Templates)

The Internet Connection for OS/2 allows you to configure a connection that uses either the Serial Line Internet Protocol (SLIP) or the Point-to-Point Protocol (PPP). SLIP and PPP allow you to establish a link between your computer and your service provider through a modem. They are similar in purpose and performance; however, PPP is easier to configure. Some Internet service providers require the use of PPP. At present, IBM Internet Connection Services (Advantis) uses only SLIP, so Advantis users do not need to use PPP.

3.5.2.2 Hardware Prerequisites

For hardware prerequisites refer to 3.5.1.2, "Hardware Prerequisites" on page 48. In addition, for LAN connectivity, you will require a supported LAN adapter.

3.5.2.3 Memory and Disk Space Requirements

The disk and memory requirements are shown in Table 8 and Table 9 respectively.

Table 8. Fixed Disk Requirements for TCP/IP V3.0	
Functions	**Required Disk (MB)**
Base Kit	9.60
Feature applications (Internet Connections)	3.88
UltiMail Lite	4.57
DOS/Windows Access	1.75

Table 9. Memory Requirements for TCP/IP V3.0	
Functions	**Memory (MB)**
Base Kit	4.0

3.5.2.4 Installation

The installation program installs the Internet Connection for OS/2 and TCP/IP for OS/2 V3.0. In Figure 47 you are prompted to select an installation drive.
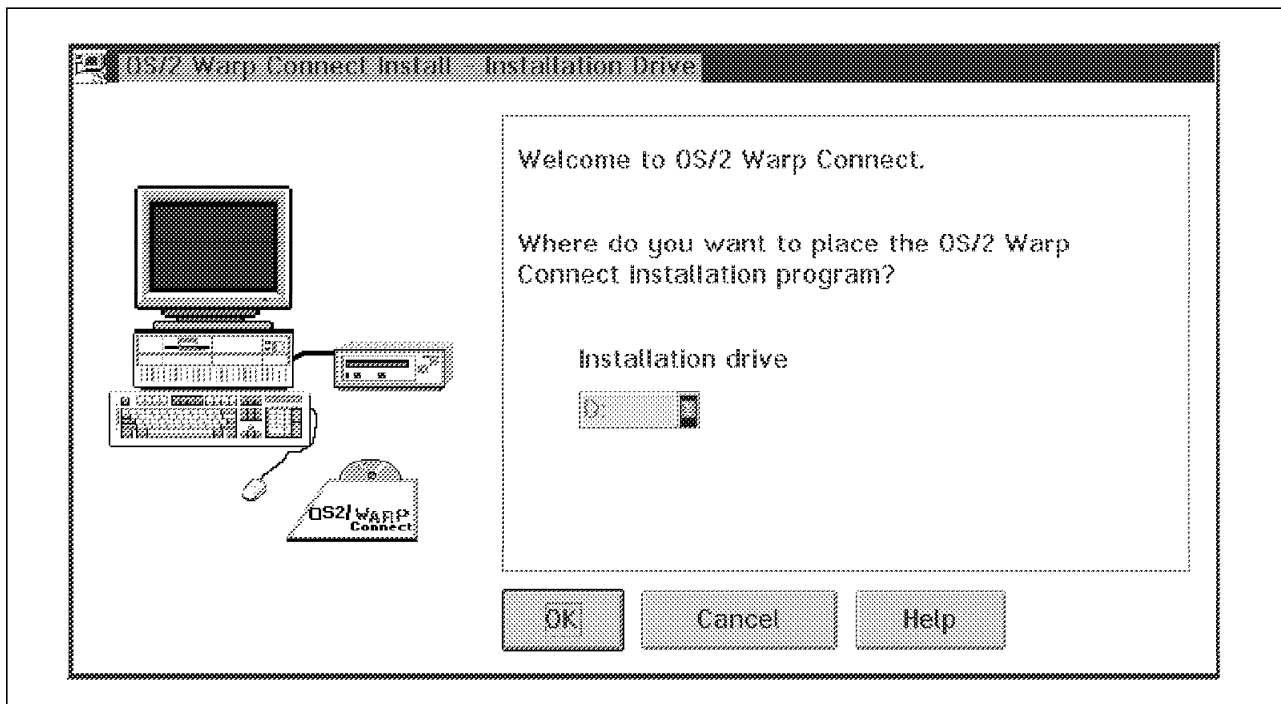
Figure 47. Installation Drive

You can do a local or a remote install. The remote install requires two disks and a LAN connection. You will be presented with the option shown in Figure 48 on page 75. If you do a remote install, the system will create two boot disks for you to use on the remote hardware. You must then reboot the remote workstation using the two disks. Do not end your local installation session, as the two work

hand in hand. The remote installation does not require an IP address, as the program will find the installation workstation at a device level.
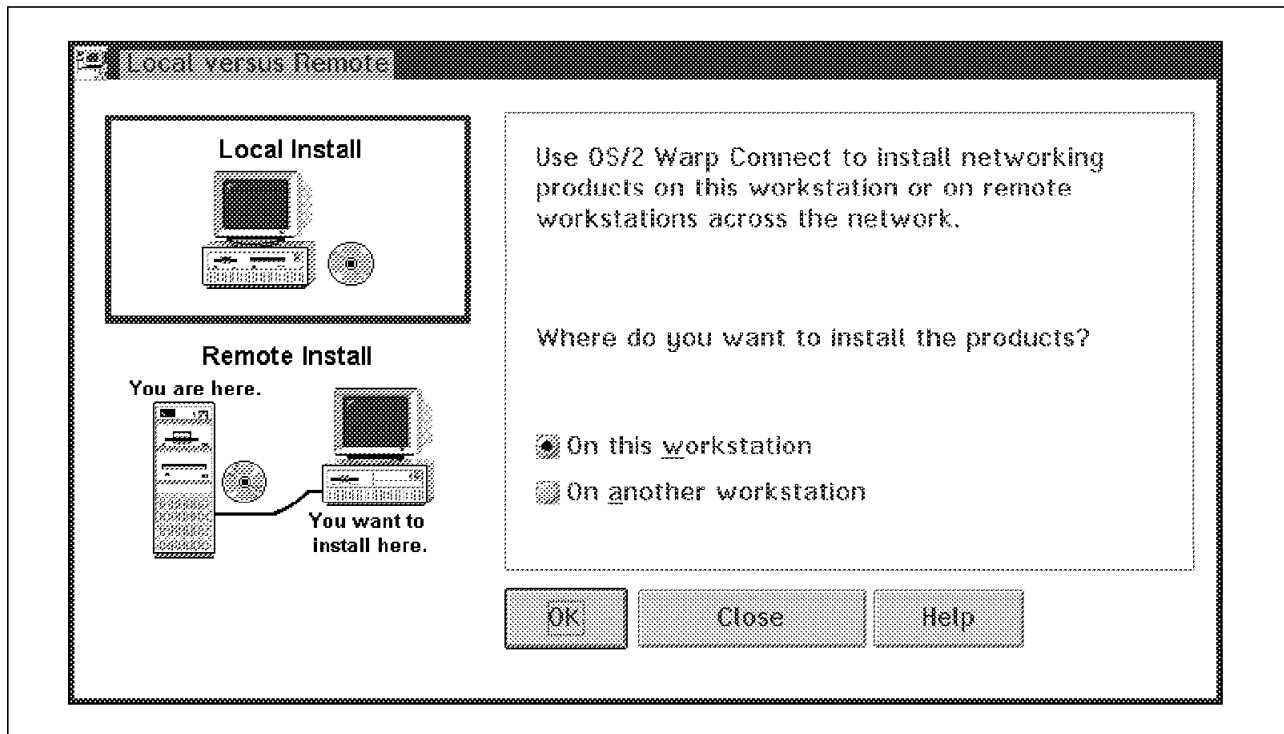
Figure 48. Remote or Local Installation

You can do an easy or advanced installation. Select the easy default configuration, as shown in Figure 49 on page 76. The advanced installation will allow you to select advanced features, manually alter the configuration files and override the merge configuration files.
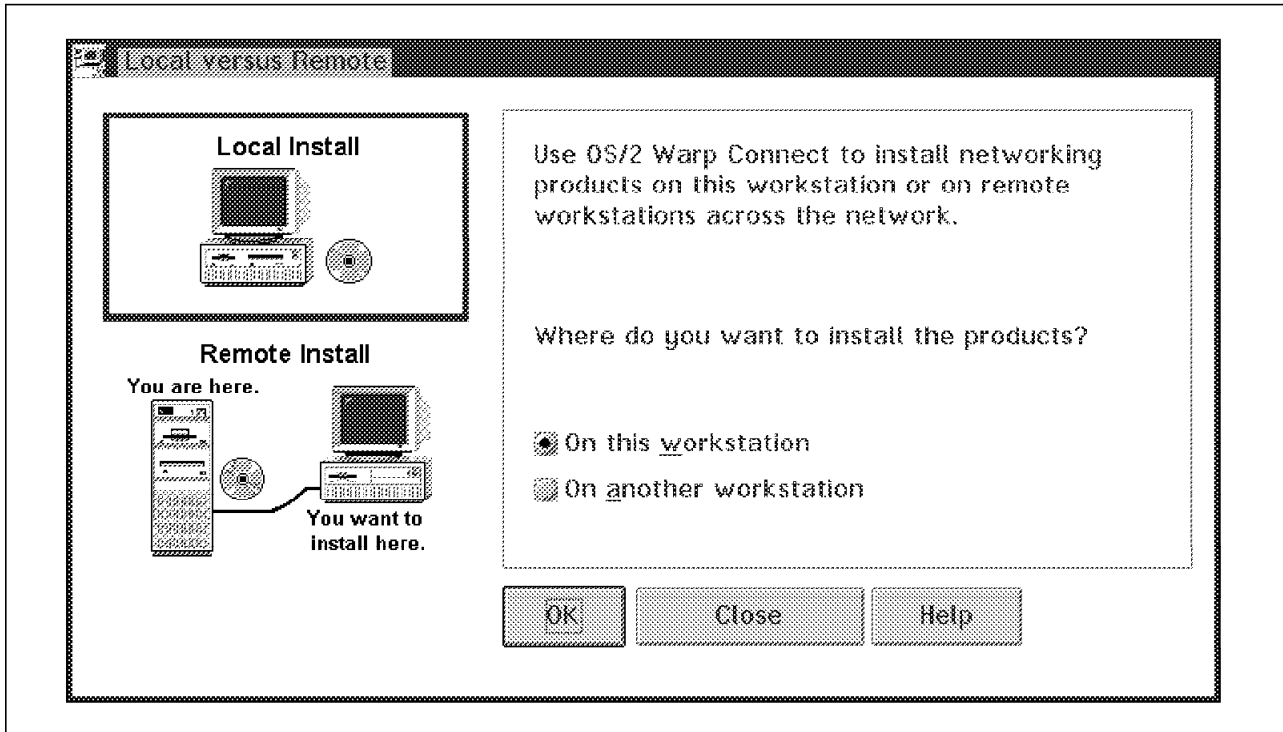
Figure 49. Easy or Advanced Installation

The LAN connection software includes IBM Peer for OS/2, Novell LAN support and TCP/IP for OS/2. You do not need to install the IBM Peer for OS/2 and Novell Netware Client for OS/2 software if you require TCP/IP access only. Select **No, do not install** as shown in Figure 50 and Figure 51 on page 77.
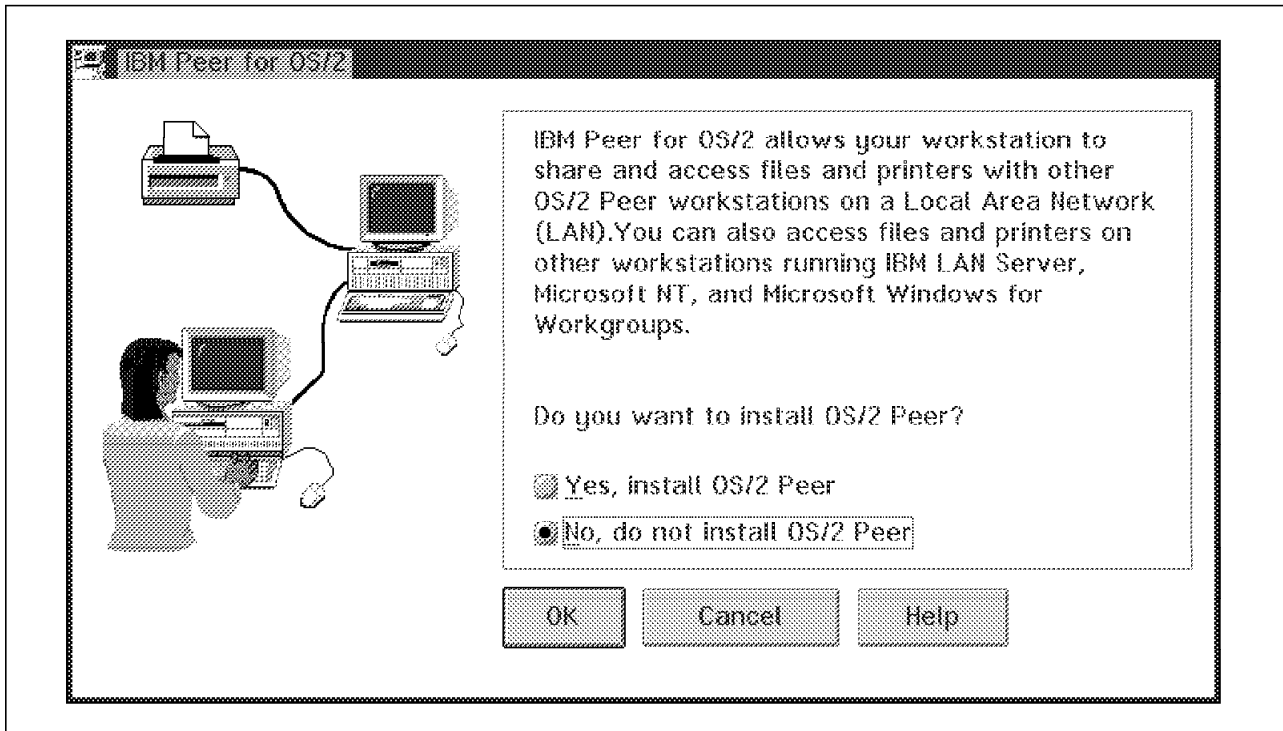
Figure 50. Do Not Install IBM Peer for OS/2
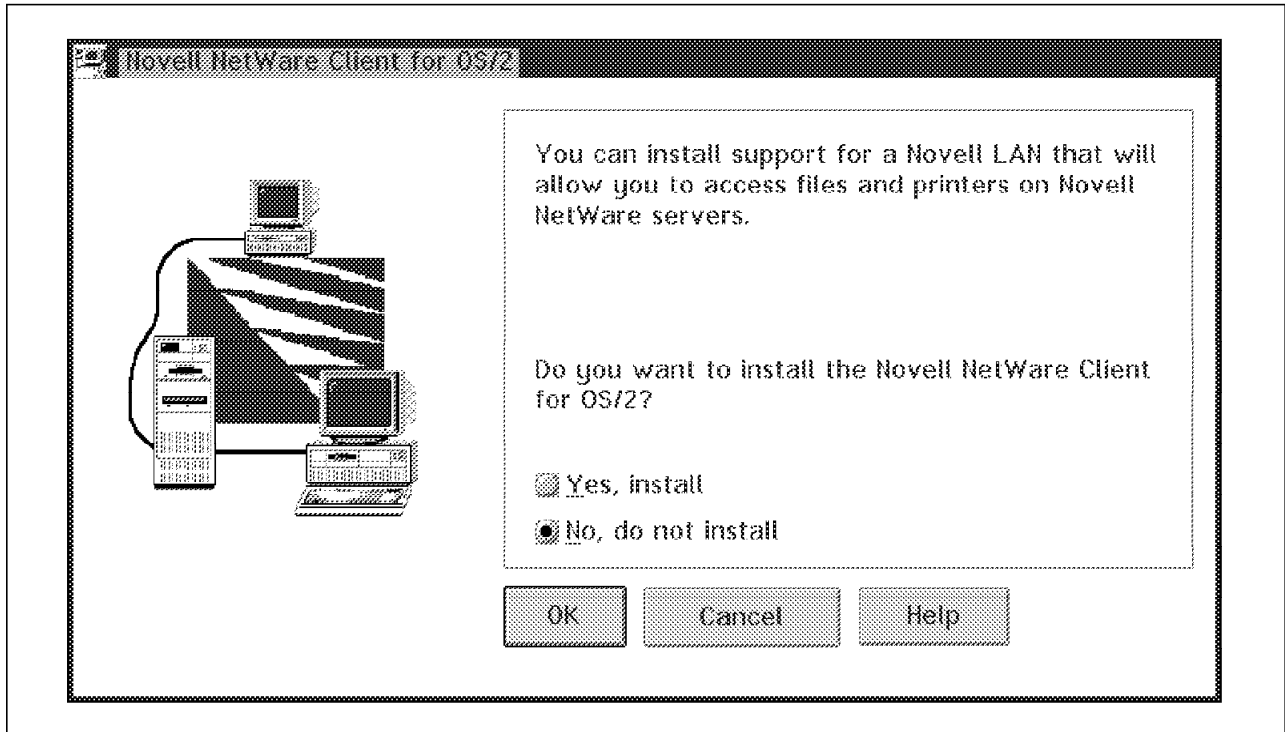
Figure 51. Do Not Install Novell Netware Support for OS/2

The installation program asks if you wish to specify the software that you wish to install. Select the TCP/IP for OS/2 radio button, as shown in Figure 52.
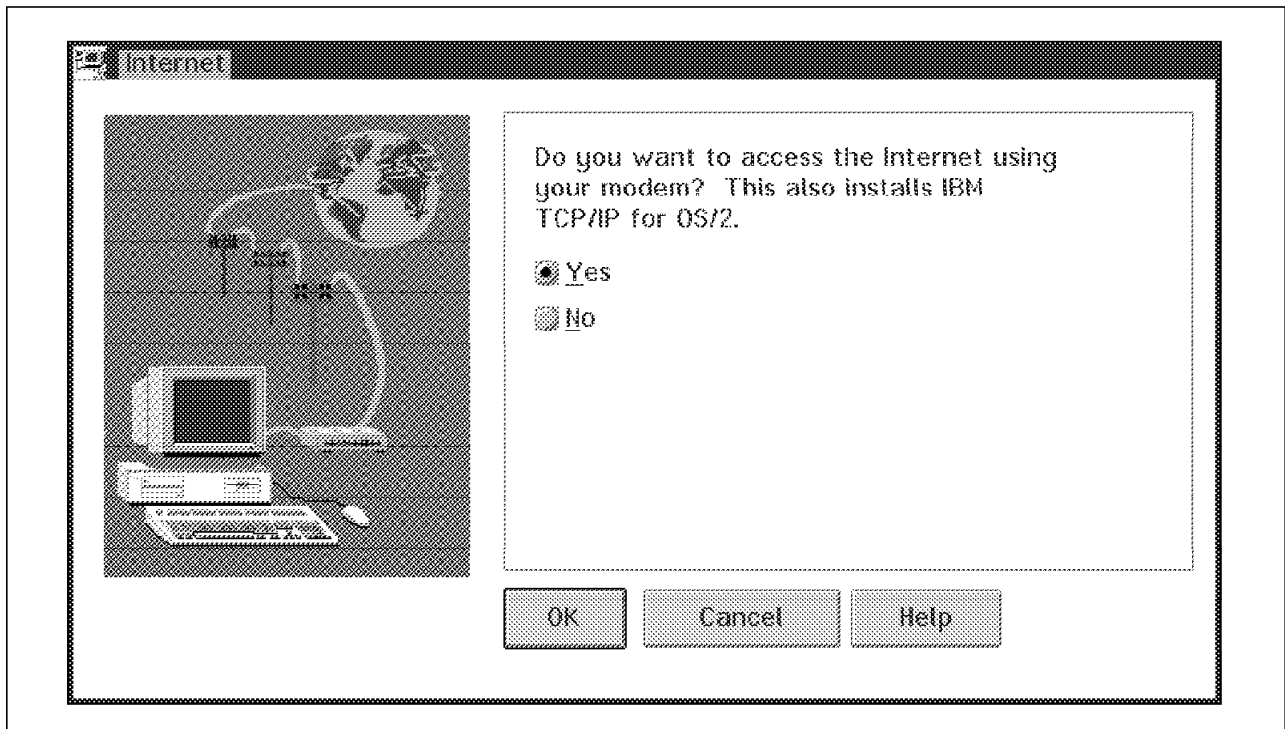
Figure 52. Install TCP/IP for OS/2

You must select an adapter which you will use as your LAN adapter. If you are using a serial PPP or SLIP connection, you will need to install these manually. The system will use your previously defined adapters as default selections, as shown in Figure 53 on page 78.
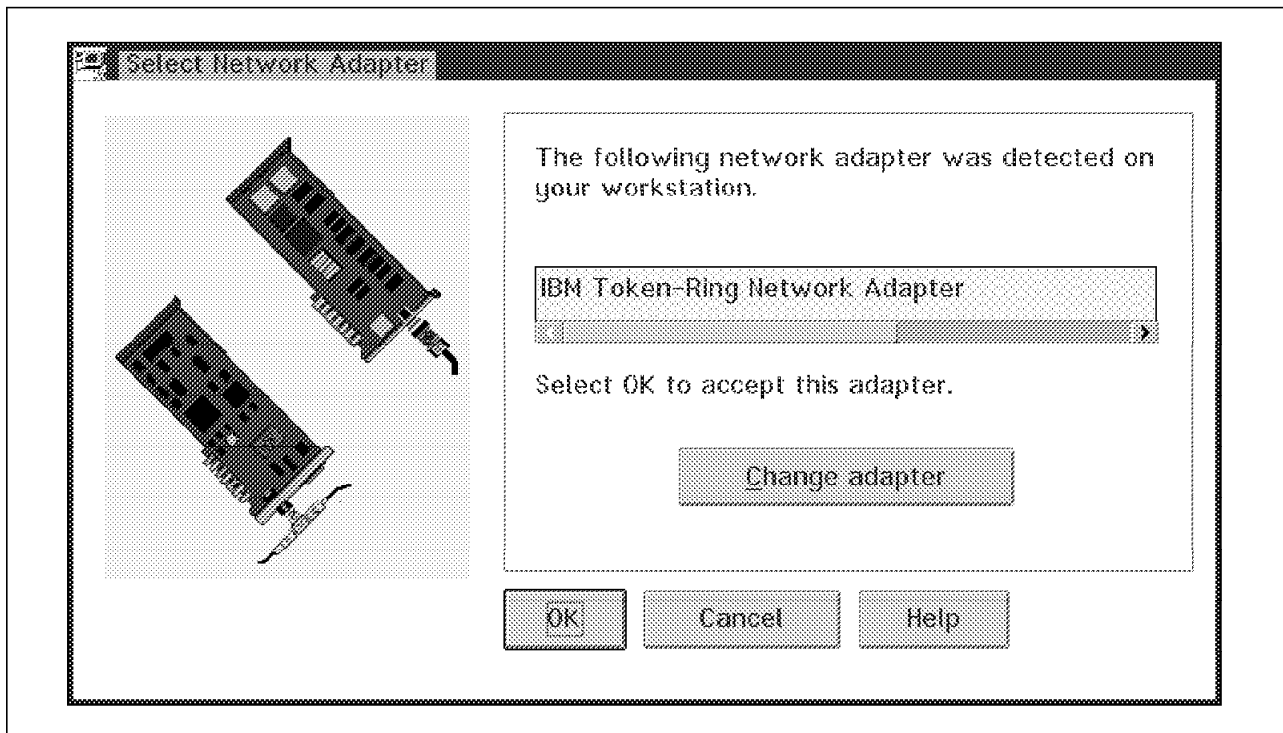
Figure 53. Select Network Adapter

You can change your network adapter, as shown in Figure 54 on page 79, which includes a list of supported MPTS adapters.
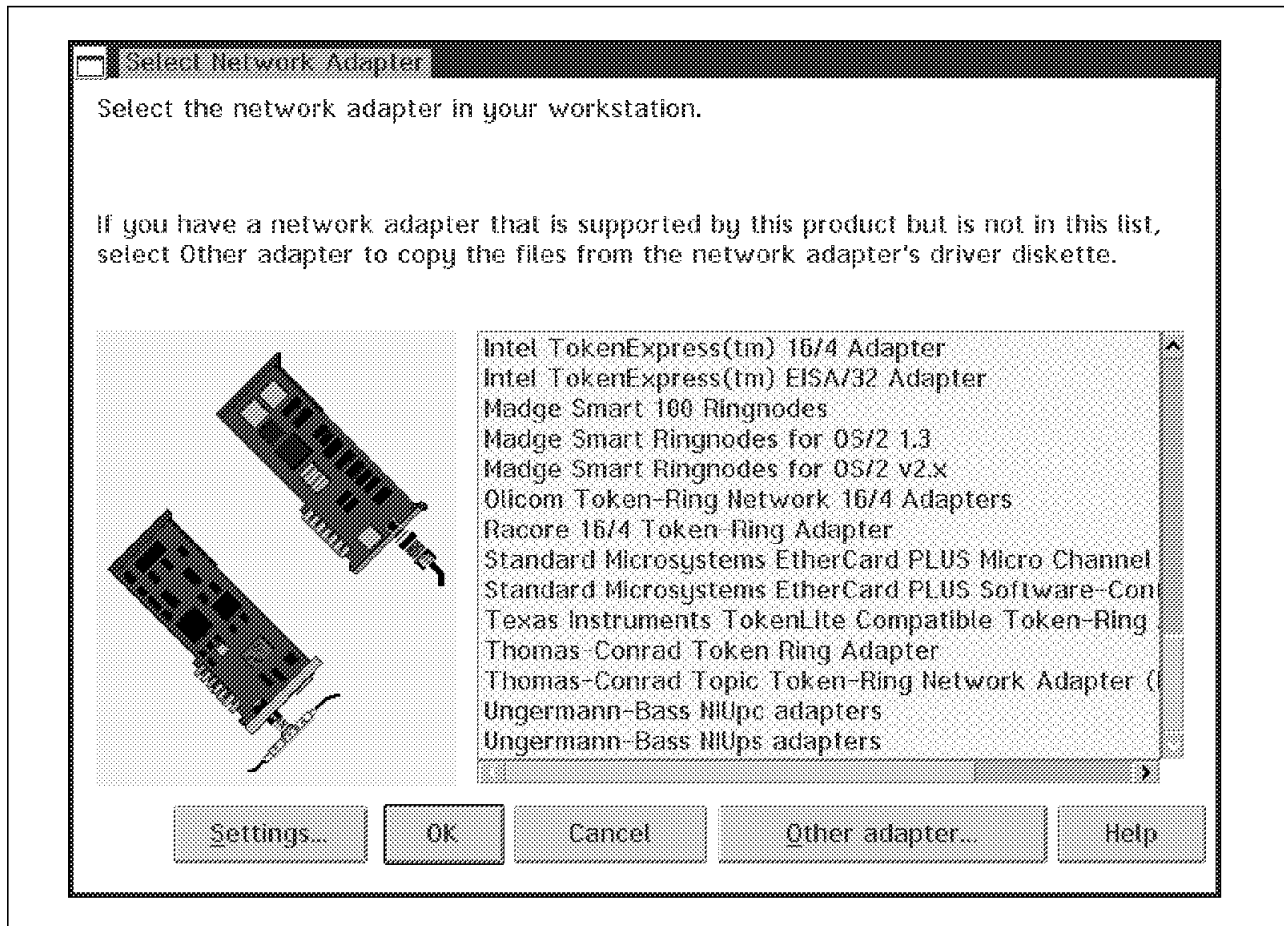
Figure 54. Select Another Network Adapter

The installation program will install the MPTS software. It creates a TCP/IP icon folder.

If you choose to install additional TCP/IP for OS/2 kits, such as the IBM TCP/IP for OS/2 X Window System Server kit, you must restart your workstation after you install each additional kit.

You must have Multi-Protocol Transport Services (MPTS) installed. It contains the TCP/IP protocol stack and the sockets libraries needed to run TCP/IP for OS/2 Version 3.0. To install MPTS during the installation process, select the MPTS page from the Options notebook. You need to ensure that Run MPTS is checked. (Note: you can ignore the description on this page indicating that MPTS is only needed for accessing the LAN. Dial-only connections also require MPTS.)

If you install TCP/IP for OS/2 Version 3.0 on an existing TCP/IP Version 2.0 for OS/2 system, the installation program reads your current CONFIG.SYS file to see if an ETC environment variable has been defined. If it is defined, TCP/IP uses this specified directory path to update new ETC files, even if you installed TCP/IP for OS/2 Version 3.0 in a different directory.

You should note:

• Since existing ETC files are not replaced, you should compare your ETC files with the new files found in the SAMPLESETC subdirectory and include any modifications.

- New PROTOCOL and SERVICES files may be needed for new applications delivered with TCP/IP for OS/2 Version 3.0. Since these files are installed in the MPTN\ETC subdirectory, you may need to move these files to the directory specified by the ETC environment variable.

- If you installed TCP/IP for OS/2 Version 3.0 in a different directory, your SETUP.CMD file must be copied to the MPTN\BIN subdirectory and you will also need to update your TCPSTART.CMD file to point to the correct path for SETUP.CMD.

- If you use the Network File System Version 2.0 kit with TCP/IP for OS/2 Version 3.0 to set up a NFS server, you must apply PN69745.

- To use the Domain Name Server (DNS) Version 2.0 kit with TCP/IP for OS/2 Version 3.0, you must apply PN69747.

- You also need to copy the ETCNAMEDB subdirectory to your MPTNETC subdirectory. ETCNAMEDB is a subdirectory of the directory in which you installed TCP/IP, usually TCPIP\ETC\NAMEDB, and contains the NAMED.BT, NAMED.CA, NAMED.DOM, and NAMED.REV files. To start a name server using TCP/IP for OS/2 Version 3, these files must reside in the MPTNETC subdirectory.

- To install the IBM TCP/IP for OS/2 X Window System Server kit with CSD UN68122 loaded on the same CID server, you must:

  1. Select the X Window System Server for installation. (You will receive a return code of 2 from the installation.)

  2. Delete X11\MISC.

  3. Rename X11\MISCPCF to X11\MISC.

  4. Install CSD UN68122.

     Alternatively, you can apply PN70086.

- If you plan to use additional TCP/IP for OS/2 kits with TCP/IP for OS/2 Version 3, you may notice a return code of 14 or 15 from TCPDSKTP.EXE during installation. You can ignore these return codes. However, after restarting your workstation, enter the `ifolder` command at an OS/2 command prompt. This will update and correct your desktop folders.

- To create or modify your network interface using the optional `sendbuf`, `recvbuf`, `segsize`, or `use576` network interface parameters, you need to add additional ifconfig statements to a TCPEXIT.CMD autostart file. These parameters can be used to tune your TCP/IP system for improved performance. You can create this file using a system editor. TCPEXIT.CMD should be stored in the TCPIP\BIN subdirectory. You cannot use the Configuration notebook to co nfigure these network interface parameters. (See the ifconfig command in the *TCP/IP for OS/2 Command Reference* for descriptions of these parameters.)

- To aid in connecting to workstations on your LAN while also connecting to the Internet, the configuration notebook creates a default net route automatically when a default router is found. However, if you delete a default router, you must also delete the network route before you can add another default router.

- If you are using UltiMail with Post Office Protocol (POP), a trap will occur if you close your in-basket. To work around this problem, keep your in-basket open. If you do want to close your in-basket, close the entire UltiMail

session to avoid the trap. (A fix will be provided by IBM. To request this fix, contact IBM Service at 1-800-237-5511.)

- If you are using an IBM ThinkPad with PCMCIA device driver support, and you install TCP/IP for OS/2 Version 3.0, you need to edit your CONFIG.SYS file after installation. Before rebooting your machine, verify that the following statements are at the bottom of the file:

```
DEVICE=<PATH>=$ICPMOS2.SYS
DEVICE=<PATH>=IBM2SS01.SYS /S0=2
DEVICE=<PATH>=ICRMU01.SYS
```

After installing the TCP/IP software, you must run select the TCP/IP configuration icon, as shown in Figure 55.
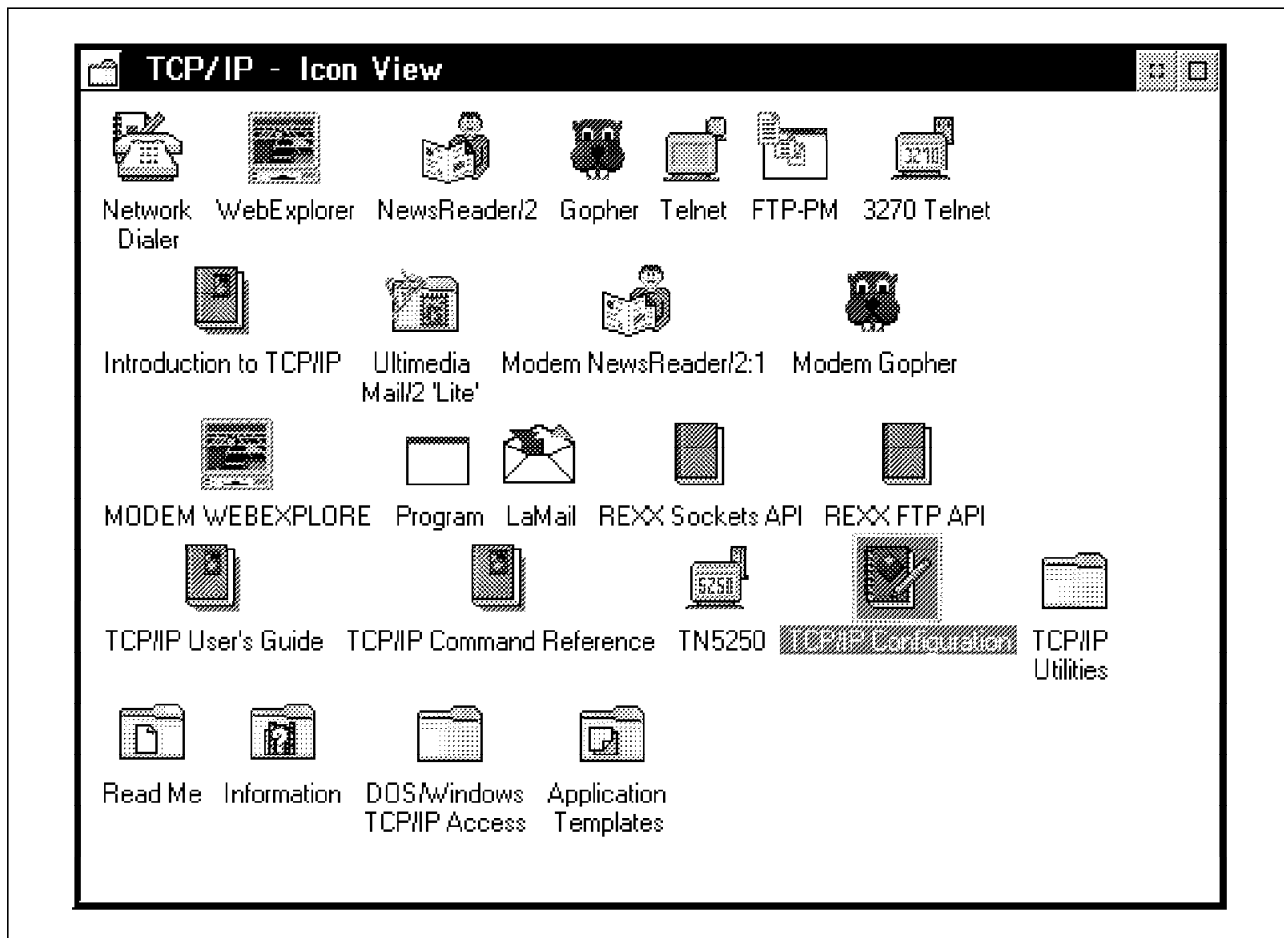
Figure 55. TCP/IP Configuration

You will be presented with screens shown in Figure 56 on page 82 through to Figure 61 on page 87. You must enter the appropriate information into each of the shown locations.
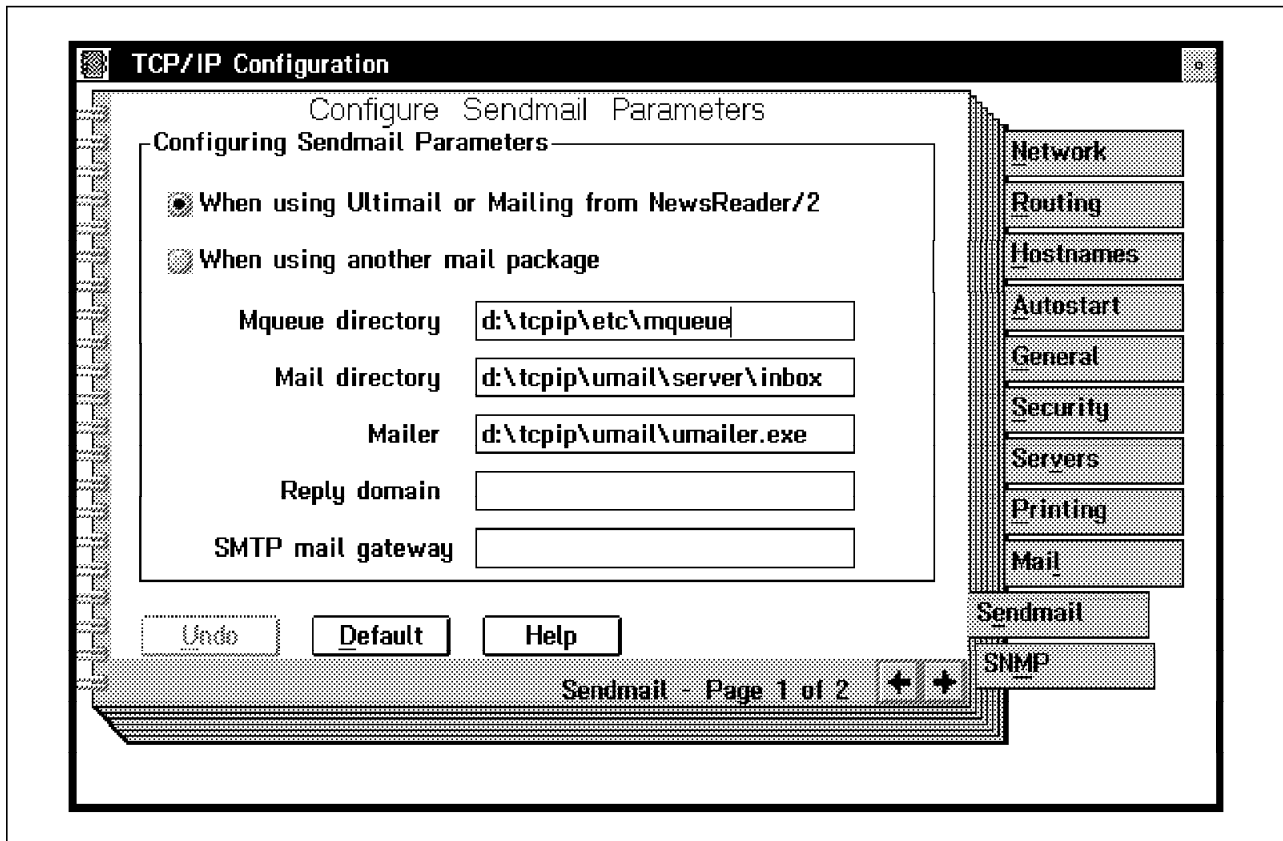
Figure 56. TCP/IP Mail Configuration
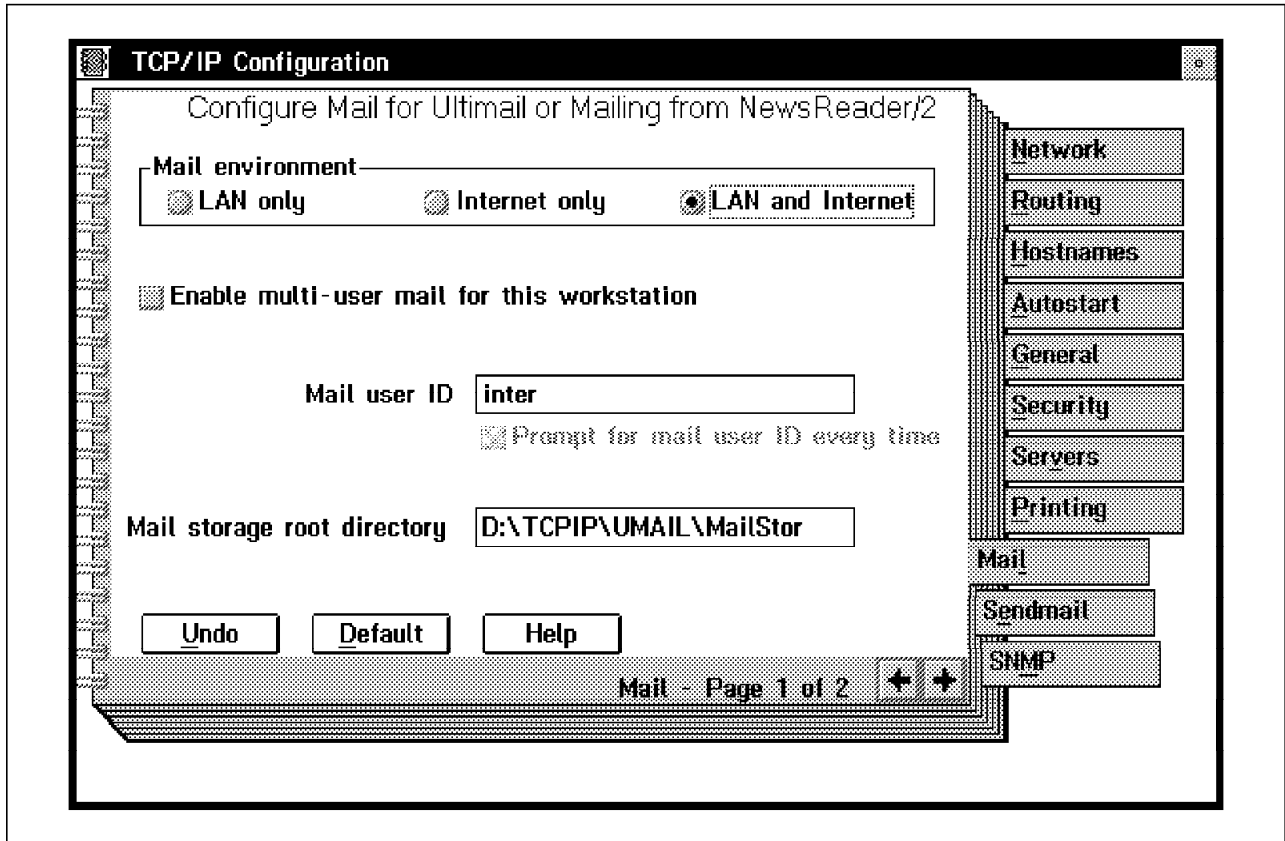
Figure 57. TCP/IP UltiMail Configuration
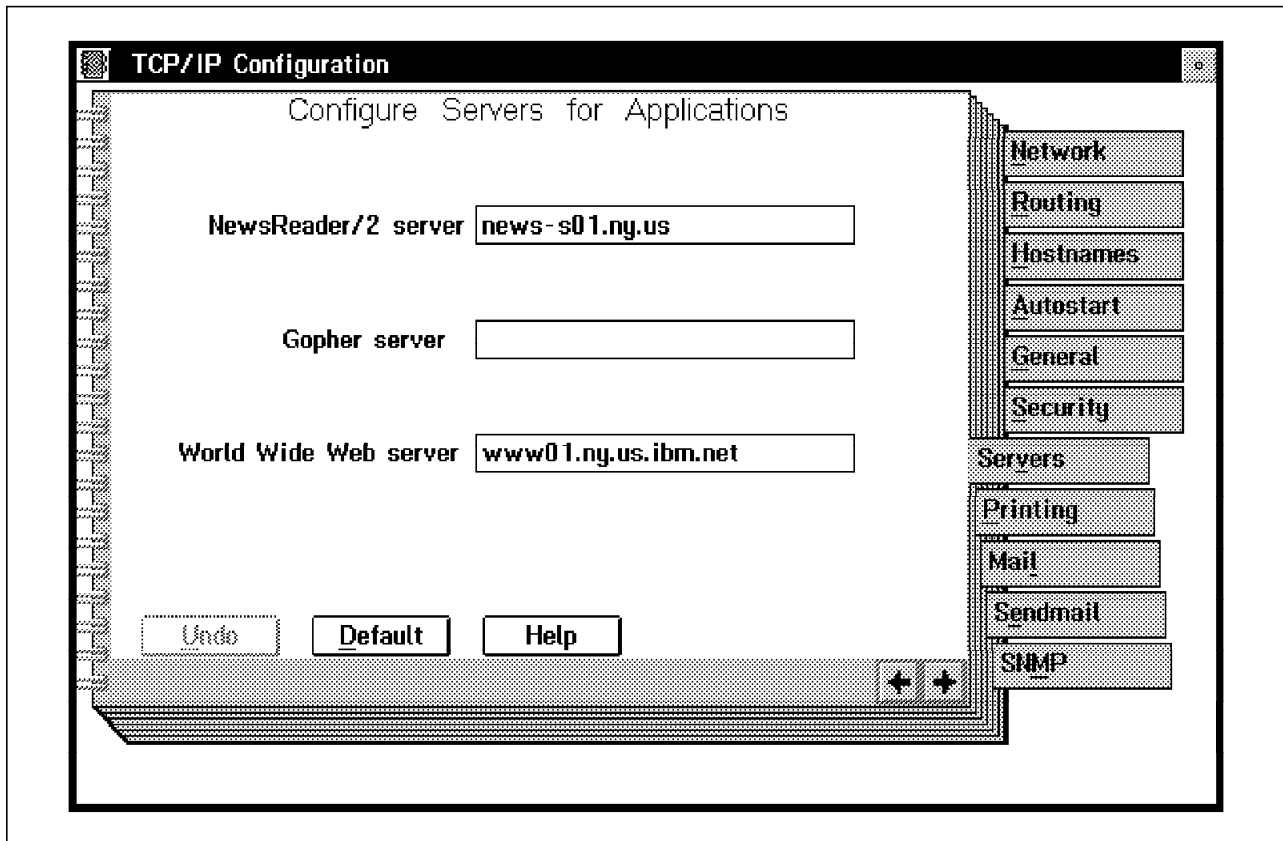
Figure 58. Configure Servers for Applications
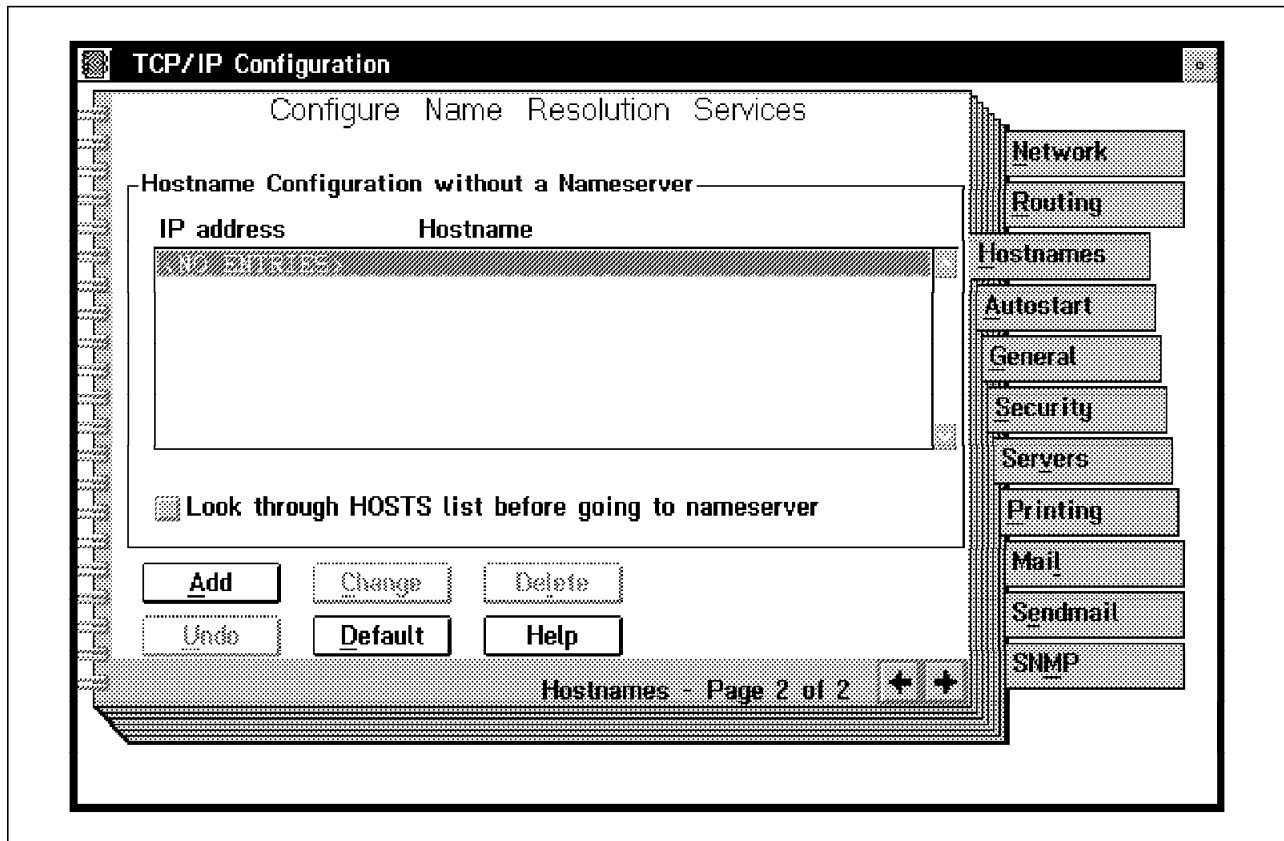
Figure 59. Configure Name Resolution Services

To enter the Routing menu, simply click on the **Routing** selection. The Configuration will automatically add both a default route and a NET route, as shown in Figure 60 on page 86.
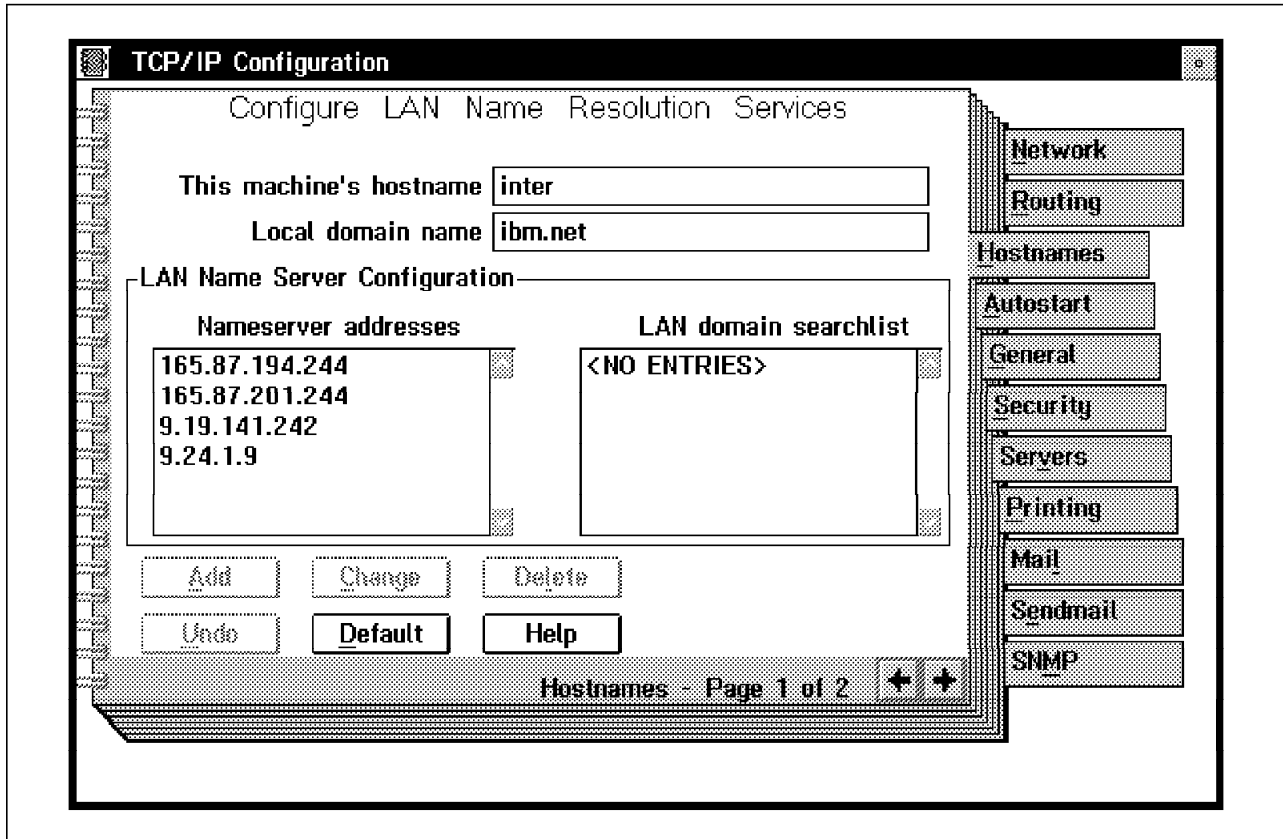
Figure 60. Configure Routing Information
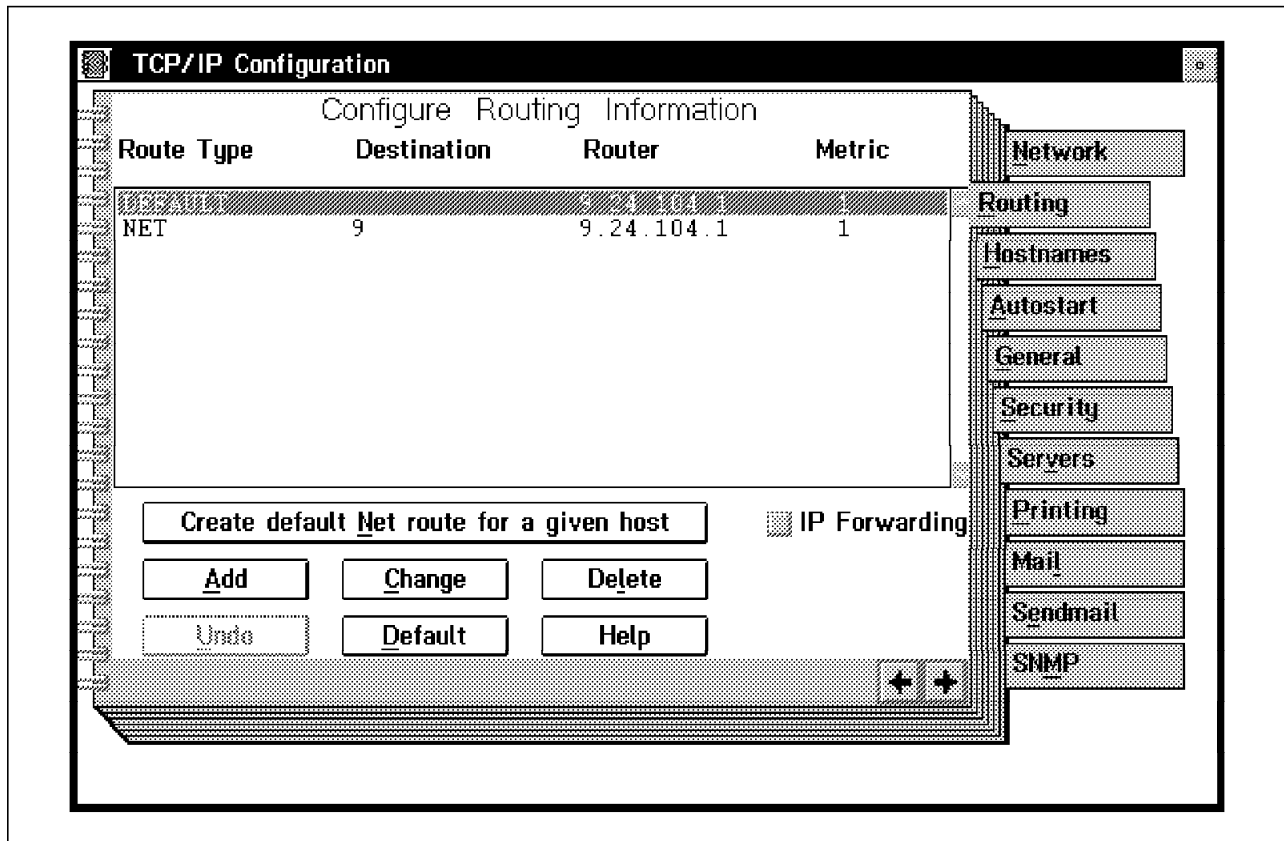
Figure 61. Configure Network Information

You must now reboot your workstation to enable your configuration changes.

By using the IBM Internet Connection for OS/2, in conjunction with a service provider such as Internet Connection Services, you can gain access to the Internet.

Simple installation and automatic network connection and registration make accessing the Internet easy for users at all levels of experience. Easy-to-use graphical interfaces mask the traditional network complexities, allowing you to focus on the information and services that you want rather than spending time learning the nuances of networking.

3.5.3 Registering with a Service Provider

After you have installed the Internet Connection for OS/2, you must register with and connect to a service provider.

To use Internet Connection Services, the default provider, select any application icon in the Internet Connection for OS/2 folder. When you are asked if you want to connect to the Internet, select Connect. The registration process will begin.

After registration is complete, a connection will be established automatically and the selected application will start. You only need to register once. The next time you select an application before a connection has been established, you will again be asked if you want to connect to the Internet, however, you will not have to register again.

To use another service provider, select the **IBM Dial Up for TCP/IP** icon in the Internet Utilities folder of the Internet Connection for OS/2 folder. You will need to provide some additional configuration information such as the provider's phone number, a subnet mask, and default servers - all of which are supplied to you by your service provider.

3.5.4 Setting up IBM Internet Connection for Windows

This section will describe setting up the IBM Internet Connection for Microsoft Windows.

3.5.4.1 Product Overview

The easy-to-use graphical interfaces in the IBM Internet Connection for Windows mask the traditional network complexities. You are free to focus on the information and services that you want. By using the IBM Internet Connection for Windows, along with an Internet service provider, you can get to the resources on the Internet. The following programs are included with the IBM Internet Connection for Windows:

- WebExplorer Mosaic. Explore the World Wide Web and browse documents that include links to graphics, sound, and video, as well as links to other related documents to fully explore the subjects that interest you on the World Wide Web. Now you can get the information that you have heard about, along with electronic books, free software, recipes, and even the latest weather reports.

- Mail. Send electronic mail and correspond with people all over the Internet. You can easily create, send, and receive electronic mail.

- Gopher. Browse the Internet, find, display, and transfer information that is available on Gopher servers on the Internet.

- NewsReader. Share information with other people in the various newsgroups on the Internet. Newsgroups have facts, opinions, and information on almost any subject.

- FTP. Easily transfer files between your computer and other computers running FTP servers on the Internet.

- Viewer. Display the images that you find on the Internet. You will be able to view the latest weather maps, street maps, pictures of tourist attractions, photographs of people, and even fine art.

- Telnet. Log in to other computers all over the Internet to get to information and programs.

- Setterm. Easily configure the fonts and colors for your terminal emulator session.

- Ping. Perform a simple echo connectivity test to another host on the Internet.

- TCPCheck. Check Your Installation and Configuration. Test whether the Internet Connection is installed properly and whether there are any problems with the connection to your service provider.

- Archie. Search the Internet for the programs, pictures, and documents you want. Then have them sent to your computer with the click of a button.

3.5.4.2 Prerequisites

You will need the following hardware and software to install the product:

- An IBM or fully-compatible personal computer with a 386 or 486 microprocessor or higher

- At least 4MB of memory

- 11MB of free space on a hard drive

- A diskette drive

- A modem, preferably at least 9600 baud

- DOS Version 5.0 or later

- Microsoft Windows Version 3.1X or Windows for Workgroups 3.1X

3.5.4.3 Installation

Before you can use this program, you need to:

1. Install the Internet Connection for Windows (including TCP/IP connection.
2. Select and register with a service provider. This is covered in 3.5.1, "OS/2 Warp V3.0 Internet Connection" on page 47 and 3.1, "Service Providers" on page 34.
3. Connect to your service provider. This is covered in 3.5.1, "OS/2 Warp V3.0 Internet Connection" on page 47.

Make sure that you have the necessary hardware and software before you begin installation.

1. Add SHARE.EXE to the AUTOEXEC.BAT file (after the PATH statement and before the WIN statement) and reboot.
2. Insert the product diskette 1 into your diskette drive A.
3. Select **File** from the Windows Program Manager menu bar.
4. Select **Run** and type in A:\SETUP. (Substitute the letter for your diskette drive if it is different from A:) Click on **OK.**
5. Follow the directions displayed on your screen to install the program. Use the quick installation if you currently have no Internet protocol programs on your computer. If you already have another Internet protocol program that is WinSock-compliant installed on your machine, you may want to install only the latest applications. The installation program will add the following to your CONFIG.SYS file.

   ```
   device=c:tcpdosbindostcp.sys
   ```

   The program will modify your AUTOEXEC.BAT file with the following commands:

   ```
   path c:tcpdosbin
   set etc=c:tcpdosetc
   call iicstart.bat
   ```

To install the software, select the program manager and use the file run option, as shown in Figure 62 on page 90.
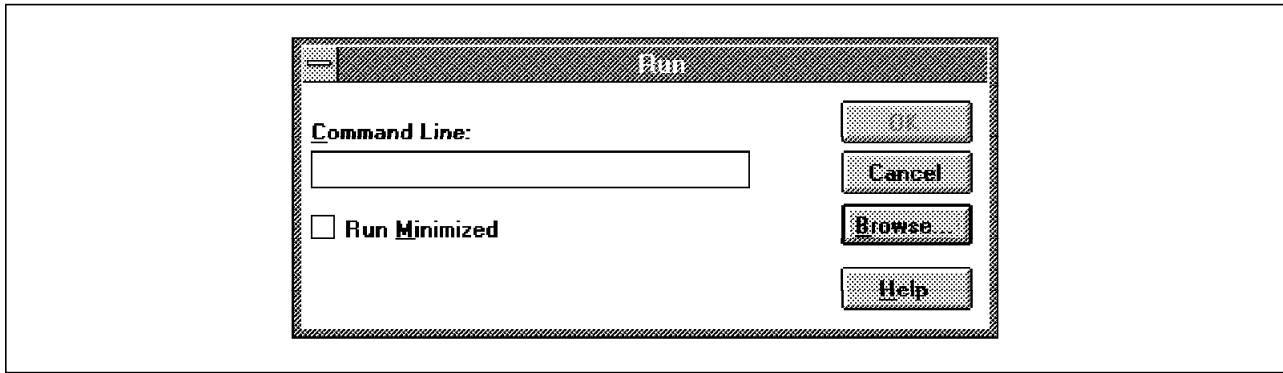
Figure 62. Select the Program Manager, File Run

Select a:\setup.exe, as shown in Figure 63.
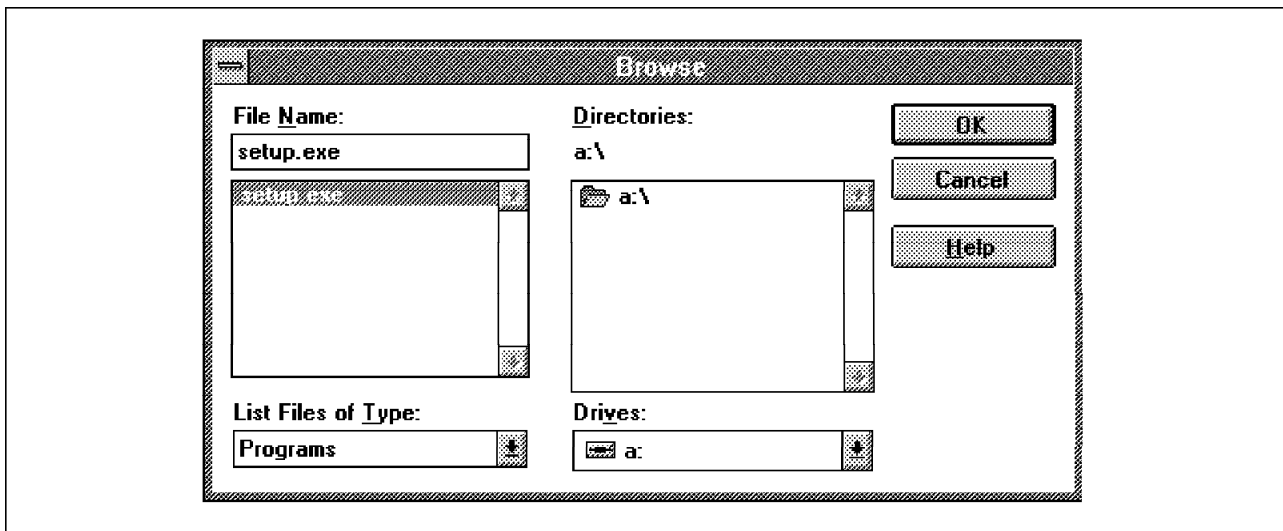
Figure 63. Select SETUP.EXE

You will be presented with three installation mode options, as shown in Figure 64 on page 91. Select the applicable option. For easy installation, select quick install. This will load everything you need, including the TCP/IP SLIP software.
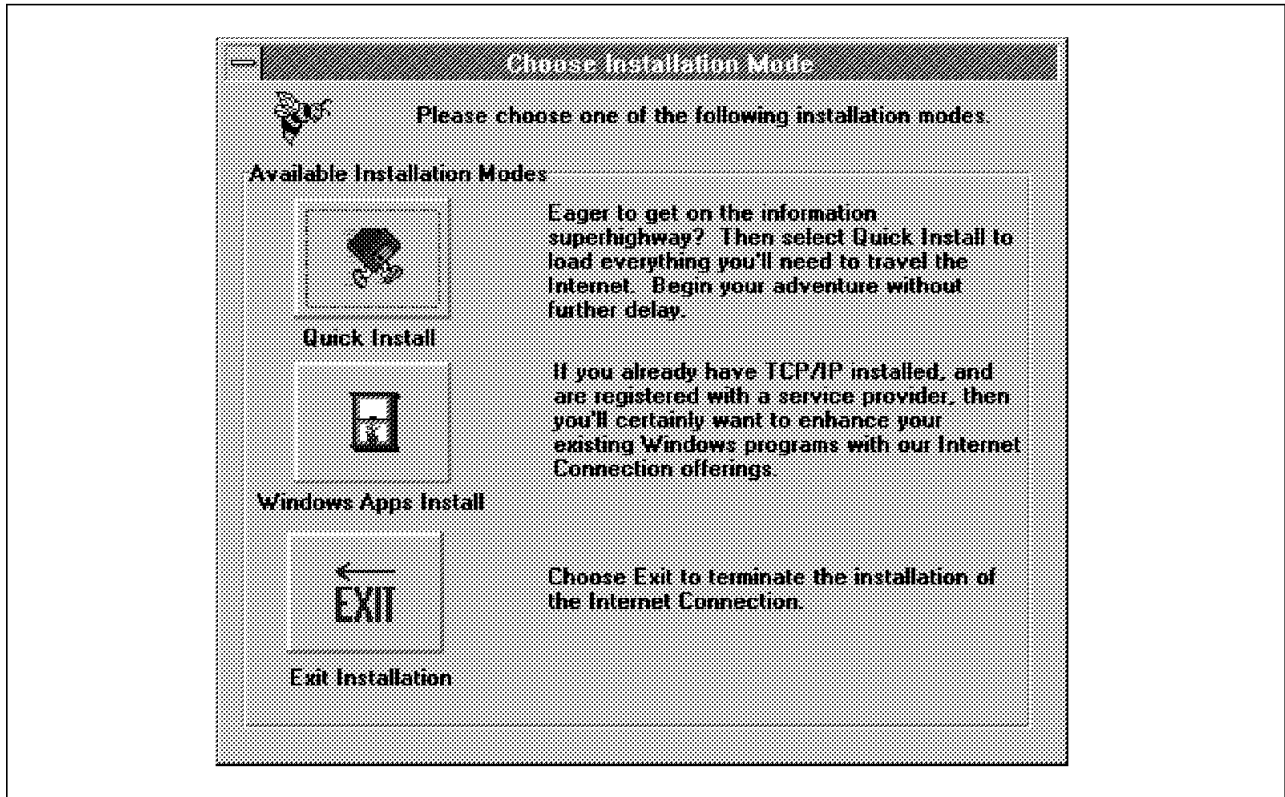
Figure 64. Installation Options for Internet Connection for Windows

The software will request an installation directory, as shown in Figure 65 on page 92. You can accept the default value, and select Continue.
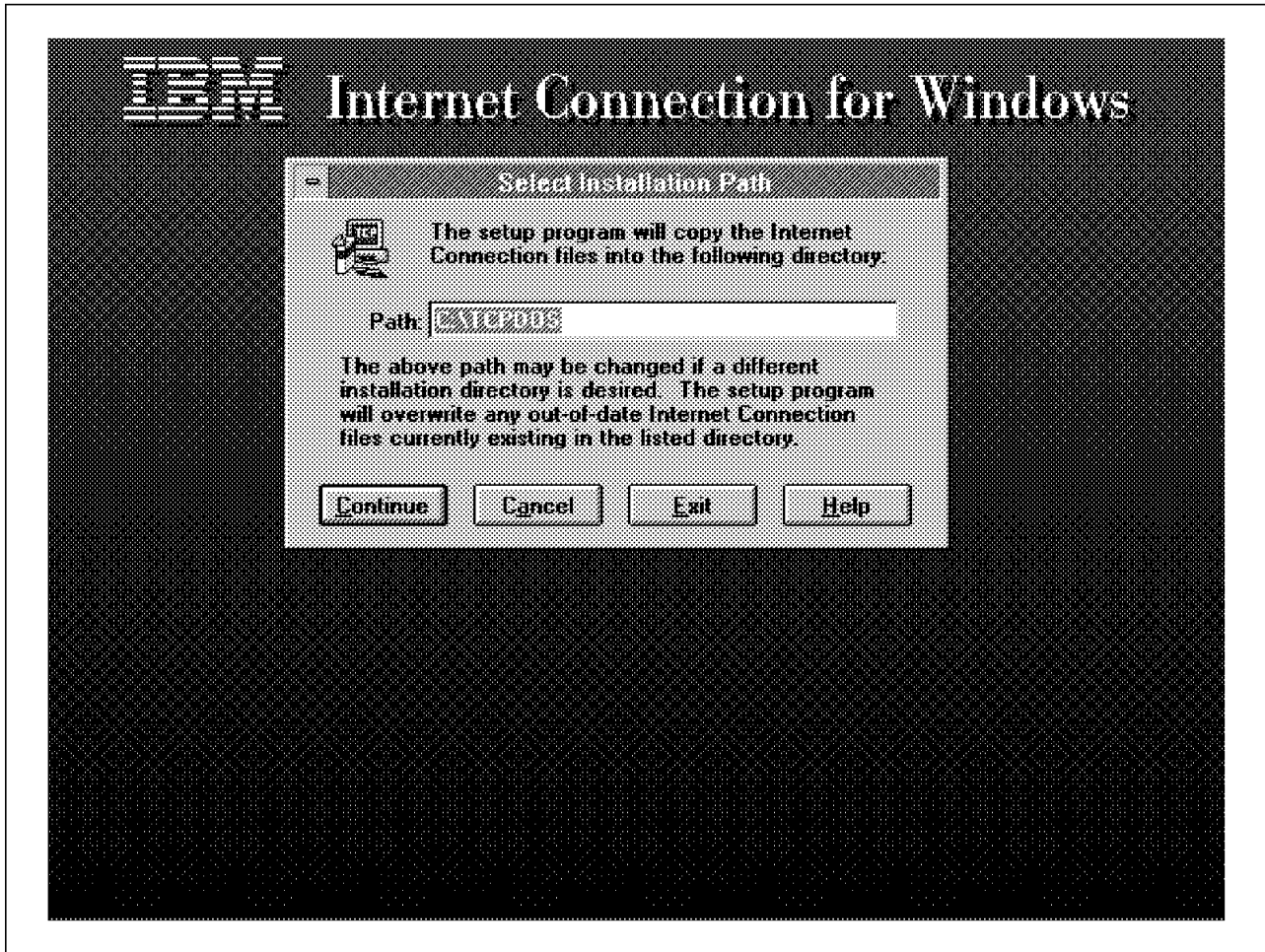
Figure 65. Installation Directory

The software will create an IBM Internet Connection folder, as shown in Figure 66 on page 93.
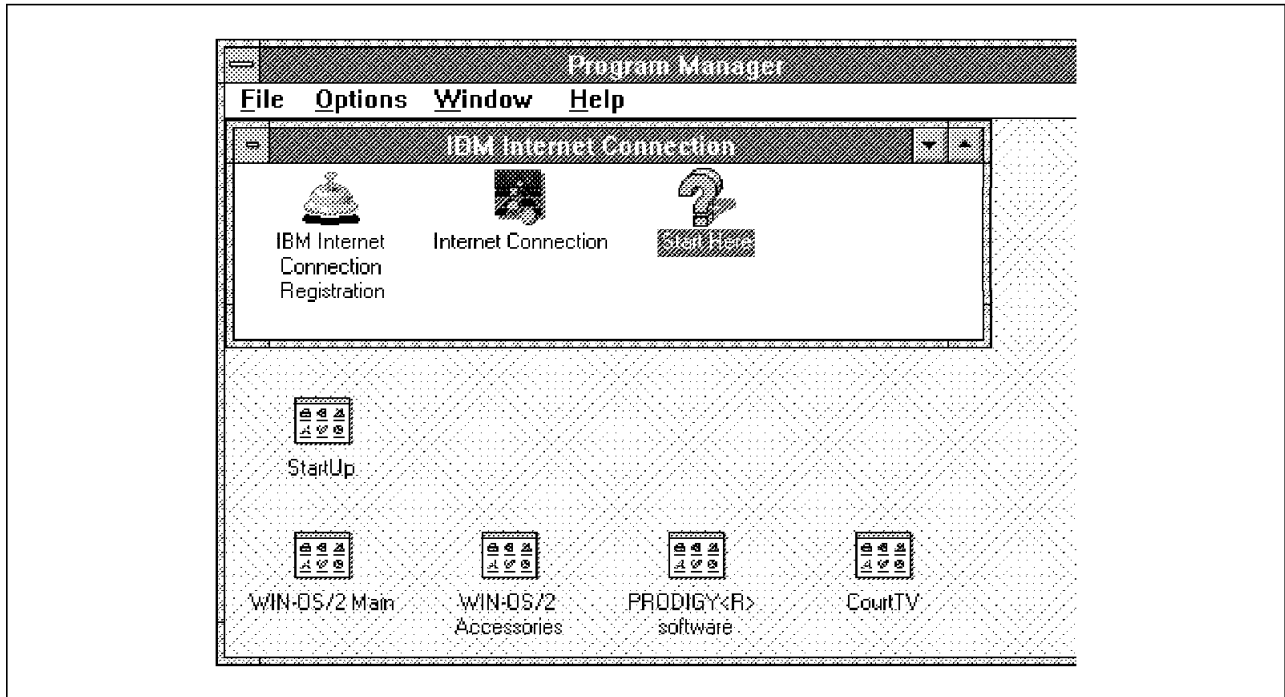
Figure 66. Internet Connection for Windows Folder

You must restart the workstation to start the TCP/IP software. Problems and errors with installation and covered in Appendix L, "Basic Troubleshooting for Internet Connection for Windows" on page 197. To start the Internet Connection, select the Internet Connection icon, as shown in Figure 66. If you have a problem, and the TCP/IP software is not running, you will see a WinSock error, as shown in Figure 67. Refer to Appendix L, "Basic Troubleshooting for Internet Connection for Windows" on page 197 for problem-solving hints.

Figure 67. Error Shown if TCP/IP Not Started

After you have installed the Internet Connection, you must register with a service provider. A service provider connects you, through your modem and phone line, to the Internet. You can use the default service provider (IBM Internet Connection services) or you can register with another service provider of your choice. With the IBM Internet Connection services, you can register online and then connect directly, without making separate phone calls or sending letters to get registered with a service provider.

After you have established an account with a service provider, you must define the connection to that service provider. Your service provider will supply you with the necessary information. This information will include your login ID, your

password, your default servers, your IP address, and more. To define your connection, select the **Add** push button from the tool bar. It should take you only a few minutes to fill in the screens. This is covered in Chapter 3, "Connecting to the Internet" on page 33. Some service providers restrict access to their machines so that only software supplied by them will work. As a result, you may need to use their software to define your connection to them. If you need to create an automated login script file for service providers that the Internet Connection does not currently support, you can use the SAMPLE.TPL in the ETC directory. You must contact the service provider for a script if they allocate IP addresses dynamically. Once you have completed the information, select the **Connect** button to establish a connection. Now you are ready to start the Internet Connection program and connect to your service provider.

3.5.5 Prodigy

This topic will describe setting up a connection to Prodigy, together with connecting into the Internet.

3.5.5.1 Product Overview

The Prodigy service is an interactive information network that is accessed through a Windows based application using a Hayes-compatible modem. Prodigy provides a US-only service. Besides only providing US based telephone numbers, the information contained within the system is typically of US applicability. Prodigy provides non-TCP/IP protocol connections via a dial-up connection. The Prodigy software is not reliant on networking software. The Prodigy service uses graphics and icons. As of June 1995, over two million people have become Prodigy service members.

Prodigy provides both a consumer oriented service, as well as an Internet access point. From the Prodigy startup screen, the following on line information categories are available:

1. News/weather
2. Business/finance
3. Sports
4. Communications
5. Entertainment
6. Reference
7. Shopping
8. Computers
9. Travel
10. Home/family
11. Internet browser
12. Mail

Prodigy members can connect to Internet via both a mail gateway and via a Web browser. The Web browser works in a similar manner to the IBM WebExplorer (see Chapter 4, "Internet Navigation Tools" on page 105). Telnet and FTP sessions are not available in the true sense via the Prodigy connection. Prodigy does not support the following Internet functions:

1. FTP
2. WAIS
3. Gopher
4. Telnet
5. Finger
6. Ping

7. News reader

All Prodigy data, including applications and content, is transmitted to a mainframe server, and then distributed over a T-1/T-3 network, as shown in Figure 68.
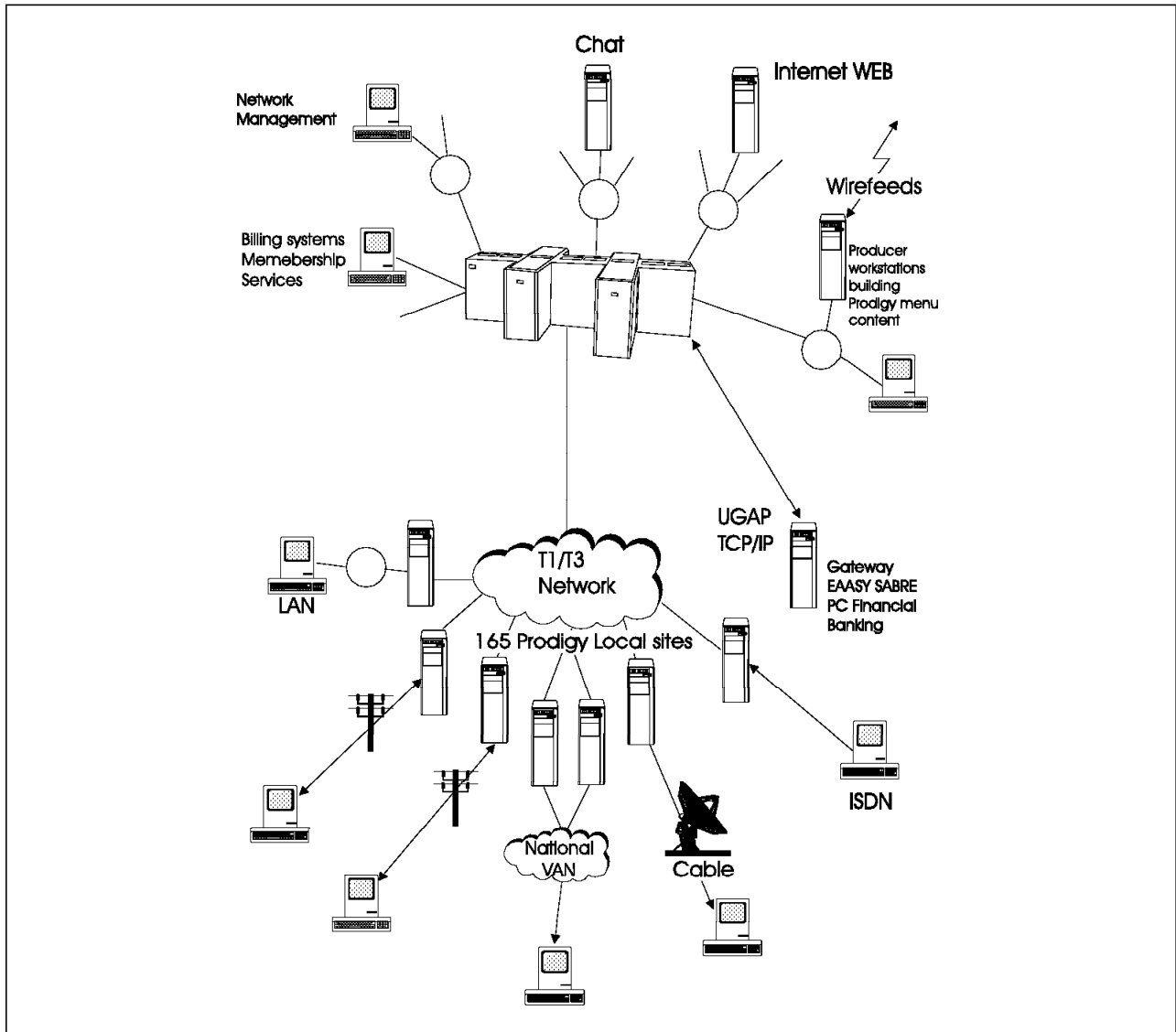
Figure 68. Prodigy Network Description. The mainframe is connected to the Internet through an Internet gateway.

The Prodigy mainframe processes a multitude of tasks, for example, it:

- Handles basic systems management

- Handles membership service communications, such as Chat

- Runs applications, such as a Web browser

- Accepts incoming wire feeds, such as API and Reuters

- Maintains Prodigy gateways for transaction applications such as PC Financial Network for banking

- maintains gateway for access to the World Wide Web using the Advantis service provider

The lower half of Figure 68 focuses on distribution activity. All Prodigy data is streamed through the T-1/T-3 network and then distributed to Prodigy local sites, or PLSs. They, in turn, distribute the data to users through a variety of channels, such as LANs, local and national VANs (Value Added Networks), cable and ISDNs. This results in a constant, interactive dialogue between the service and the users that is continually transmitted throughout the network.

3.5.5.2 Installation

The Prodigy software can be obtained from Prodigy or downloaded off the Internet if you have an Internet ID. If you do not have an Internet ID, you can get the Prodigy software by contacting Prodigy at:

1-800-776-3449
1-914-448-8000

Alternatively, you can send them E-mail to info99a@prodigy.com specifying that you need to be sent a disk copy of the Prodigy software.

The Prodigy software can be downloaded from the Prodigy Web server located at:

http://www.astranet.com/FILES/produzip.exe

This file must be downloaded to your local PC. The file is quite large, and will take some time to load down. The program we downloaded was 1.3MB in size. To download the file, run your Web browser program. We used the IBM WebExplorer program. Set your Web browser to the following URL:

http://www.astranet.com/abtprod2.html

This HTTP contains the Prodigy online services information. Located on this page, you will see the **Prodigy service software for Windows compatible PCs** icon. Click on this highlighted text. The system will now indicate that it has no viewer registered for this type of file. It will ask you if you wish to download the file to your local workstation. Click on the **OK** button. The system will ask you where you wish to save the file. After you enter the desired location, the file will be downloaded to your workstation.

This file is a self-extracting ZIP file. To UNZIP the file, run the program from a DOS shell to UNZIP the files. After extracting the files, you must run the INSTALL.EXE program as shown in Figure 69 on page 97.
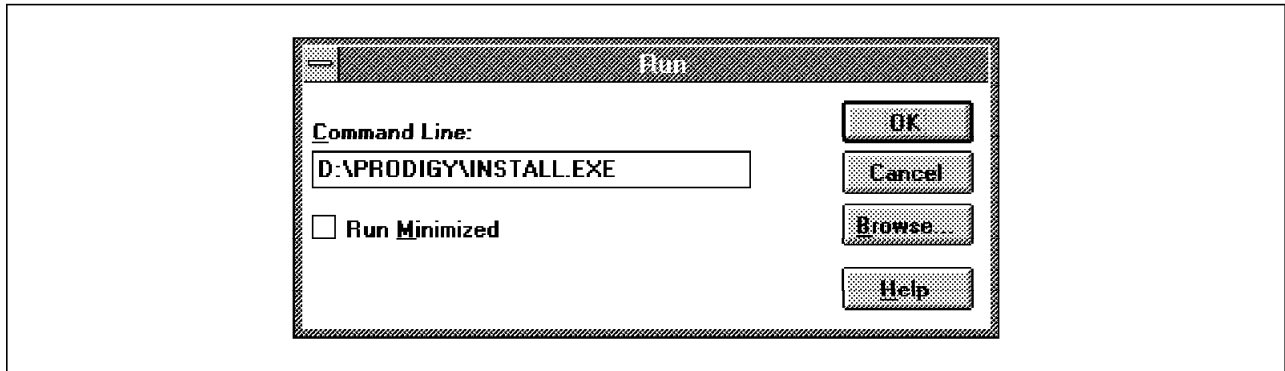
Figure 69. Installing Prodigy

The INSTALL.EXE program must be run under a Windows shell. You will need Win-OS/2 or Windows 3.1 to run this program. We ran the program under Win-OS/2. After running the INSTALL.EXE program, you should see the panel shown in Figure 70.
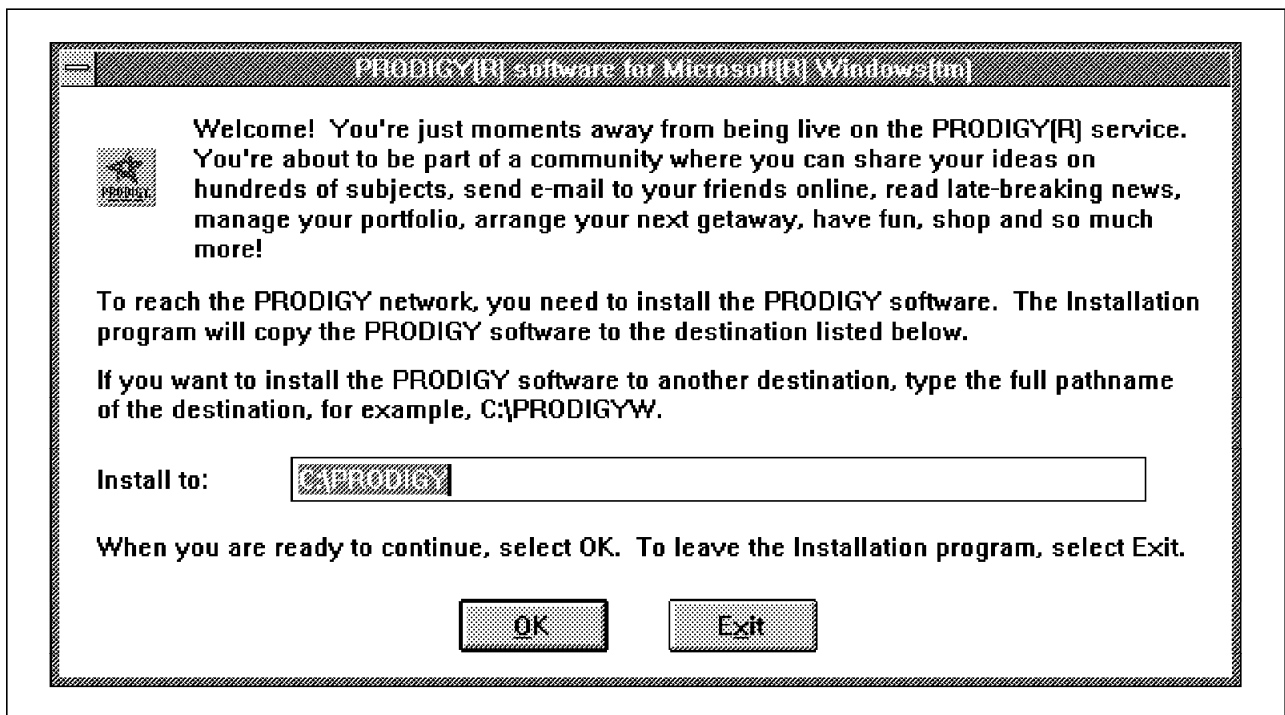
Figure 70. Installation Directory

You must now follow the instructions presented on the screen. You should not be using your modem at this time. If you are connected to the Internet, click on the IBM Internet Dialer icon located in the IBM Internet Connection for OS/2 folder. You will see the screen shown in Figure 71 on page 98. Click on the **Hang up** icon. Your Internet session will now be terminated. You will need to sign on again later if you need to re-access the Internet.
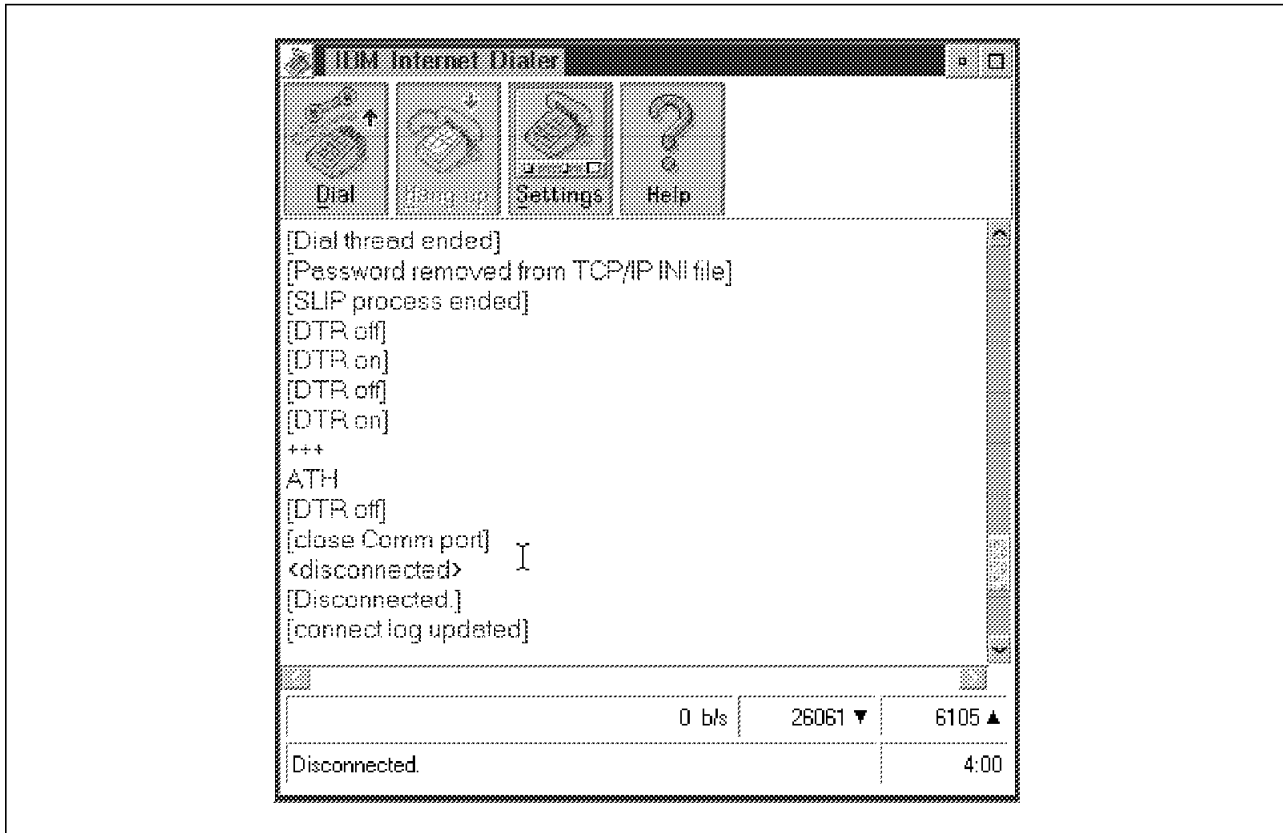
Figure 71. IBM Internet Dialer Control Screen

The install program will download the software into the needed directories and create the necessary icons. Select the Prodigy icon to run the Prodigy program. If you do not have a user ID, you will be presented with a sign-on screen (Figure 72 on page 99). Click on the **I would like to become a Prodigy member** icon.
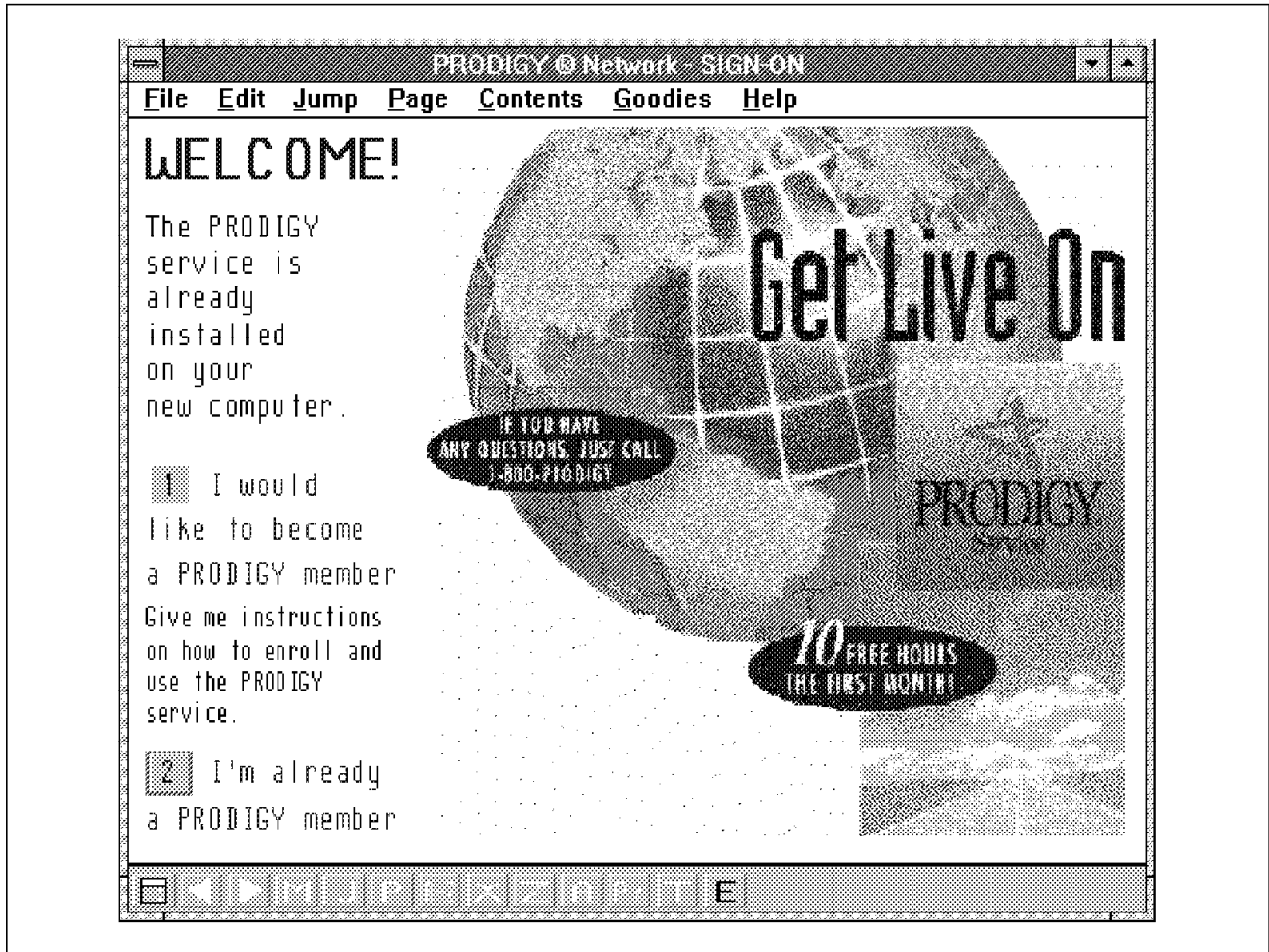
Figure 72. Prodigy Registration Screen

You will then be asked to set up your modem communications, as shown in Figure 73 on page 100.
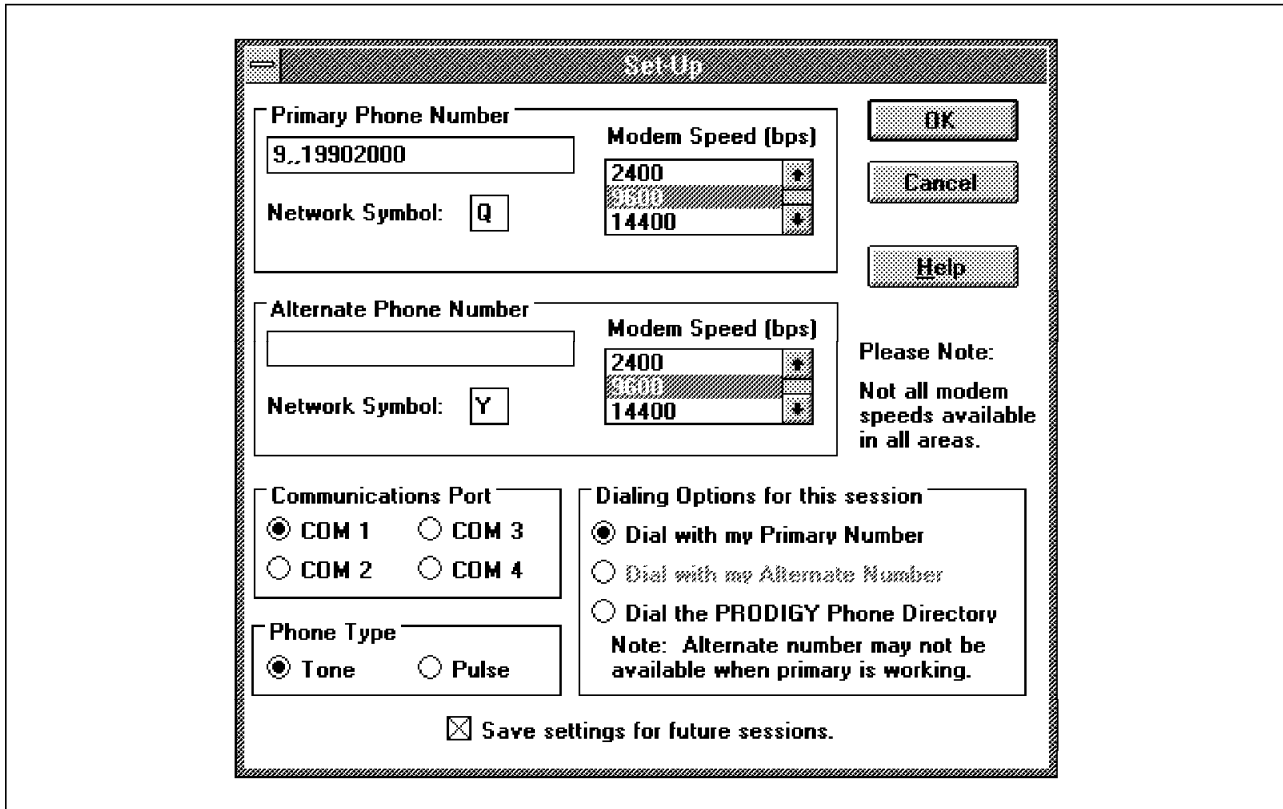
Figure 73. Modem and Communications Set Up

You must follow the instructions presented to you. Before you have given your account details, you will be shown the service enrollment screen shown in Figure 74 on page 101. We were given a free trial month with 10 hours of free access time on the system. Take note of the service costs. After you have entered all your account details, you will be given an account ID.

Take note of your Prodigy user ID and write it down. Unlike your Internet user ID, it is not user specifiable and tends to be typical of a machine-generated user ID.
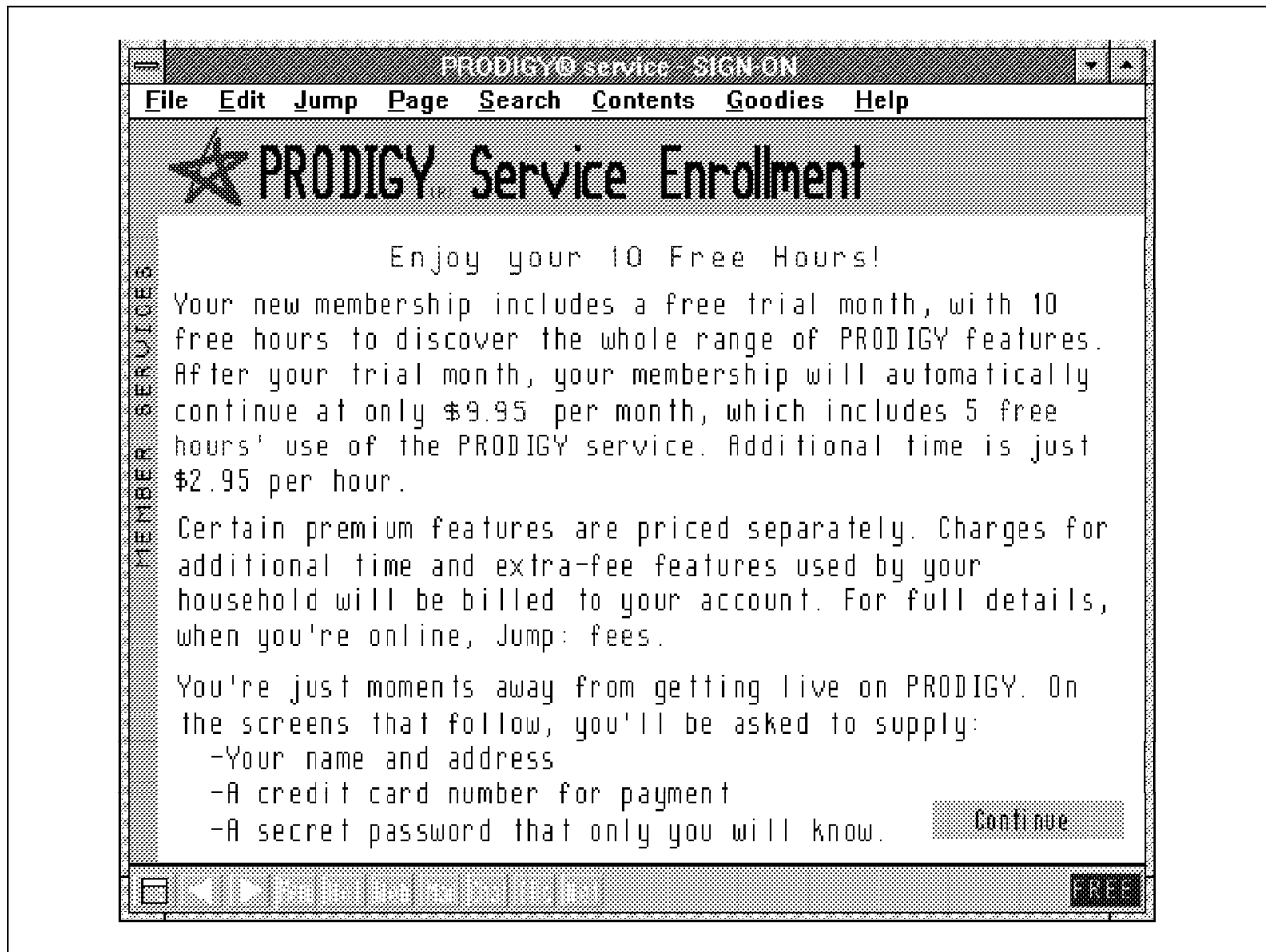
Figure 74. Service Enrollment

You need to check the Prodigy terms and conditions which you need to accept
prior to your user ID being accepted. The next time you sign on to the system,
you will see a different sign-on screen. All you need do is enter your User ID and
password, as shown in Figure 75 on page 102.
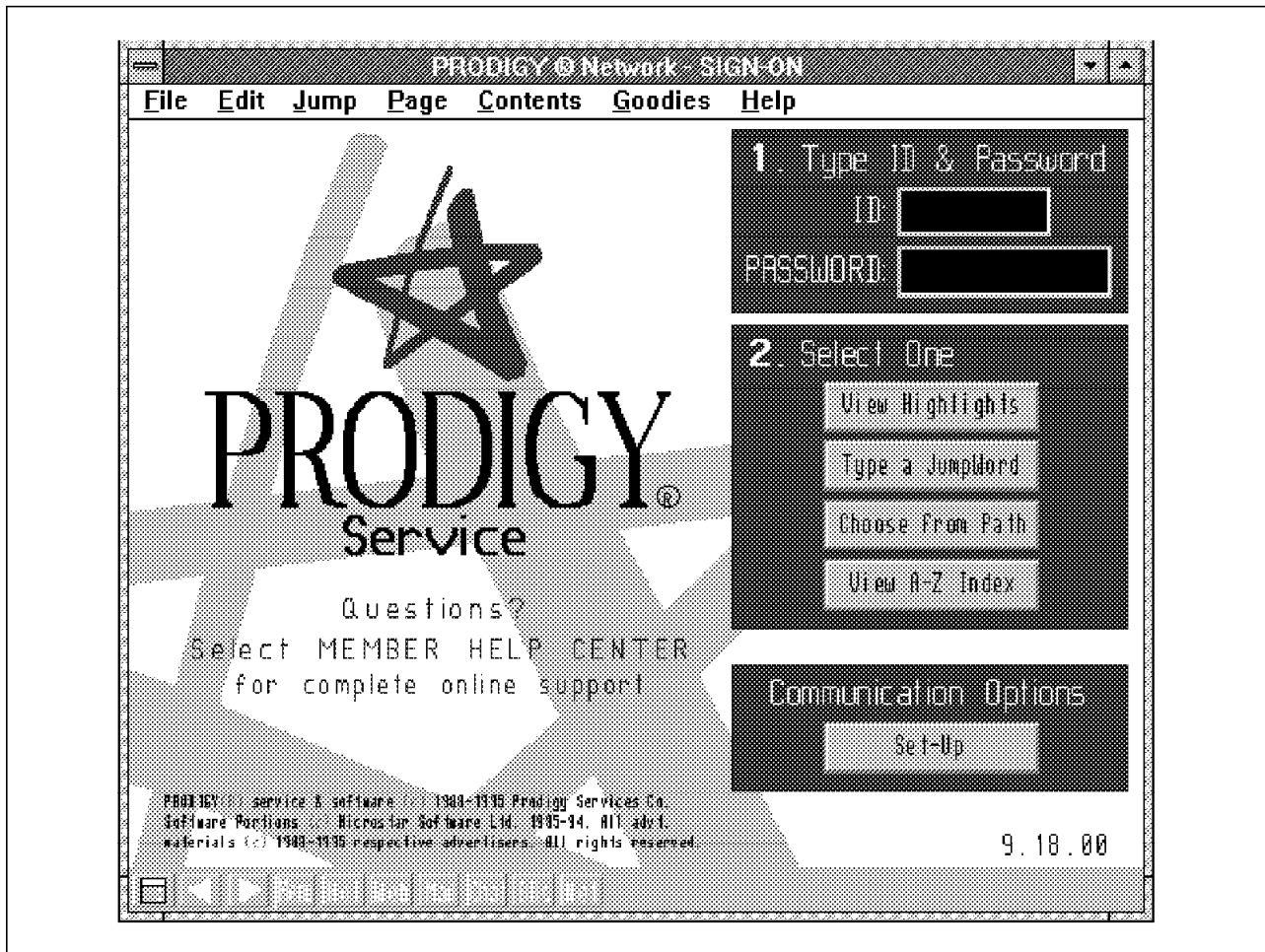
Figure 75. Prodigy Sign-On Screen

After you sign onto Prodigy, the system checks the version of your software. If needed, the system will *automatically* download the latest version onto your system, as shown in Figure 76 on page 103.
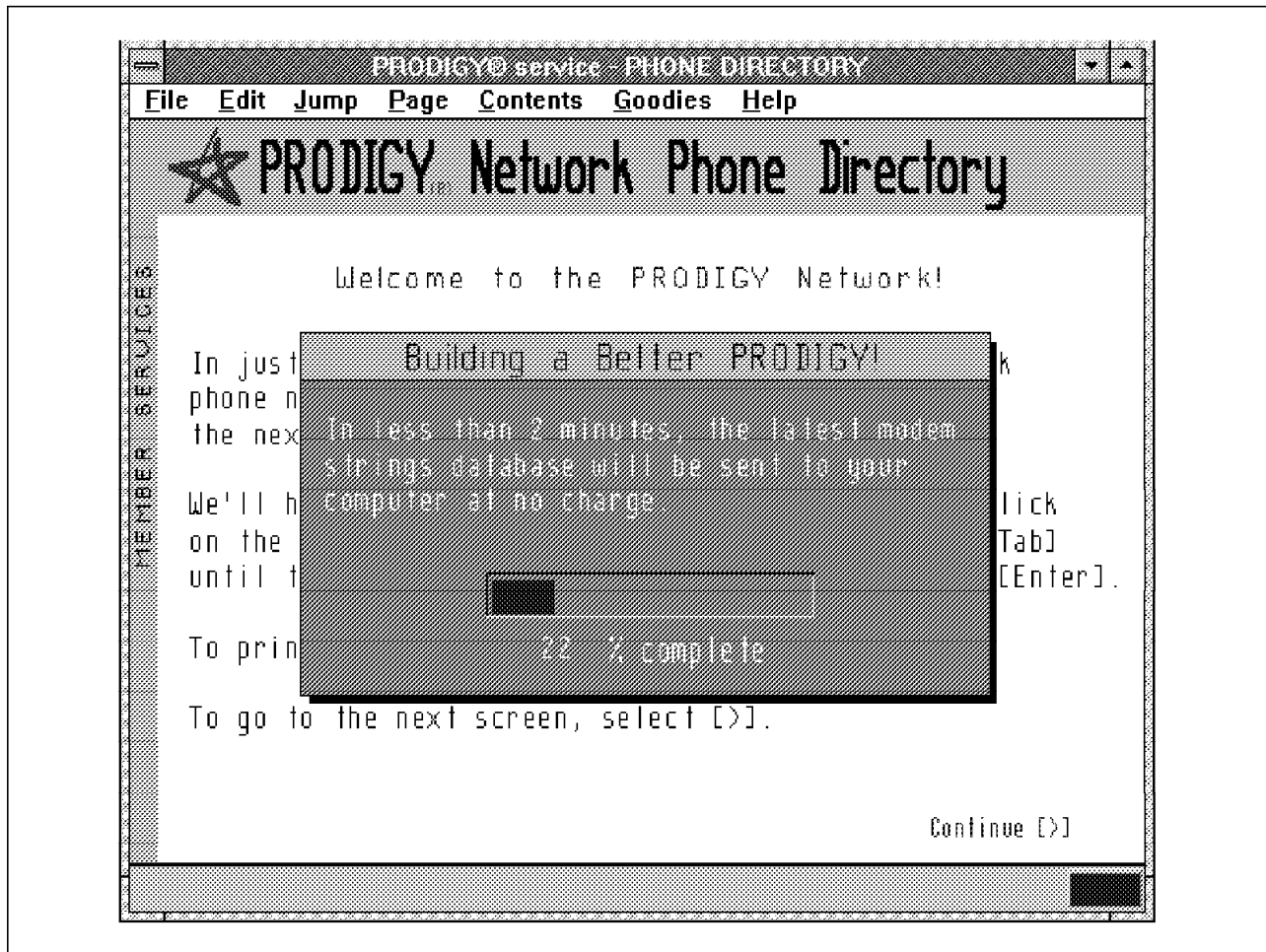
Figure 76. Downloading Latest Version of Software

3.5.6 Direct Internet Access from Your LAN

This section will describe connecting to the Internet from your corporate LAN.

When setting up a corporate link into the Internet, you need to take a number of things into account. These include:

- How are you going to manage your security?

- What type of access do you want?

- What speed of communication do you require?

- Will you be installing an external web server?

- What Internet services do you want your corporate LAN users to use?

A service provider should at a minimum connect your corporate system up to an IP router and a leased line into their network. You will then be part of the Internet. The line options should include a high bandwidth communications channel. The speed of this line will be governed by the number of applications and data types that you will be using on the Internet. Most businesses use either a 56 or 64 Kbps line. Line options include T-1, ISDN, and analog 56 Kbps and 64 Kbps. Once this is setup, the corporation will have a full access connection to the Internet. Along with this access comes a large problem: security. Although the corporation now has access to the Internet, your corporate LAN will be open

to abuse from the Internet. The Internet users will have access to your corporate network. To avoid this, you should install a firewall at the Internet connection point. With firewalls, a company can make selected data and applications accessible to the Internet, while sensitive data is restricted. IBM Global Network provides these kind of connections and security protections. Firewalls will be described in Chapter 6, "Security and Firewalls" on page 137.

3.5.6.1 Setting Up Firewall Access

To set up a local client to access the Internet through a firewall, you will require either proxy daemons or socks daemons running on the firewall. Setting up a firewall is covered in the redbook *Building a Firewall with the NetSP Secure Network Gateway*. From a client point of view, your Internet access application should be socksified to access the socks server. The web browser, IBM WebExplorer for OS/2, supports socks servers. You will need to tell the WebExplorer where to find the socks server or the proxy gateway. Run the configure servers menu to set up your application.

Once the firewall products have been installed and configured, your corporate LAN users will need to point out the location of the firewall server as the socks server. All socks requests will be processed by this client. This will allow internal users to access the WWW through the firewall socks daemon. Users outside the corporate LAN should not be permitted to access any of the corporate data through the firewall. Although the firewall does not permit FTP access from the Internet, it does permit telnet access from outside. This should be disabled. You must set up proxy users on the firewall for internal to external FTP and telnet access.

Chapter 4. Internet Navigation Tools

This chapter will cover some of the more commonly used Internet navigation tools.

4.1 Internet Commands and Programs

Access to the Internet has grown out of the conventional TCP/IP commands, including among others:

- FTP
- Telnet
- Mail
- Ping
- Traceroute

TCP/IP commands are not intuitive for the average workstation user, and can make working on the Internet complex if not an impossible task. Additional commands and programs have developed over time. During the 1980s a large number of more user-friendly programs and commands were developed on university campuses. Some of these programs came into general usage. Of these, the following programs will be used:

- Archie
- Gopher
- Mosaic
- NewsReader
- Veronica
- Wais
- Whois
- WWW and HTTP

The Internet is not comprised of individual networked machines each doing there own thing when required. If that were the case, each user would need a very powerful computer to do the most elementary Internet tasks. For this purpose, among others, the Internet is comprised of a complex meshing of user applications and dedicated servers, each server performing a particular function. Following are some application server types:

- News servers
- Mail, POP and MIME
- FTP servers
- WWW and HTTP servers
- Gopher servers
- Proxy servers
- Socks servers

4.1.1 Finger

Finger is a command that lets you find someone's login name (and hence E-mail address), if you know what computer a user is set up on. Finger also tells you if the user is currently logged on to the target machine. To use the finger command, you need to telnet onto a server which supports the command. If you are connected onto the Internet through a firewall, you will have to use a proxy logon to your firewall.

The general format of finger is as follows:

```
%finger name@host
```

4.1.2 Ping

When connecting to the Internet, you will first need to know if you can
communicate with anyone else on the Internet. The easiest command to use to
test this is Ping. If you cannot contact a host using the ping command, you will
not be able to contact the host using any of the upper-level TCP and UDP
commands. Ping communicates using the ICMP protocol. It is the lowest
application layer on which you can contact a host using the TCP/IP
communications protocol. As it is not dependent on the TCP layer for message
acknowledgement, unless the Ping implementation times out after a period, the
client can wait indefinitely for an answer from an uncontactable host. When you
contact a host, you will see fields returned as shown in Figure 9 on page 20.

The general format of Ping is:

```
%ping host or
%ping host in dotted.decimal

tollbooth3:ping is.co.za
/etc/ping -c 5 -s 56 is.co.za
PING is.co.za (196.4.160.2):56 data bytes
64 bytes from 196.4.160.2: icmp=seq=0 ttl246 time=468 ms
64 bytes from 196.4.160.2: icmp=seq=1 ttl246 time=412 ms
64 bytes from 196.4.160.2: icmp=seq=2 ttl246 time=363 ms
64 bytes from 196.4.160.2: icmp=seq=3 ttl246 time=337 ms
64 bytes from 196.4.160.2: icmp=seq=4 ttl246 time=320 ms
---------- is.co.za statistics ---

5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 320/372/468 ms
tollbooth3:
```

4.1.3 Traceroute

The traceroute command is useful for trouble shooting. It will find the route that
an IP packet is taking to get to a host. In static routing environments, this
command will show you the same route to a specific route. In a dynamic routing
environment, the route can change each time you use it. The traceroute
command relies on each host or router returning an error condition back to the
originating host. It does this by sending an IP packet time to live (TTL) length of 0
in the case of the first router. This router return an error condition back to the
originating host. The TTL is then incremented by one, and resent to the next
host. This occurs up to 30 times, with each host returning an error condition until
the destination host is encountered. The traceroute program will collate the
errors received from each host together with their IP and domain name. These

are presented to the host as a route to a particular host. The traceroute command is implemented using the SNMP protocol. Some routers do not properly implement the error condition, and these will return invalid error messages. These errors are reported as * * *.

The traceroute command is implemented differently on different platforms, as shown in Table 10.

Table 10. Traceroute Implementations	
Operating system	**Command**
OS/2 (IBM TCP/IP V2 and V3)	tracerte
DOS (IBM Internet Connection for Windows)	tcptrace
AIX 3.2.5 and AIX 4.1	traceroute

An example of the traceroute command is shown as follows:

```
rs600012:/ > traceroute 198.74.69.100
traceroute to 198.74.69.100 (198.74.69.100), 30 hops max, 40 byte packet
 1  6611ral.itso.ral.ibm.com (9.24.104.1)  7 ms  8 ms  7 ms
 2  6611ral.superlab.css.ibm.com (9.24.96.1)  18 ms  15 ms  14 ms
 3  6611slk.sl.dfw.ibm.com (9.24.1.1)  73 ms  59 ms  60 ms
 4  6611wlk.sl.dfw.ibm.com (9.19.141.241)  61 ms  65 ms  73 ms
 5  * * *
 6  9.32.108.1 (9.32.108.1)  66 ms  64 ms  68 ms
 7  9.32.1.9 (9.32.1.9)  109 ms  107 ms  107 ms
 8  9.32.12.2 (9.32.12.2)  111 ms  109 ms  109 ms
 9  tollbooth3.cwp.ibm.com (198.74.69.100)  111 ms  111 ms  111  9  toll
cwp.ibm.com (198.74.69.100)  111 ms  111 ms  111 ms
rs600012:/ >
```

4.1.4 Telnet

The Telnet program can be used to log in directly to a remote server. Once you sign onto the remote system, the system should request a login ID and password from you. The telnet command will set up your login screen according to the terminal which you are emulating on your system. The most common terminal emulation settings are:

- VT100
- VT220
- Dumb terminals
- ANSI
- NVT
- HFT

These parameters should be set by your emulation program. The screen on the remote system will then be set up accordingly. The telnet command takes the following form:

```
telnet host [port-number]
```

The port number is an optional parameter. It defaults to port 23. You can use the telnet command to connect to a different service. For example, if you wanted to test a NNTP server, you could telnet to port 3000 for example. Refer to Appendix D, "Coexistence of TCP/IP V2.0 and Internet Connection for OS/2" on page 175 for more details on port numbers.

The following forms of Telnet are supplied with TCP/IP software packages.

- Telnet. This supplies the default ASCII terminal login session.
- TN3270. This is used to provide IBM 3270 Telnet connections to IBM MVS and VM hosts systems.
- TN5250. This is used to provide IBM 5250 Telnet connections to IBM AS/400 systems.

4.1.5 Archie

One of the biggest problems on the Internet has been finding files and data. FTP protocols allowed users to transfer files around, but the location of these files was transmitted mostly on a word-of-mouth basis. Archie was developed to search remote FTP sites for files on the Internet. Archie would then create an index of these files. An Archie server looks at this file index to search for files.

A list of Archie servers is listed in Table 11 on page 109.

Table 11. Archie Servers	
Name	**Area**
archie.au	Australia
archie.edvz.uni-linz.ac.at	Austria
archie.univie.ac.at	Austria
archie.uqam.ca	Canada
archie.funet.fi	Finland
archie.th-darmstadt.de	Germany
archie.ac.il	Israel
archie.unipi.it	Italy
archie.wide.ad.jp	Japan
archie.sogang.ac.kr	Korea
archie.kr	Korea
archie.redis.es	Spain
archie.luth.se	Sweden
archie.switch.ch	Switzerland
archie.ncu.edu.tw	Taiwan
archie.doc.ic.ac.uk	United Kingdom
archie.unl.edu	USA (NE)
archie.internic.net	USA (NJ)
archie.rutgers.edu	USA (NJ)
archie.ans.net	USA (NY)
archie.sura.net	USA (MD)

To use the Archie search command, you need to telnet to a server which supports the command. If you are connected to the Internet through a firewall, you must telnet to the firewall using a proxy telnet command.

An example of telnetting to an Archie server is:

```
% telnet archie.unl.edu
Trying
Connected to crcnis2.unl.edu
Escape character ^T


SunOS UNIX (crcnis2)
login:archie
password:archie
```

You will now be logged onto the Archie server. The initial screen gives a lot of information that will help you with your searches. Read it carefully. You can now

begin using the Archie search engine. When you have finished, you can quit, as follows:

```
archie> quit
```

This will terminate your session and return you to your original system.

You can also use Archie by using electronic mail. If you do not have telnet available to you or your firewall does not use proxy telnet sessions, you can use Archie via an E-mail session. To do this, use your Internet E-mail program to construct a message as follows:

```
mail archie@archie.rutgers.edu          use any Archie server
Subject                                 no subject necessary
prog geology                            specify the area of
.                                       interest
```

You can contact archie servers from the IBM office system using the INOTE command in the same way, as follows:

```
inote archie@archie.rutgers.edu         use any Archie server
Subject                                 no subject necessary
prog geology                            specify the area of
.                                       interest
```

In addition to the prog keyword, the following keywords can also be used:

path email address. Tells Archie to send the responses to a different E-mail address than the address sent from

compress. Causes the output to be sent in UUENCODE format

prog regexp. Looks for filenames that match the regular expression

help. Returns the Archie help file

list regexp. Returns the list of servers that match the *regexp*

servers. Returns a list of all known Archie servers

whatis keyword. Returns a list of files that match the keyword in the whatis database

quit. If you have set up your mail to automatically send a signature file at the end of your note, this signature script will be received by the Archie server as an Archie request. To avoid processing your signature file as an Archie request, issue the quit command at the end of your Archie request.

Some time later you will get a mail answer back containing the Archie search answers.

4.1.6 Gopher

A gopher might sound like a little furry animal that burrows underground, but in fact it is one of the more important search tools on the Internet. Gopher lets you burrow through the Internet by selecting files and resources from command menus. When you access something you like you can access the resource without having to worry about the file's location. For example if you want to look at files at a particular site, rather than looking up the address and telnetting to the site, you can use gopher to access the site and browse the files. The major advantage of gopher is in its packaging. It allows you to combine numerous actions together, such as telnet and ftp. Gopher does not allow you to access anything that wouldn't be available by other means and as such there are no gopher-specific resources on the Internet. Some security files, for example, are available only through gopher and they are transported via FTP. Gopher will use whatever command (telnet, FTP, etc.) it needs to get a resource.

To access the gopher system, you run a gopher client program. When you start a gopher client, you will first connect to your home gopher server. The gopher client will then choose the appropriate utility for dealing with the resource you select. For example, if it is a file, the client uses FTP to retrieve the file for you. If the resource is a resource requiring a login, the client creates a telnet session. If it's an Archie or Wais index, gopher will use Archie or Wais as needed. You can move from server to server using the gopher program.

Open the gopher program icon from the Internet Connection folder (Figure 20 on page 51). Gopher then connects to the default server. If you are not connected to the Internet, the system will ask you to dial into you service provider. If the default server connection fails, select a specific server option. If you don't know any gopher servers, select a server from the list on the menu bar of Well Known Gopher Servers menu. A list of public gopher access sites is listed in Table 12.

Table 12. Public Gopher Servers		
Name	**Login**	**Location**
consultant.micro.umn.edu	gopher	North America
ux1.cso.uiuc.edu	gopher	North America
panda.uiowa.edu	gopher	North America
gopher.msu.edu	none required	North America
gopher.internic.net	gopher	North America
gopher.ebone.edu	gopher	Europe
info.anu.edu.au	info	Australia
gopher.chalmers.se	gopher	Sweden
tolten.puc.cl	gopher	South America
ecnet.ec	gopher	Ecuador
gan.ncc.go.jp	gopher	Japan

After you have connected, you will see icons representing the resources available on the server's home menu, as shown in Figure 28 on page 58. All the items on the menu need not reside on the server to which you are connected. The icons may include links to other gopher servers.

4.1.7 WWW and HTTP

The World Wide Web, or WWW, is the newest information service to arrive on the Internet. The WWW is based on a technology called hypertext. Hypertext is a method of presenting information where selected words in text have links to other information. WWW is an attempt to organize all the information on the Internet into hypertext documents to form a super database.

You might well ask, what is so great about the WWW, since gopher has had links to information around the Internet for some years now. This is not exactly true, since WWW and gopher differ in a number of important ways. First, the WWW is based on hypertext links and is structured around whatever the author feels might be relevant to his document. A gopher menu is not as flexible. WWW knows the contents of files to which the hypertext refers, whereas gopher does not know details on the contents of a file until a user selects the file. Hypertext documents can integrate multimedia in the hypertext document. Gopher servers can't integrate multimedia files with other types of data. The advantage of hypertext is that in a hypertext document, if you want more information about a particular subject, you click on the highlighted item.

The World Wide Web is based on a client/server model with the following specifications.

- URL (uniform resource locator). URL is a standard for specifying an object on the Internet. Web browsers can access the following URL objects types:
    - HTTP (Browse through HTML documents)
    - Gopher (Browse through gopher menus)
    - FTP (Download files). This will not work if you are accessing the Internet through a firewall that has restricted FTP file transfers.
    - NNTP (Read news files)
    - local files
    - WAIS (Connect to a WAIS Server)
- HTTP (hypertext transfer protocol). HTTP is an application-level transfer protocol for transferring the URL object. It can handle security and display different image formats and multimedia formats.
- HTML (hypertext markup language). The WWW hypertext documents are stored on HTTP servers. These documents are written in a language called HTML. The HTML language is similar to the IBM script markup language. Web browsers can understand the HTML language. An example of an HTML document is included in Appendix H, "HTML Example" on page 185.

More information on URLs, HTML and HTTP is available at:

```
http://www.hcc.hawaii.edu/guide/www.guide.html
http://info.cern.ch
```

To access the WWW, you need to use a client-based web browser, such as IBM WebExplorer, Mosaic or Netscape. These client programs need to link to a WWW server.

The IBM WebExplorer for OS/2 has the following unique features:

- **Text and Graphics Streaming** Text and graphics can now display as soon as they are received from the network. Using the Configure Loading option from the Configure pull-down menu, you can:
  - Specify whether you want to preview the document before images are loaded (fast load) or wait until the entire document is loaded to see it.
  - Specify if you want to display images while loading (streaming graphics) or wait until the images are complete before they display.
  - Use the fast load method to display the text and put place holders on the images that take longer to load. If the graphics were created with height and width tags, WebExplorer will automatically display the correct amount of space for them. Otherwise, it will reformat the display to fit the graphics as they come in.

Streaming graphics is independent of the fast load method. It controls how images are drawn once they begin to display. If you select streaming graphics, you can also say whether you want GIF interlaced images to be drawn as precise or smeared.

NOTE: The TIFF graphical format is no longer supported.

If you want to interact with a document before it is completely loaded, you can stop the loading process by pressing the escape (Esc) key or by selecting the animated icon, as shown in the top right hand corner of Figure 77 on page 116.

- **Multi-Threaded Design** WebExplorer uses separate threads to load documents and images simultaneously, display graphics, and format the screen. This capability enables users to view and interact with one document while loading others in the background.
- **Internal Viewer** By default, WebExplorer will show images by using its own internal mechanisms for handling GIF, JPEG, XBM, TIFF, and OS/2 BMP graphics. If you want to use your own program to view images, select Internal Viewer from the Options pull-down menu to toggle this feature on or off. WebExplorer supports true-color displays, that is, those with 65,000 or 1.67 million colors.
- **Drag and Drop** You can use the drag and drop function to capture images and HTML from an open document and place them on your desktop where you can save, maintain, and reuse them.
  - To capture an image: place the cursor over an image, press and hold the right mouse button, drag the image to the desired location, and release.
  - To capture HTML: place the cursor anywhere in the document except over an image, press and hold the Ctrl key and the right mouse button simultaneously, drag the image to the desired location, and release.

You can also maintain frequently used documents on your desktop by using the URL drag and drop feature. This allows you to drop the URL for a document on a file folder or any other place on your OS/2 Warp desktop to create a URL Workplace Shell Object.

  - To drag a URL from WebExplorer: move the cursor onto the WebExplorer window over any location except an image, press and hold the right mouse button, move the cursor (and object) to the desired location and release.

You can also maintain frequently used documents on your desktop by using the URL drag and drop feature. This allows you to drop the URL for a

document on a file folder or any other place on your OS/2 Warp desktop to create a URL Workplace Shell Object.

  – To drag a URL from WebExplorer: move the cursor onto the WebExplorer window over any location except an image, press and hold the right mouse button, move the cursor (and object) to the desired location and release.

Once you have created a URL Workplace Shell object you can:

  – Drop the URL object onto an unopened WebExplorer icon and WebExplorer will open with the document at that URL.
  – Drag and drop a URL onto an open WebExplorer window and it will open the document at that URL.
  – Double-click on the WebExplorer URL Workplace Shell object to change the Settings notebook for the icon.

Note: Many applications, such as editors, do not allow copy-based drag operations and you will not be able to directly drop HTML, images, or URLs onto them. Instead, drag and drop them to the desktop first and then drag them to the application.

• **Color Palette Management** The -p option allows you to enable color palette management. When you start WebExplorer with this option, it uses its own best set of colors rather than the system default palette or the last palette loaded by another application.

• **Color WYSIWYG Printing** Advanced image processing techniques are used to accurately display images and text on both color and monochrome printers. The entire document is also reformatted on the fly to exactly fit the margins of the printer, producing high-quality output for archival or hardcopy distribution of Web documents.

• **Mailto Support** There are two ways you can send mail to other users on the Internet:

  – By clicking on a mail address (userid@domain) when it appears as a highlighted link in a document.
  – By specifying the mailto protocol and a mail address (mailto:user@domain) as a document URL. Select **Open document (URL)** from the File pull-down menu or use the current URL area under the Tool Bar.

Either of these will display a mailto window in which you can type your correspondence.

Note: You must have your Email address specified. To do this, select **Servers** from the Configure pull-down menu to get the Configure Servers window.

• **Hierarchical Display of News Reader Articles** News reader articles are displayed as a hierarchical tree of conversations. For example, one person posts an article, then someone replies, then someone replies to them, and so on. This function is available to WebExplorer only when the news server supports it.

• **News Posting Support** You can post a response to a news group by clicking on an entry in a news group list and selecting Post to newsgroup(s). This will display a newspost window in which you can type your correspondence.

Note: You must have your E-mail address and News Server specified. Select **Servers** from the Configure pull-down menu to get the Configure Servers window.

• **Disable/Enable Proxy and Socks Servers Configuration** If you need to disable your proxy or socks server configuration to communicate to a specific server, you can use check boxes so that you do not have to re-type the name of the proxy or socks server to re-enable it.

If you are currently using proxy or socks, you will need to check the enable check box in the **Configure Servers** menu item.

- **HTML V2.0 and HTTP V1.0 Compliance** WebExplorer supports all markup in the HTML V2.0 standard, including forms, ISO-Latin-1 fonts, in-line graphics, glossaries, and more. Since some documents on the Internet are not compliant with the proposed standard, WebExplorer attempts to clean up the document by introducing markup where appropriate. It also supports HTTP V1.0 which includes GET and POST access methods, image maps, and MIME headers. IBM is committed to supporting these public standards as they evolve, including HTTP V3.0 when it is standardized.

  WebExplorer does not support the as-yet-to-be-defined HTML V3.0 standard as well as the in-line mail function. If you encounter an HTML document which contains imbedded in-line mail commands, the system will report an error.

- **Total Configurability** The size, position, colors, fonts, QuickList selections, network servers, and home page are all remembered between uses of the WebExplorer in the EXPLORE.INI file. By using the -i flag when starting the WebExplorer, users can specify a particular .INI file to use. This allows a network administrator to make one copy of the executable file accessible by users, while each user can maintain individual .INI files on their local disk.

- **QuickList Archival in HTML** The QuickLists are written to both the initialization file EXPLORE.INI as well as a separate WEBMAP.HTM file in HTML format. These web maps may then be exchanged among user groups, renamed and organized into directories, or stored in databases to maintain an entire library of topical QuickLists. Future releases of WebExplorer will learn and categorize topical QuickLists on the fly using proven AI technologies. It is also planned to allow loading and saving of QuickLists into separate HTML files.

- **Advanced Viewer Configuration** If you find that you need to configure a viewing program for file types that are not listed, you can modify the [advanced] stanza of the EXPLORE.INI file (see Appendix I, "EXPLORE.INI Configuration File" on page 187) to associate a file type with a MIME type and to assign a viewing program for the MIME type.

To use IBM WebExplorer, select the WebExplorer icon located on the Internet panel, as shown in Figure 20 on page 51.

Once you are connected to the WWW, you will see a default home page, as show in the example in Figure 77 on page 116.

```
IBM WebExplorer - IBM Internet Connection - Home
File   Options   Configure   Navigate   QuickList   Help

http://www.ibm.net/
```

IBM® Internet Connection
Your guide to the best of The Net

What's new @ibm.net

(Last Updated: 19 May, 1995)

IBM Internet Connection - *EMEA: Europe, Middle East, Africa Help Desk*
IBM Internet Connection Home Page - *in Japanese*

- Welcome and New User Information
- Your Friends at IBM
- Worldwide Reference Library
- Internet Exploration Toolkit
- Lively Arts
- Business District
- Entertainment
- Travel Center
- News Rack
- Cyber-Mall
- Sports Scene
- Arcade

These pages brought to you by the IBM Global Network. Click here for *the IBM Home Page*.
Your thoughts are important to us. Please mail your feedback to webmaster@ibm.net.
If you have a *LINK* that you would like to see included on this site, please send us a REQUEST.

`/cgi-bin/imagemap/www`

Figure 77. WebExplorer Home Page

You can change this home page by selecting Configure Servers. You will see your E-mail address on this screen as well as your news, proxy and socks servers. The default option does not show your current URL. It is recommended that you turn this on using the Options pull-down menu and selecting **Show current URL**. These changes will update the EXPLORE.INI file, as shown in Appendix I, "EXPLORE.INI Configuration File" on page 187.

Now that you are connected to the World Wide Web, you will notice that there are highlighted items appearing in the document. These point to hypertext-linked documents at other locations. You can use these to begin surfing around the Internet by clicking on these highlighted text items.

If you find a location you want to keep, click on the hand icon to add it to the QuickList so that you can reuse the location by simply selecting the location from the QuickList location.

To access an object, simply type in the object type and location in the command line area, as follows:

```
type://location name/directory/file name

For example:

http://ibm.austin.com/aix/test.html
```

The object can be any one of the supported URL types.

If you are accessing the WWW through a corporate network, you need to set the WebExplorer up to access your company firewall as a proxy server. IBM has not implemented this approach. WebExplorer is socksified. You can set it up to contact the company socks server. Internally, IBM uses Web Explorer through a socks server. The socks server is located at tisgate.cwp.ibm.com (9.14.1.100).

IBM currently has both official and planned WWW server support for:

- OS/400 WWW server
- AIX WWW server
- OS/2 server
- MVS WWW server

An example of useful WWW server home pages are listed in Chapter 8, "Useful Internet Sites" on page 157.

The IBM Global Network Advantis default WWW server is located at:

```
http://www01.ny.us.ibm.net
```

The IBM default WWW server is located at:

```
http://www.ibm.net
```

4.1.8 Veronica

Veronica is a search engine, similar to Archie, that is built into gopher. Just as Archie creates its index of FTP sites, which you search, Veronica allows you to search all gopher menus for resource items. Unlike Archie, which searches ftp for files only, Veronica can search for other resources, including FTP files. Like Archie, Veronica searches remote sites for resources on the Internet. Veronica

then creates an index of the resources. A Veronica server looks at this index to search for gopher resources.

To use Veronica, you need to look on gopher servers for a Veronica menu item.

4.1.9 WAIS

WAIS (Wide Area Information Search) is a database system for looking up information contained in files and libraries on the Internet. Veronica and Archie search file headers, but do not search the contents of the files themselves. Wais lets you search through Internet files for articles containing your search criteria.

WAIS creates indexes by searching through predefined documents which a particular WAIS server can use. As a result of the nature of WAIS searching, searching tends to be complex and time consuming. For this reason, dedicated WAIS servers do not cover every document available on the Internet, and are subdivided into interest group and locality WAIS servers. USA WAIS servers will tend to hold USA document indexes only and similarly European servers will only hold European documents.

To make a document available for a WAIS server, an index must be created for that particular server to use in a search. When a WAIS client searches a WAIS server, it searches this index for occurrences of the search request.

There are a number of WAIS servers on the Internet. These include both public and private servers. A list of public WAIS servers are listed in Table 13. To access the public servers, telnet into the WAIS server. You will be presented with a text-based WAIS client (SWAIS). You can now issue a WAIS search query. A Windows-based search engine can be obtained from:

```
ftp://ridgisd.er.usgs.gov/software/wais
```

Table 13. Public WAIS Servers		
Name	**Login**	**Location**
info.funet.fi	wais	Europe
swais.cwis.uci.edu	swais	West USA
cnidr.org	demo	East USA
sunsite.unc.edu	swais	East USA
quake.unc.edu	wais	East USA

In a WAIS server, there is a full-index of all the documents on the server. Most people do not use WAIS clients, such as SWAIS. They access WAIS servers using gopher or Web browsers.

4.1.10 Whois

One of a number of problems on the Internet is although there are millions of
users who use the system, finding a user ID for mailing purposes can be very
difficult and sometimes downright impossible. Normally the easiest way of
finding a user ID is to phone the person concerned and ask him for his user ID.

Another way of getting a user ID is to use the whois command.

Whois is:

- The name of an InterNIC white pages directory wherein one can find where
  an end-user might be located
- A general kind of white pages directory
- A command used to access the white pages directory

The original InterNIC directory was maintained by the Defense Data Network
(DDN) and the Network Information Center and at its peak contained 70,000
entries. In its prime you were automatically listed if your had any authority over
an IP network; in addition, anyone who wanted to be listed could get into the
directory at their request.

With ARPAnet no longer supporting the Internet, the DDN NIC stopped supporting
a global white pages for the Internet. The DDN NIC directory still exists, but it
only supports the MILNET. Currently the registration services portion of the
InterNIC maintains the whois directory for non-military network and domain
contacts.

On the original whois white pages, any Internet user who wished to appear on
the InterNIC white pages, simply sent an E-mail note to Internic requesting that
he be added to the white pages. The new whois directory does not accept
random listings from people who want to be included. It is restricted to people
with authority over some portion of the Internet. People who connect to the
Internet through a service provider using protocols such as PPP or SLIP are
viewed as having no authority over the Internet. If you are responsible for a
registered network, and you do not appear in the whois listing for your network,
you should contact InterNIC to have this rectified.

To use the whois command, you need to telnet to a server which supports the
whois command. If you cannot telnet to a server which supports the whois
command, telnet to internic.net. If you are connected to the Internet through a
firewall, you will have to use a proxy logon to your firewall, then telnet to
internic.net. You do not need a user ID to log on to internic.net. To run the
command, type whois followed by the last name of the person or company you
are looking for, as follows:

```
telnet tollbooth3.cmp.ibm.com
tollbooth3: whois isg
ISG Advanced Open Systems (PTY Ltd (NET-ISGAIX-ZA) ISGAIX-ZA 196.14.32.0
ISG Technologies (ISGTEC-HST)                NS.ISGTEC.COM 204.92.192.2
ISG Technologies (NETBLK-NETBLK-ISGTEC) NETBLK-ISGTEC
                                    204.92.192.0 - 204.92.207.0
ISG Technologies Inc    (NET-ISGTEC-NET1) ISGTEC-NET1 192.139.45.0

The InterNIC Registration Services Host contains ONLY Internet
Information (Networks, ASNs, Domains and POCs).
tollbooth3:
```

You can also use whois through E-mail. If you do not have telnet available to you or your firewall does not support proxy telnet sessions, you can use whois via a mail session. To do this, use your internet E-mail program to construct a message as follows:

```
mail mailserv@internic.net        use a mail server
Subject                           no subject necessary
whois isg                         specify the whois you wish to query
.
```

This can be used from the IBM office system using the INOTE command in the same way, as follows:

```
inote mailserv@internic.net       use a mail server
Subject                           no subject necessary
whois isg                         specify the whois you wish to query
.
```

There is a whois service dedicated to purpose of obtaining addresses for users of the Tollbooth gateway on the NIC@VNET.IBM.COM server. This whois service enables users, internal and external, to look up addresses of IBMers who are registered with the VNET gateway. To use this service, you must send an E-mail to NIC@VNET.IBM.COM. The subject of your note should contain ″WHOIS <name>″ only, where <name> is the last name of the user in question, as follows:

```
mail nic@vnet.ibm.com      use a VNET whois server
Subject>whois denton             find out the details of * denton
                                 registered to use the IBM VNET Gateway
```

4.1.11 NewsReader

Sending news on the Internet involves subscribing to and sending articles to bulletin boards on topics of particular relevance to the article being sent. These bulletin boards are organized into newsgroups. A news reading program is required to read articles within a newsgroup. Newsgroups are organized on a hierarchical basis, with the major heading first, followed by subgroupings, all separated by a period. For example:

```
comp.sys.ibm.pc.hardware.comm
```

To read Internet news, you require a news reader client application. The news reader application will need to be set up to contact a news server. A news server collects news items from the following sites:

- USENET. USENET is a network based upon a set of rules for passing news documents. It is made up of the following seven newsgroup categories:

  - comp. Covers computer related articles.
  - news. Covers network news and software.
  - rec. Group discussing hobbies and recreational activities.
  - sci. Discussion group on scientific research and applications.
  - soc. Covers social issues.
  - talk. Group debates on controversial issues.
  - misc. Anything that might not fit into any of the above categories.

- Clarinet. Clarinet broadcasts news items from traditional wire services. This is not a free service, as is the case with USENET.

- Local News sources. Local groups are known as alternative news group hierarchies. The most common alternative newsgroups are:

  - alt. Covers some strange newsgroups. Discussions tend to be out of the mainstream.
  - bionet. This covers items of interest to biologists.
  - bit. BITNET discussion group.
  - biz. Discussion group on business items. This group also includes advertisements and other marketing. Such activity is not allowed on other newsgroups.
  - de. Covers issues in German.
  - fj. Covers issues in Japanese.
  - IEEE. Discussions related to the Institute of Electronic and Electrical Engineers (IEEE).
  - Mail reflectors.

To ensure that all newsgroups are available to users on the Internet, a news server's administrator makes agreements with other news server administrators to transfer certain newsgroups over the Internet, between each other. In this manner, newsgroups are promulgated throughout the Internet, as shown in Figure 78 on page 122.
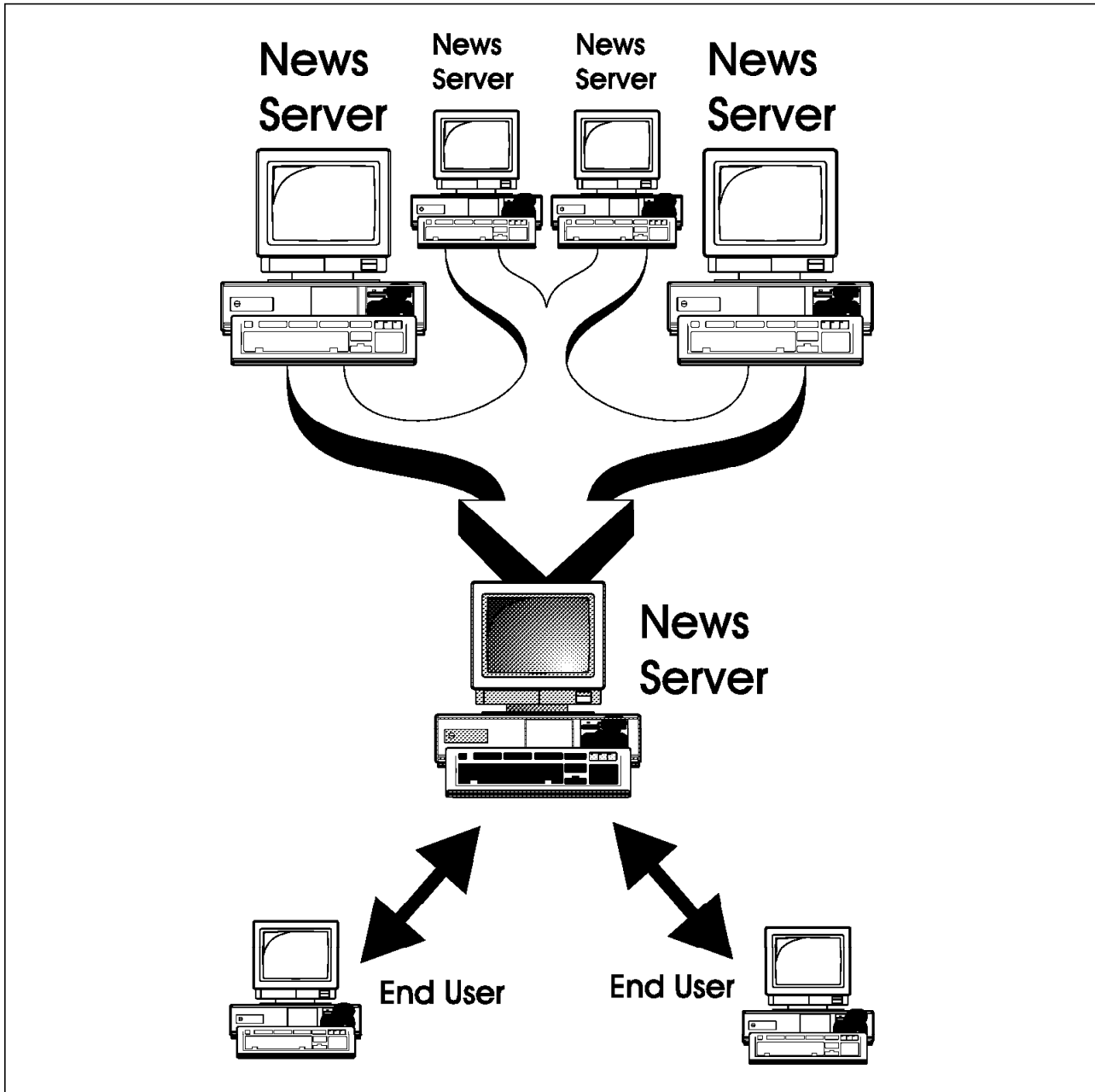
Figure 78. Newsgroup Distribution

The news server will hold these articles for a set length of time, as specified by the news server administrator.

There are a large number of news servers on the Internet. Each service provider normally provides their own news server. The IBM Global Network Advantis news server is located at:

```
news-s01.ny.us.ibm.net
```

4.1.11.1 SMTP, POP and MIME Mail Servers

Most Internet users start by using the system to send electronic mail. Mail involves sending an electronic mail message to a user@location.

Four methods exist for sending E-mail on the Internet. These are as follows:

- SMTP (Simple Mail Transfer Protocol)
- POP (Post Office Protocol)
- IMAP
- PCMAIL

SMTP is the underlying transmission mechanism for much of the Internet mail. SMTP is a simple peer-to-peer model. Each host that wants to receive mail will set up an SMTP server. When mail is sent, it will be received by the SMTP server. You will then contact the local SMTP server to look at your mail.

POP is a protocol designed to handle the problems of having to log into the mail server to get your mail, and to rather have the client fetch the mail from the mail server. The POP server must be running POP-compliant code. The client will then contact the POP server which will transmit the client's mail to the client, as shown in Figure 79.
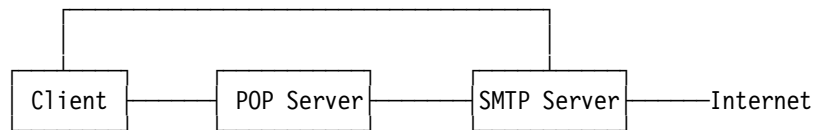
Figure 79. Client Mail Protocol

The mail client provided in IBM Internet Connection for Windows supports POP V3 as well as SMTP.

The latest POP version is RFC 1460 (POP V3).

The SMTP standard for sending mail on the Internet complies with the RFC 822 standard. The RFC 822 specifies the format of the mail handlers, so that different systems can handle each other's mail. The RFC 822 standard handles only plain ASCII data.

In the ever expanding Internet world, messages are being constructed with multiple object types. Unlike the RFC 822 mail servers, which need to UUCODE and UUDECODE objects to be able to send multiple object data types, such as image and audio data, a new RFC has been proposed to handle multiple object types.

RFC 1521 was proposed to handle multiple mail object types. The mail extensions referred to in RFC 1521 are known as Multipurpose Internet Mail Extensions (MIME). MIME specifies how to encode binary data and encapsulate non-ASCII attachments to electronic mail. MIME is a specification for automatically sending objects other than text in E-mail messages. The MIME specification is also used by the WWW to transmit its HTTP messages. MIME is more of a function of the client code than the mail server itself which, to be MIME compliant, must not alter the mail message in any way.

MIME mail clients know how to process several different file attachments themselves, in particular:

- Image data
- Audio data
- Video data

MIME users will send their mail using MIME-compliant mail client software. This software will do the necessary file imbedding. The mail will be sent to a MIME-compliant mail server, which will route the mail to its final destination. The mail recipient then requires MIME-compliant client and server code on their system to be able to read the MIME imbedded objects.

The UltiMail Lite package provided in OS/2 Warp Connect is MIME compliant.

Occasionally you may wish to send binary data through the Internet mail. Individual files are conventionally sent via FTP. FTP has the following shortcomings for transferring files:

- E-mail can access more sites than FTP, as seen from Figure 4 on page 6.
- FTP cannot send a binary file to many users at once.
- FTP cannot send a binary file to newsgroups.

If you wish to imbed binary objects in your mail, you will need to ENCODE them into ASCII format. RFC822 only supports sending mail in ASCII format. To imbed a binary image file in your mail, you should do the following:

1. PC-DOS users must down load UUCODE and UUDECODE from the Internet. If the reader can access the IBM Internal PCTOOLS disk, they will find the UUCODE utility on the PCTOOLS disk. The UUCODE software can be found by using anonymous FTP to fas.hardvard.edu. Once logged in using anonymous FTP, cd /pub/smt/mto/software. Transfer the UUREM413.EXE file in binary format. This is a self-extracting DOS file containing the UUCODE and UUDECODE programs.

2. From the DOS shell: `C:>UUCODE file.bin < file.bin >file.asc`

3. Run mail program

4. Insert the binary encoded data using the r command, `r file.asc`.

when the recipient receives the mail, they will need to decode it as follows:

1. Save their mail message, using the save file function.

2. From the DOS shell: `C:>UUDECODE saved file.bin`

The IBM Global Network Advantis POP server is MIME compliant. The IBM Global Network Advantis mail servers are located on:

```
smtp-gw01.ny.us.ibm.net        - SMTP Server
pop02.ca.us.ibm.net            - POP Server
165.87.194.244                 - NAME Server 1
165.87.201.244                 - NAME Server 2
165.87.194.250                 - Config Server 1
165.87.201.250                 - Config Server 2
129.37.1.60                    - Registration Server
ibm.net                        - Mail Domain
```

4.1.11.2 FTP and FTP Servers

You can transfer files between your local client workstation and a remote host, using the FTP and TFTP file protocols. FTP is a file transfer protocol and TFTP is a trivial file transfer protocol. TFTP provides less functionality than FTP. The FTP protocol is used more often than the TFTP protocol. To use FTP, you must identify yourself to the host with your user ID and password. If you do not know an ID on the remote host, use the anonymous user ID, and your username@host as your password. TFTP does not require a password or user name, and is hence not often used.

Once you are signed onto the remote host using FTP, you can issue a cd subcommand to access the directory from which you wish to transfer files. If the files are binary, issue the im subcommand, or if the file is ASCII, issue the as subcommand. You can then get the files using either get or mget subcommands. The mget subcommand allows you to transfer multiple files, while get applies to single files.

Refer to the platform-specific TCP/IP documentation for more details on transferring files.

The FTP command is not well suited to copying recursive and imbedded directories when copying multiple files. You will often find that the end user has created a TAR or ZIP file containing both the file data and imbedding structure up front. You will then have to transfer one zipped file over in binary format. You will then have to unzip the file on your local host.

FTP requires a full Internet connection. Prodigy dial-in connections and IBM (non-TCP/IP) VM sites do not support the FTP command. Some Internet users only have mail access to the Internet through gateway protocols. You can use E-mail to send files across the Internet using UUCODE and UUDECODE. The reverse is also true but not as straightforward if you are trying to get files without the mail UUCODE imbedding, which requires that someone mail you the file from the remote site. You can use mail to receive files from FTP sites. These specialized sites are termed FTP servers. To do this you would send the FTP site a special mail message, which the FTP server will receive, and then send the files back to you as mail. The mail data is not sent in MIME format. The end user will have to use UUDECODE to receive binary files on his site, as all mail is sent in ASCII format. A list of selected FTP servers is shown in Table 14.

Table 14. FTP Servers	
Name	**Area**
ftpmail@decwrl.dec.com	United States
ftpmail@ieunet.ie	Ireland
bitftp@vm.gmd.de	Germany
bitftp@pucc.princeton.edu	United States
bitftp@plearn.edu.pl	Poland

The IBM Global Network Advantis FTP server is located at:

```
165.87.194.246
```

To use these file servers, first send a message with the single word help,
followed by a colon on the next line. For example:

mail ftpmail@decwrl.dec.com
Subject:
help
:

This can be used with the VM INOTE command. The decwrl.dec.com help file is
listed in Appendix E, "TCP/UDP Service Protocol Usage" on page 177. Do not
use servers if you have FTP capabilities at your site.

FTP servers can take days to send the mail files back. So be patient.

4.1.11.3 Gopher Servers
The Internet Gopher allows you to browse through the Internet using a series of
menus. These menus are based on gopher servers. The IBM Global Network
Advantis default gopher server is located at:

```
gopher.www01.ny.us.ibm.net
```

4.1.11.4 Proxy Servers
A proxy server, or application gateway, secures traffic for a particular TCP/IP
application. The proxy server will authenticate users for remote applications.
Proxy servers are normally used for security reasons, such as in a firewall.

The IBM Internet firewall proxy servers are located at:

```
IBM SIDE

 tollbooth.cwp.ibm.com 198.74.69.200
tollbooth2.cwp.ibm.com 198.74.69.111
tollbooth3.cwp.ibm.com 198.74.69.100

INTERNET SIDE

 tollbooth.vnet.ibm.com 192.124.113.9
tollbooth2.vnet.ibm.com 192.124.113.10
tollbooth3.vnet.ibm.com 192.124.113.100
```

4.1.11.5 Socks Servers

A socks server intercepts and redirects TCP/IP requests that cross between two portions of the Internet. The socks server will intercept each TCP/IP request, validate its user ID, and check for authorization to go into or out of one area of the network to another. Applications such as telnet, ftp, finger, gopher and mosaic can be handled through a socks server. In such a way, a socks server can pass Internet traffic without the traffic violating the system security. Applications need to have been compiled to use a socks server. Such applications are termed socksified applications.

Normally socks servers have one secure network interface and one insecure network interface. When the server receives a socksified request from one side of the network, the sockd daemon is spawned by inetd. The socks server:

- Intercepts Socksified TCP/IP requests on the TCP/IP socks port 1080
- Validates the user
- Pipes the request onto the Internet

IBM uses socks servers internally through a firewall. The IBM firewall socks servers are located at:

```
IBM SIDE

 tollbooth.cwp.ibm.com 198.74.69.200
tollbooth2.cwp.ibm.com 198.74.69.111
tollbooth3.cwp.ibm.com 198.74.69.100

INTERNET SIDE

 tollbooth.vnet.ibm.com 192.124.113.9
tollbooth2.vnet.ibm.com 192.124.113.10
tollbooth3.vnet.ibm.com 192.124.113.100
```

4.1.11.6 Search Engines

As mentioned in the Chapter 1, "Overview" on page 1, finding documents and objects on the Internet involves scanning through vast numbers of sites and files. Besides Archie, which searches FTP sites, numerous other commands are available which can be used to search the Internet. Listed in Table 15 are the locations of a number of the more useful search engines available.

Table 15 (Page 1 of 2). Search Engines on the Internet		
Description	**Location**	**Notes**
http://www.directory.net.	Searching for Commercial sites on the Internet.	Contains a comprehensive list of companies and commercial organizations connectable via the Internet.

Table 15 (Page 2 of 2). Search Engines on the Internet		
Description	**Location**	**Notes**
Search the World-Wide Web	http://w3.raleigh.ibm.com/search.html	Contains a full list of search engines available on the WWW.
Webcrawler	http://webcrawler.cs.washington. edu/WebCrawler/WebQuery.html	One of the most comprehensive search engines on the WWW.
Yellow pages	www.yellow.com	WWW yellow pages (commercial and educational sites)

4.1.12 Retrieving RFCs

Throughout this book, we have referred to many RFCs. These are the Internet documents that are used for everything from general information to definitions of the TCP/IP protocol standards. This section will cover how you can obtain these over the Internet. The tools you will need to use these are described in more detail throughout the book.

The most common method for obtaining an RFC is via anonymous FTP. RFCs are stored at many different sites around the world. A selection of sites are listed in Table 16.

Table 16. RFC Sites	
Host Name	**Location**
nic.ddn.mil	US (eastern)
ftp.nisc.sri.com	US (western)
nisc.jvnc.net	US (eastern)
nnsc.nsf.net	US (eastern)
munnari.oz.au	Australia
funet.fi	Finland
sunic.sunet.se	Sweden
chalmers.se	Sweden

There are three files that can help you handle a large number of RFCs. These are located in the *netinfo* directory at nic.ddn.mil.

```
rfc-index.txt
rfc-by-title.txt
rfc-by-author.txt
```

You must download these files using anonymous FTP.

While anonymous FTP is the fastest and most commonly used way to get an RFC, some sites cannot use FTP. You can also get RFCs through electronic mail. Getting RFCs using mail is not standardized at all the sites. Two methods exist in getting mail RFCs. The choice of which method to use depends on the site you are using, and the case of trial and error suffices in which method to use. We have included an example of each as follows:

```
mail sendrfc@nisc.jvnc.net       use a send server
Subject RFC 822                  specify requested RFC
                                 Null message


mail mail-server@nisc.sri.com     use a mail server
Subject RFC 822                  specify no subject
send rfc822                      specify the RFC you require
```

Chapter 5. IBM on the Internet

The question often arises: "*Is IBM committed to the Internet?*". The answer is simply YES: IBM is committed to supplying products which provide easy access to the Internet as well as making it more manageable and secure for those using the Internet. IBM is increasing its commitment daily, including providing software support and supplying announcement letters on the Internet. IBM has developed Internet-specific software for Windows 3.1, OS/2 and AIX. It has provided WWW servers for the AIX and OS/2 platforms. It is planning to provide WWW servers for the MVS, VM and OS/400 platforms. The IBM home page was launched in May 1994. IBM has more than 10,000 objects on the WWW. IBM has supplied both Internet products and services, through the IBM Global Network and its relationship with Advantis.

IBM and the IBM Global Network are members of CommerceNet, a consortium of companies working to help shape the direction of online commerce, including electronic data interchange (EDI).

IBM research is a member of the Internet Engineering Task Force. This larger body contains an IP security work group, which is working to define an Internet standard for IP tunnels. IBM is a member of this work group. IP Tunnels provide end-to-end security between workstations communicating over the Internet over different gateway protocols.

As can be seen from Chapter 2, "Internet Networking Overview" on page 11, IBM was one of the founding partners in both networking and providing workstations for the Internet. Connections to the Internet have been created from every one of its main software architectures, from OS/2 with dedicated Internet connection software through to the host-based VM and MVS TCP/IP Telnet and FTP sessions.

IBM is developing a broad range of products and technologies to improve the methods of searching and retrieving of information from the Internet. These include:

- New authoring tools for HTML
- New search technologies
- Distributed Computing Environment based technologies over the Internet
- Support for electronic commerce with new authentication, encryption and security services

Support for Internet connections is provided using the methods listed in Table 17 on page 132.

Table 17 (Page 1 of 2). Internet Software Platform Support			
Software platform	**Protocol**	**Internet connection**	**Notes**
MVS	TCP/IP	SMTP Telnet FTP PING Routing (Static and Dynamic) HTTP Web Server	Simple connections to service providers using standard TCP/IP commands.
VM	TCP/IP	SMTP Telnet FTP PING Routing (Static and Dynamic) HTTP Web Server	Simple connections to service providers using standard TCP/IP commands. The IINUS1 mail gateway machine is located in Tampa, Florida. VM/RSCS V3.1 and VM/TCPIP V2.2. The gateway uses SURAnet as its Internet service provider. For performance reasons there is direct connectivity between the gateway and several VNET backbone systems (WPLBB and PKEBB). The VNET nodeID of the gateway is IINUS1. The Internet domain name for the VNET network is VNET.IBM.COM The IBM VNET/Internet gateway has been designed by Advantis/IIN and IBM's Inter Enterprise Systems group (IES). The gateway is an Advantis owned and managed system.
OS/400	TCP/IP	SMTP Telnet FTP Static routing	Simple connections to service providers using standard TCP/IP commands.

Software platform	Protocol	Internet connection	Notes
AIX	TCP/IP	SMTP Telnet FTP Finger SLIP and PPP (PPP via third party software) PING POP Routing (static and dynamic using routed and gated) Gopher WWW NetSP (Firewall) USENET (NNTP News Subscriptions)	From simple to complex Internet configurations with multiple tasking support.
OS/2	TCP/IP	SMTP Telnet FTP SLIP and PPP Finger PING Routing USENET (NNTP News Subscriptions) Gopher WWW	Dedicated connections to service providers using both IBM Internet-specific and standard TCP/IP commands with multitasking support.
DOS and Windows	TCP/IP	SMTP POP Telnet FTP Finger SLIP and PPP PING USENET (NNTP News Subscriptions) Gopher WWW	Dedicated connections to service providers using both IBM Internet specific and standard TCP/IP commands.

Table 17 (Page 2 of 2). Internet Software Platform Support

IBM provides product announcements on the Internet using an announcement server. This listserver automatically supplies an Internet E-mail user with new announcement information from selected categories.

To register with the listserver:

1. Send an E-mail to announce@webster.ibmlink.ibm.com. The keyword subscribe must be your first and only word in the mail. Leave the subject blank.

2. You will be sent a category form.

3. The announcement categories include:

   • Large Systems (Mainframes, Enterprise Systems and Large Scale (HW110)

   • AS/400 Business Computing Systems and Servers (HW120)

   • Advanced Work Stations (RISC/6000, AIX) (HW130)

   • Personal Systems (PC Series, Thinkpads) (HW140)

   • Supercomputers (HW150)

   • Parallel Processors (HW160)

4. Select the categories to which you wish to subscribe.

5. Resend this category form back to announce@webster.ibmlink.ibm.com.

6. Alternatively, send an E-mail message with the following form:

   mail announce@webster.ibmlink.ibm.com
   Subject:
   SELECT HW120 HW150

7. You can get detailed announcement letters by sending a get request to the listserver with a list of the requested announcement letters. You will need to get the announcement letters from the announcements received above. Send an E-mail message in the following form, where 199406 and 194401 are example announcement letters which you are requesting:

   ```
   mail announce@webster.ibmlink.ibm.com
   Subject:
   GET 194406 194401
   ```

5.1 IBM HTTP Sites

IBM has numerous WWW home pages, including those at the following HTTP sites:

   • http:/www.ibm.com
   • http:/www.ibm.net/adv
   • gopher:/os2info.gopher.ibm.com

Refer to Chapter 9, "Commercial Usage" on page 159 for more details on IBM HTTP sites. IBM provides both public and internal web servers. The internal web servers cannot be accessed by the Internet at large. The IBM web servers are located in the ibm.com and ibm.net domains.

IBM has product-specific web servers for OS/2 and AIX sites.

5.1.1 IBM FTP Sites

IBM customers with Internet access can obtain software maintenance including OS/2 CSDs and AIX fixes at software.watson.ibm.com. FTP to this machine with a user ID of anonymous.

This server is restricted to customers. IBM personnel cannot use the anonymous login ID, and must obtain the CSDs via internal routes.

Another FTP site that is used by IBM's WebExplorer Client/Server group for providing software maintenance is ftp.ibm.net.

IBM personnel can obtain selected software maintenance for the OS/2, DOS/Windows and AIX platforms via anonymous FTP from software.tcp.raleigh.ibm.com (9.67.111.134).

5.1.2 AIX Sites

AIX and CATIA PTFs can be retrieved across the Internet using the AIX FixDist utility.

The following has been extracted from the IBM Direct documentation.

FixDist (SM) is a powerful user friendly service tool for downloading AIX and AIX related fixes. The latest version introduces support for proxy FTP. With proxy FTP, an intermediate server need only support proxy sessions between the IBM FixDist server(s) and your client application running AIX 3.2. This is provided as a free service and allows AIX customers with the latest fixes. A connection to the Internet is required. FixDist is supported on AIX 3.2.5 or later, and AIXwindows 2D Version 1.2 or later. If AIX Windows is not running on the system, an ASCII curses version of FixDist will be used. Currently, there is one server established in Boulder, Colorado. IBM will be introducing FixDist servers in key locations worldwide. The IBM Boulder server (aix.boulder.ibm.com) maintains the FixDist server. This listing is available via anonymous FTP in the directory:

`/fixdist_servers/FixDist.list`

The FixDist client code can be downloaded from the anonymous FTP site:

`aix.boulder.ibm.com (198.17.57.66)`

Included in Appendix F, "FixDist Installation Instructions" on page 179 are the installation instructions for FixDist. With FixDist, customers can view fixes by fix number, APAR number, product name or subsystem name. Once a fix is selected, the utility attempts to deliver only the necessary fixes to satisfy all requisites. This speeds up delivery of the package because all fixes may have already been received and hence don't need to be downloaded.

5.1.3 Other Sites

CATIA and CADAM defect/non-defect data can be transferred to the IBM
Customer Support Center via the Internet. To send or receive information do an
anonymous FTP to testcase.boulder.ibm.com or 198.17.57.67. Then cd to
/cadcam/toibm for sending and /cadcam/fromibm to receive data.

IBM customers with Internet access can get most IBM software fixes from
software.watson.ibm.com. FTP to this machine with a user ID of anonymous.
Amongst others, the following directories are maintained on this server.

- OS/2
- DB2
- MVS
- Security
- AIX4

Chapter 6. Security and Firewalls

6.1 Security

Computer security on the Internet has become a contentious issue. When the Internet was first created, it was viewed as being an open system to all. The need for security on the Internet should be obvious. It is being used for military, education, and commercial uses. Each area requires different levels of security to keep unwelcome intruders out. There is always a trade-off to be made between computer security and system functionality. Two types of security violations can occur on the Internet:

- Passive attacks. These involve tapping communications lines. This type of attack is difficult to detect.
- Active attacks. These involve someone trying to get into your system using conventional TCP/IP and Internet commands. These are easier to detect. The Satan program has been developed on the Internet to test your system for such attacks. The Satan program can be obtained at:

  ftp://ftp.win.tue.nl/pub/security.

  Satan requires PERL V5 to run. The PERL shell script language can be found at numerous locations on the Internet.

The United States Military Department of Defense (DOD) developed a set of security level standards which systems accessing DOD should comply with. These systems ranged from top security A1 systems downwards through Class B, C security. Few systems on the Internet meet even Class C2 security standards.

Much of what is transmitted on the Internet is for all practical purposes, in full view for all to see. E-Mail is the most commonly used service on the Internet. Most mail is passed on plain ASCII text. The general user might not be concerned that someone may be able to read his mail. However, with the Internet becoming a vehicle for business transactions, paying bills and credit card purchases, the conventional Internet will need to become far more secure.

With systems being required to conform to higher levels of security, this raises the topic of the higher administration workload to manage these systems.

Besides the need to conform to higher levels of system security, another security problem area exists in program bugs. This security risk area can be reduced by reducing the amount of programs running on an Internet server. Reducing the number of programs, reduces the number of potential bug security violations. The most famous of these was the sendmail command, which has been used as the entry point for hacking attacks over the last few years.

The final method used to break into systems involved breaking easy passwords. System hackers can use a dictionary of common words and people's names and run this dictionary against a user password until a match is found. Passwords on the Internet are stored using encryption algorithms. The password encryption is based on the data encryption standard: Crypt.

A list of security holes has been included in the ITSO redbook *Building a Firewall With the NetSP Secure Network Gateway*, GG24-2577.

A new HTTP security group was proposed in December 1994. This group was tasked with defining requirements and specifications for the provision of security services to HTTP. Three security protocol extensions have been proposed by this group. These are:

- Shen. Secure CERN. Developed by CERN.
- Secure HyperText Transfer Protocol (SHTTP). Developed for CommerceNet, of which IBM is a member.
- Netscape Communications Secure Socket Layer (SSL). Developed by Netscape.

These new protocols support a variety of security mechanisms to HTTP clients and servers. Several encryption models will be used in these protocols, including PGP (Pretty Good Privacy). PGP can be used with the Mail function, although this is not standardized yet. PGP contains encryption algorithms which use two-level encryption. The first level, called ciphertext data, encrypts the data with a public key and linked to a set of users. This public key will have a corresponding private key associated with the user. Public key technology uses two keys: a secret private key and a complementary public key. The two keys are related, so that when a file is encrypted using the public key, only the complementary private key can decrypt the ciphertext. Thus the public key can be shared across the Internet with the assurance that without the corresponding private key, a secure file cannot be compromised. This will allow servers to distribute open ciphertext files which can only be read with PGP compliant software programs. If the file recipient wanted to look at the ciphertext file he would need to enter their single level key to unlock the file.

The PGP program uses RSA public key technology to do the encryption.

The IBM WebExplorer is expected to contain SHTTP security in the next release.

Once programs become SHTTP, SSL, or Shen compliant, commercial use of the Internet is expected to grow.

6.2 Firewalls

Company security used to be a simple matter. Companies maintained their own computer networks separate from other networks. The wide open connectivity of the Internet can give you many security problems. You will need to protect both your own private data as well as access to the machines inside your corporate network from abusive external use. The first step to achieving this is to limit the the number of points at which the private secure network is connected to the unsecured Internet. If you have one unique path, you gain a lot of control over which traffic to allow into and out of the Internet. This traffic needs to be controlled by a firewall.

The IBM NetSP (Network Security Program) is a network security firewall product. It is available on AIX on the RS/6000. The firewall premise works along the idea that the firewall is set up between a secure network and an insecure network. The insecure network being the internet, as shown in Figure 80 on page 139. The firewall requires two network cards. Each card needs to have different IP addresses and subnets. The secure network can be set up using a private IP address.
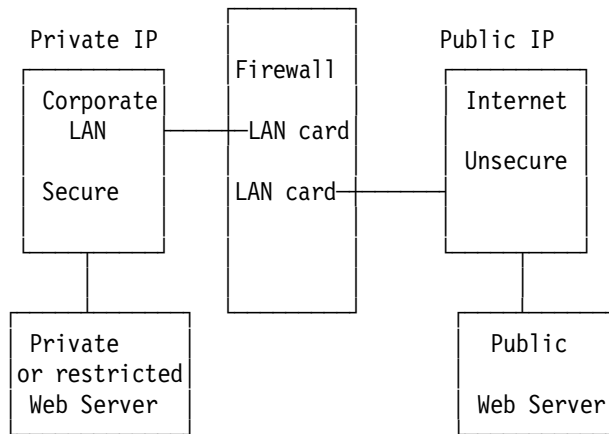
Figure 80. Firewall Access Showing Multiple Network Cards

The installation of the NetSP product is covered in the IBM redbook *Building a Firewall with the NetSP Secure Network Gateway*, GG24-2577 and *Installation, Configuration and Administrative Guide to the NetSP Secured Network Gateway for AIX*, SC31-8113.

To be able to access each network, individual requests must pass through the firewall. The firewall can hence be used to control access from the secure and unsecure sides of the network. The Private LAN can be set up with a private LAN IP range of addresses, as discussed in Chapter 2, "Internet Networking Overview" on page 11. The public IP address must be obtained from a service provider or the Internic. A public IP address must be assigned to the unsecure LAN adapter. A private or public IP address can be assigned to the secure LAN card.

Three methods of restricting access to a secure network when using NetSP SNG (Secure Network Gateway) firewall are:

- IP screening and filtering. This allows all packets passing through the firewall to be screen and validated. All datagrams are validated against IP validation rules. These rules specify which IP packets can pass through the firewall. The rules provide controls to decide which packets are passed and which are blocked using a deny and permit status. This security validation in itself is not sufficient, as it can be by-passed through IP spoofing (invalid IP addresses).

- Proxy serving. This tool runs as a background daemon. It allows an internal user using normal TCP/IP commands to access the non-secure Internet. The user has to be given an ID on the firewall. The user will first access the firewall. Having successfully accessed the firewall, he again has to re-issue the TCP/IP command again to reach the desired workstation on the unsecure Internet. The two proxy TCP/IP services supported are FTP and telnet. User cannot access the secure network using the FTP command. Most firewall sites restrict telnet access from the unsecure network. FTP services should be set up such that a user must issue the site command to access FTP sites outside the firewall, and should not be given write access to the firewall.

- Socks Server. Socks is an emerging standard for application gateways. The socks server will intercept all socks-level application calls on the firewall, validate them and pass them on. Unlike the proxy server, applications need to be compiled to use the socks server. This process is termed socksification. Unlike the proxy server, a user does not log onto the firewall,

and hence does not require a user ID on the firewall. The NetSP SNG provides the following four socksified client commands:

- Telnet

- FTP

- Finger

- Whois

The client files are prefixed with an r in each case. This code can be freely distributed from the SNG onto other RS/6000s in your network.

The OS/2 Warp connection can be set up to use a socks server to connect to the Internet. The NetSP provides one socks server to intercept and redirect all TCP/IP requests at the firewall. It handles data to and from many socksified TCP/IP applications such as Telnet, Mosaic, Gopher and OS/2 WebExplorer. With the sockd daemon installed on the firewall host, users in a secure network can safely access remote hosts on the Internet. To cross the firewall, these users must use programs that are designed to work with a sockd daemon. This program allows clients to use their webrowsers without breaching the security of the internal network. The firewall host that runs the sockd does have to be open to the internet, and requires specialized security. The socks process runs as follows:

1. A user starts a socksified client application, such as the OS/2 WebExplorer.
2. WebExplorer must be set up to use a socks daemon. This is set up using the server configuration menu. The user would enter the secure network IP address of the socks server.
3. WebExplorer sends a request to the socks server on the firewall host.
4. The sockd checks the user identity, and then connects the user to the remote host. This checking is done using the user's IP address. Basically, the sockd validates that the user comes from the secure network side.
5. After establishing the connection, the server sets up a secure IP stream for the duration of the connection.

Using a firewall, an Internet connection can be set up as shown in Figure 81 on page 141.
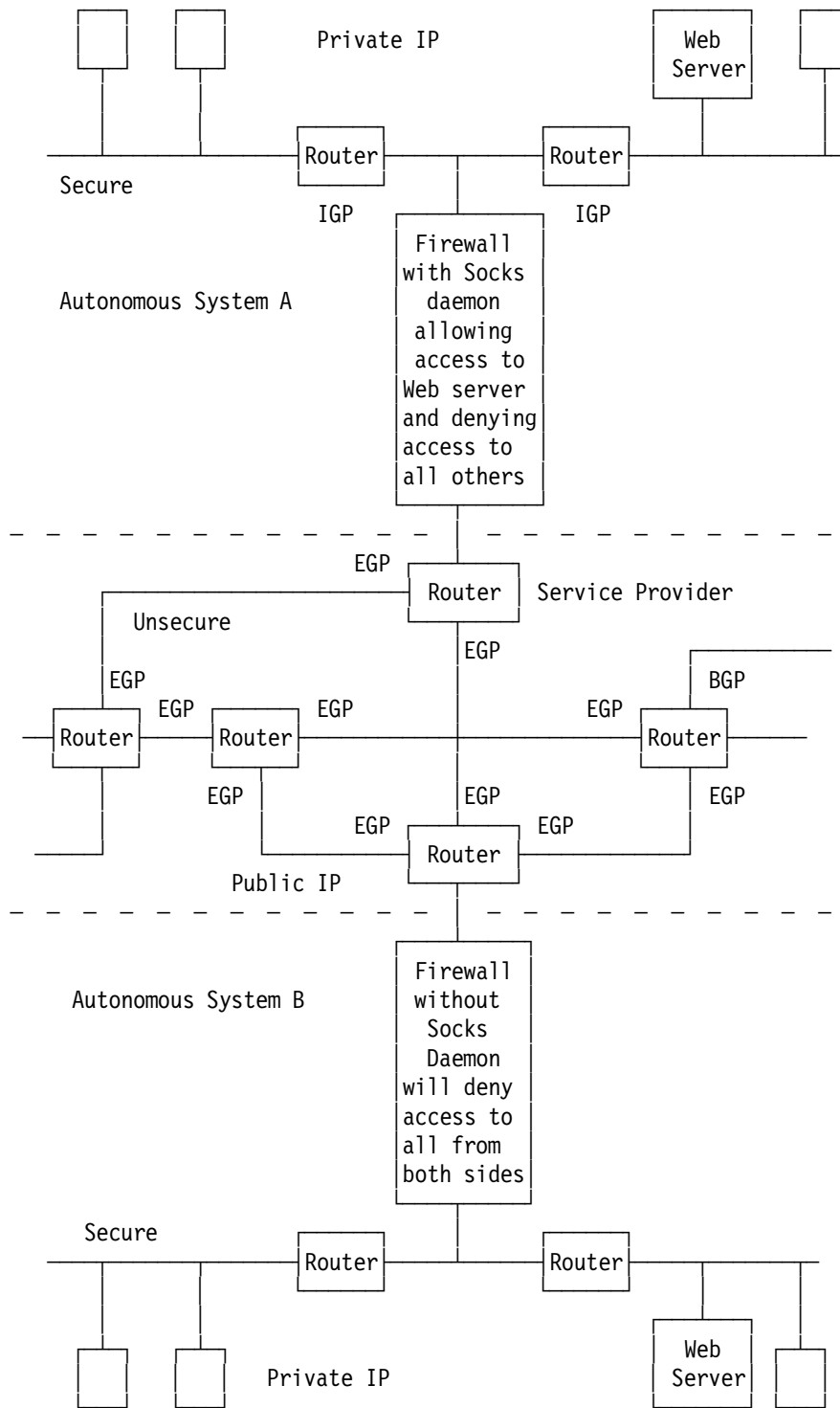
Figure 81. Internet Routing. This diagram shows a typical Internet setup. The Web server on autonomous system A will be accessible to all inside system A. External users would access the Web server through the socks daemon running on the firewall A. Internal users would be able to access other web servers on the unsecure Internet. The firewall B, which is not running the socks daemon, will restrict traffic from both sides of the firewall. The traffic on the network will be routed using IGP, EGP and BGP routing protocols.

The NetSP can manage full World Wide Web access to the firewall from the secure network to the unsecure network. The reverse is not true. The NetSP

product restricts unsecure access for security reasons. For this reason, some of the WWW access protocols are not permitted. The main vehicle for WWW documents is the HTTP tool. HTTP is a stateless protocol; that is, the server retains no continuing information about a client. The basic HTTP exchange is a simple request-response sequence, as follows:

1. A request is sent from a client to a WWW server on TCP port 80 by default. This request is set up on the WWW server HTML script.

2. The response packets flow in the reverse path to the request along the same port as the originating request.

The web hyperlinks allow for FTP, gopher and NewsReader access. Firewalls are set up to deny FTP requests from outside the firewall. FTP file transfer through the firewall will be refused. If you are placing a public web server on the Internet, You should place your server outside the firewall. This will allow you to setup the web server to provide full WWW access onto your server.

Chapter 7. Placing Data on the World Wide Web

This chapter covers some aspects of providing information on the Internet. It also covers aspects of setting up a Web server, and creating your own Web pages using the HTML markup language. This section includes some basic HTML commands.

Since you have browsed the Web for a while and seen what is being put on the Web, you might want to put your own stuff on the Web as well. This section will cover getting your data onto the Web and setting up your own Web servers to provide the capabilities for others to see for your presentations.

Up to now, we have been describing connecting to the Internet as a client. The Internet has the capability of making every one both a reader of information, as well as a publisher of information. Data is distributed using common networking concepts, such as the client/server architecture. Each Web client site accesses a Web server site on the Internet. Each server request depends on the client requesting information. Browsers make requests to different servers depending on the hypertext link followed by the user. The servers do not keep track of the origin of the request and regard each request as a completely new request, even if it comes from the same client browser program.

To be able to put your data on the Web, you need to make to data accessible to others. This can be done using one of the following methods:

- Placing your data in service provider Web documents. Some service providers allow users to create their own Web documents, and include these in their own home pages. These Web pages are imbedded within the service provider's Web document. The service provider must approve the content of the document and can edit the document.

- Creating your own Web pages on service provider Web servers. Prodigy will be providing storage capabilities for their customers to create their own Web documents. This service allows you to create your own Web pages. You have full authority on the content of the page. The Web document is stored on the service provider's Web server. Service providers will charge for this service and the storage requirements of the data in your document.

- Set up your own Web server, onto which you can place your data. You then have complete control over the content of the Web document, as well as the storage capacity, processing power of the server, and line link speed.

Setting up a Web server is a lot more complicated than setting up a Web client program. This section gives a brief overview of the main issues involved. A public Web server can run on virtually any computer system that is connected to the Internet. IBM Web server support is provided on the MVS, VM, AIX and OS/2 platforms. Refer to Table 17 on page 132 for more information. Multitasking systems are better suited to running a Web server. A moderately sized UNIX workstation, such as the IBM RISC System 6000 Model C10, will usually handle a large web load. The limiting factor is likely to be communications bandwidth.

It is advisable to designate staff to be responsible for administering the Web server. Having presence on the Web is likely to have far-reaching implications for an organization. Decisions about implementation, site maintenance require managerial involvement at the highest level and the widest possible consultation throughout the organization.

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Web servers and browsers understand the following markup languages and file formats:

- HTML
- Postscript
- ASCII
- Image and Audio media

HTML is accepted as the standardized browser format. It is incorporated into both ASCII and GUI based browsers. The chapter will cover some of the basics of the HTML language.

Other document languages are being proposed by a number of vendors, but have not yet been accepted by the Internet browser developers as language standards. These include:

- Silicon Graphics 3D document development language
- Sun Microsystem Inc.'s Java WWW development language
- Netscape Communications Corporation HTML extensions

7.1 Running a Server

To set up a Web server, you should have the following resources:

- Operating system expertise
- Adequate server hardware
- HTTPD and HTML skills
- An external high-speed Internet connection
- Funding and commitment

The Web is an inherently open system. The very fact that a Web server is connected to the Internet, makes it open to security violations. You must set up your system security on the web server to restrict all logins from outside the server, and only allow web server requests to access the server. If you install a firewall on your system, you a recommended to place the server on the unsecure side of the firewall. If you have your corporate LAN connected to a public Web server, you must connect through the firewall. This allows the firewall security software to manage the socks and proxy security.

Web servers respond using the Multi-purpose Internet Mail Extensions (MIME).

You will need to obtain and install your server software. Once installed, you must configure your system so that the server is started automatically. Details on setting up a Web server are not covered in this redbook. More details can be found at:

http://info.cern.ch/hypertext/WWWW/TheProject

7.2 HTML Markup Language

The Hypertext Markup Language is used to describe the general structure of a document. It is not a page description language like Postscript. Postscript contains page size descriptions and font descriptions. HTML relies on the browser to provide the fonts. As numerous different types of browsers are used to access HTML documents, each based on different hardware types, a page size setting would be pointless. What might work well on one person's system will not necessarily work on another's.

HTML is available in three levels. All browsers support HTML Level 1. A second level, termed HTML Level 2, is now available. HTML Level 2 is similar to Level 1 with a few changes, one being the ability to support what is termed interactive forms. Most browsers available today support HTML Level 1 and Level 2. A third level of HTML has been proposed, but has not been standardized yet. The third level provides support for features such as tables and mathematical symbols. Level 3 is generally not supported by most Web browsers.

7.2.1 Document Structure

The section will cover organizing your data into such a format that it is presentable to other readers on the Internet.

When creating an HTML document you must plan the structure of your document. That is:

- If you want people to read your document, they must be in a presentable format. Placing data on the Internet is much like placing information in a newspaper. If the readers have difficulty in reading it, it will not get many readers.

- What information are you trying to provide?

- Whom do you intend the audience of your document to be? Many HTML documents on the Internet are merely artistic creations.

- Allow for both ASCII and GUI browsers.

- Create a storyboard of your document.

- Test your idea on others before going public.

- If the page will represent a business, get corporate approval of the document layout and information.

- Get examples of HTML documents on the Internet, and look at how they are structured. Pull down the HTML documents from the top 25 WWW sites (see Chapter 8, "Useful Internet Sites" on page 157). Note that some HTML documents and images are copyrighted.

7.2.2 HTML Structure

All HTML documents have a basic structure, as follows:

```
<HTML>
<HEAD>
<TITLE> This a test title </TITLE>
</HEAD>
<BODY>
.......
```

```
</BODY>
</HTML>
```

This will give a WWW page as shown in Figure 82.

Figure 82. HTML Example

7.2.2.1 HTML Header Structure

HTML Tag: Every HTML element has a begin tag and an end tag, for example, HTML and /HTML. The first document structure tag is the <HTML>, which indicates that the content of this file is in the HTML language. All of the text and HTML commands in your HTML should go within the beginning and ending HTML tags.

The format of the <HTML> tag is as follows:

```
<HTML>
.......
</HTML>
```

HEAD Tag: The <HEAD.> tag specifies that the lines within the the HEAD tags form the document header.

The format of the <HEAD> tag is as follows:

```
<H T M L >
<H E A D >
.......
</H E A D >
</H T M L >
```

TITLE Tag: Each HTML document needs a title. To give a document a title, use the <TITLE> HTML tag. The title tag always goes inside the document header (<HEAD>) tag. You can only have one title in a document. The title can only contain plain text. Pick a title that is short and descriptive. The title should also be relevant out of context. That is, someone else could link to your document from elsewhere on the Web, and the title should take this into account, as a title of *Part 3* would not work well if referenced from another site.

The format of the <TITLE> tag is as follows:

```
<H T M L >
<H E A D >
<TITLE> This a test title </TITLE>
</H E A D >
.......
</H T M L >
```

7.2.2.2 HTML Body Structure
BODY Tag: The body of document must lie within the <BODY> tag.

Elements which make up the body of an HTML document can include:

- Headings
- Paragraphs
- Comments
- Links
- Lists
- Images

The format of the <BODY> tag is as follows:

```
<H T M L >
<H E A D >
<TITLE> This a test title </TITLE>
</H E A D >
<B O D Y >
.......
</B O D Y >
</H T M L >
```

Headings: HTML defines six levels of headings. Heading tags <H> include numbers to indicate the heading numbers. These numbers are not displayed in the heading itself. The headings appear as bigger, bolder, centered, underlined, or all in capital letters. Their appearance varies from browser to browser. The format of the <H> tag is as follows:

```
<HTML>
<HEAD>
<TITLE> This a test title </TITLE>
</HEAD>
<BODY>
<H1>Test heading level 1</H1>
..........
<H2>Test heading level 2</H2>
..........
<H3>Test heading level 3</H3>
..........
<H4>Test heading level 4</H4>
..........
<H5>Test heading level 5</H5>
..........
<H6>Test heading level 6</H6>
..........
</BODY>
</HTML>
```

This will give WWW page as shown in Figure 83 on page 149.
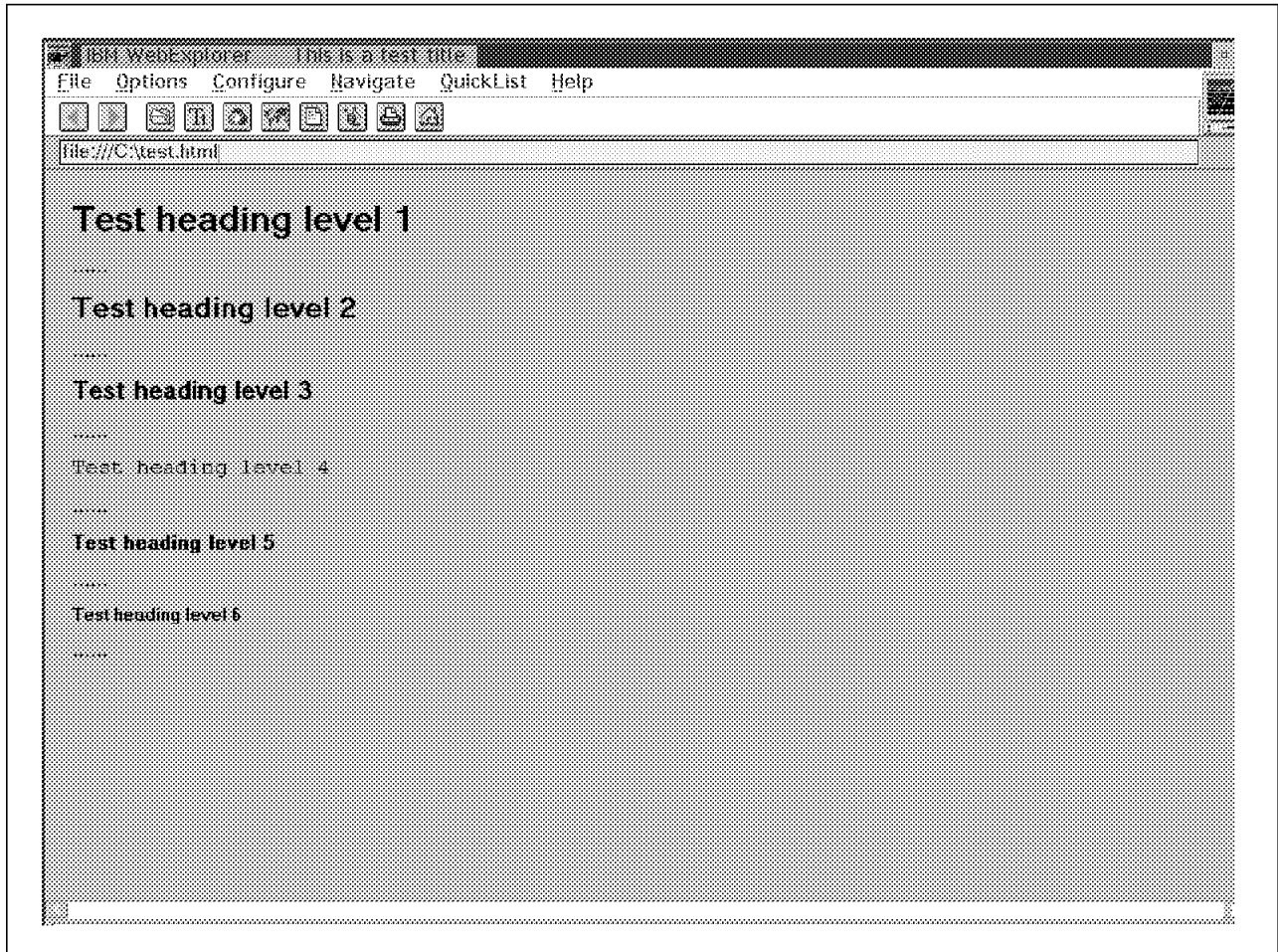
Figure 83. HTML Heading Example

Paragraphs: Paragraph tags are used to indicate paragraphs within your document. A plain text paragraph is defined using the <P> tag.

Unlike the other HTML tags, the paragraph tag format varied from HTML Level 1 and 2. Most browsers support both Level 1 and Level 2 tag definitions. The Level 2 format of the <P> tag is as follows:

```
< H T M L >
< H E A D >
<TITLE> This a test title </TITLE>
</ H E A D >
< B O D Y >
<H1> Level 1 header /<H1>
< P >
This is a test paragraph
< / P >
< P >
This is the second test paragraph
< / P >
</ B O D Y >
</ H T M L >
```

Comments: Comments are useful for putting into a document to help you to describe the document itself and to provide some kind of status of the document. The text inside the comment tag is ignored by Web browsers. Each comment line should be individually commented. An example of the comment tag is:

<!- This is a comment statement ->

Links: The power of the HTML language is when you start using links to link your document with other object on the Web. These objects include other HTML documents, images, and audio files. This will allow you to reference other objects on the Web within your own document, which by simply being clicked on, can be called up locally by a Web browser. In the same light, other Web publishers can refer and place links to your objects in their documents.

To create a link in HTML, you need:

- The name and location of the object to which you are linking.
- The text or image which will serve as the hot spot which readers will see when browsing your document. If you include images in your link, you will need to take into account that some readers will be using ASCII-based browsers, and will not be able to view your images.

To create a link you use the <A>...</A> tags. Unlike the previous tags, the <A> tag includes tag attributes. A typical link tag format is:

```
              Opening Tag
       ┌─────────────────────┐


   <A HREF="../test.html">From local HTML</A>
                            └───────────────┘
                            Text that will be
                               highlighted
or
                                        Text that will
              Opening Tag               be highlighted
       ┌────────────────────────────┐ ┌───────────────┐

   <A HREF="HTTP://ibm.com/test.html">From HTTP site</A>

              Linked HTTP file
       └──────────────────────┘
                                            └──┘
                                          Closing Tag
```
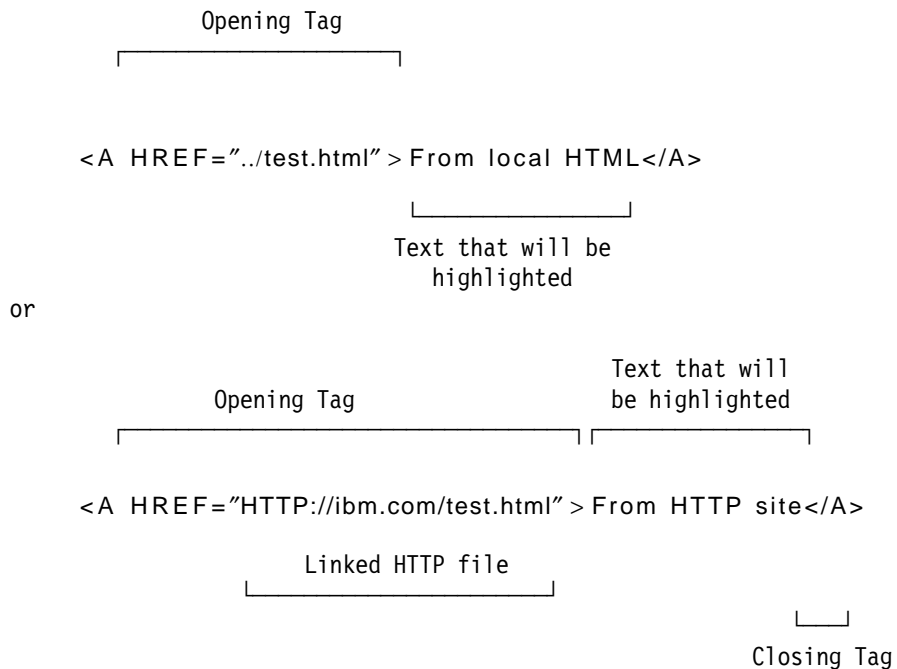
Lists: The HTML list tags allow you create:

- Numbered lists <OL>
- Unordered lists <UL>
- Menu lists <MENU>
- Directory lists <DIR>
- Glossary lists <DL> and <DD>

All list tags have the following in common:

- The form is surrounded by the opening and closing tags, for example <OL> and </OL>
- Each element within the list has its own tag <DT> and <DD> for glossary lists and <LI> for lists

The following is an example of the list tag:

```
<HTML>
<HEAD>
<TITLE> This a test title
</HEAD>
<BODY>
<H1> Level 1 header /<H1>
< P >
This is a test paragraph
< / P >
< U L >
<LI> This is list element one
<LI> This is list element two
<LI> This is list element three
<LI> This is list element four
< / L I >
</BODY>
</HTML>
```

This will give WWW page as shown in Figure 84 on page 152.
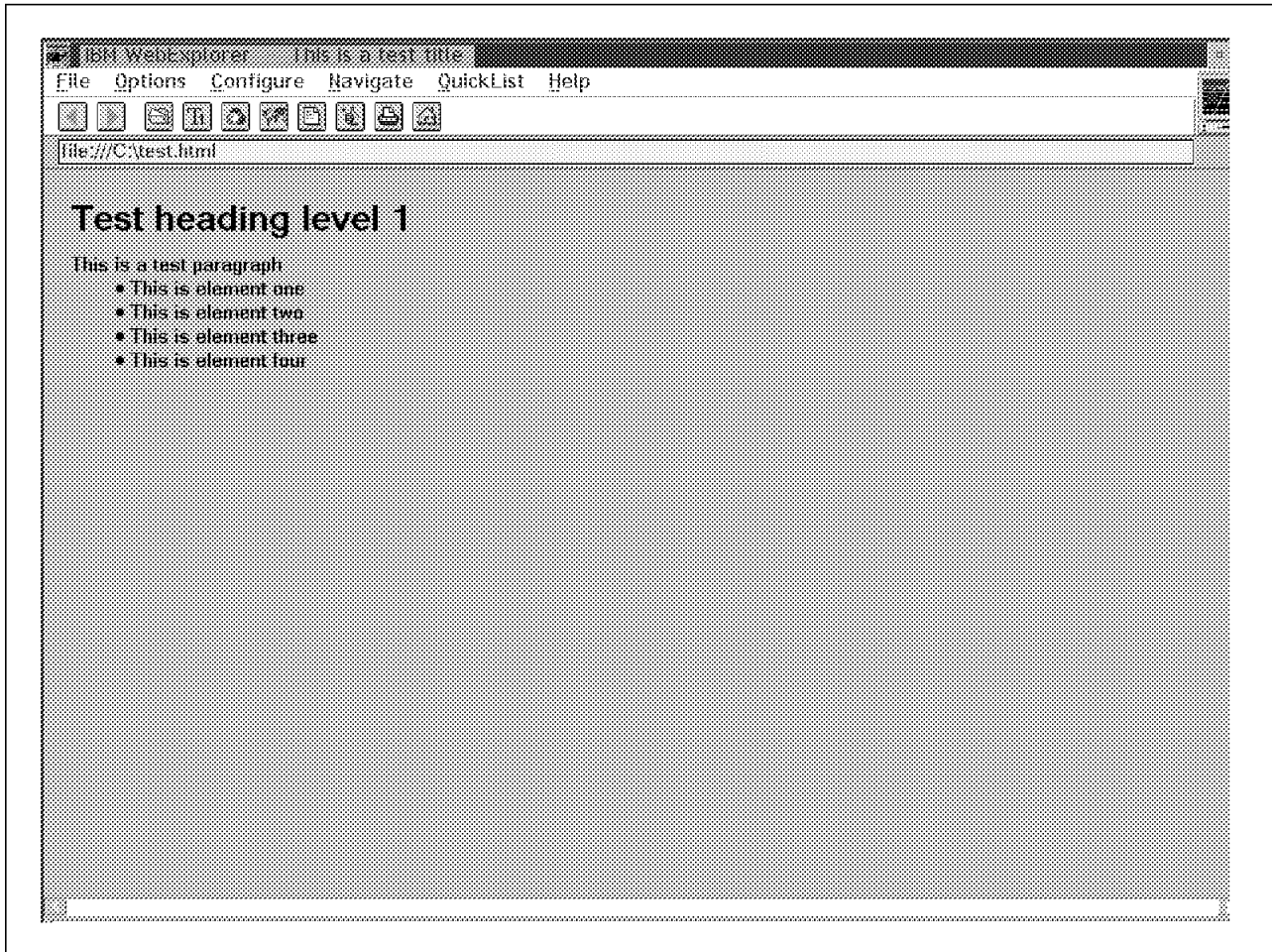
Figure 84. HTML List Example

Images: HTML allows you to include both inline images and external images in your documents. Inline images are images that appear directly on the web page. External images are images that are only downloaded at the request of the reader. Inline images can be in various graphics formats including GIF, JPEG, BMP and XBM. Inline images are specified using the HTML tag <IMG> tag. The <IMG> tag has no closing tag. Although you normally use the <A> tag to include images in your document, you can also use it to imbed the other formats. You will require the necessary browser and hardware to utilize the following formats:

- AIFF sound files (.au)
- JPEG compressed image format (.jpg)
- Wave format sound files (.wav)
- MPEG audio (.mp2)
- MPEG video (.mpg)
- AVI video (.avi)

An example of an Inline tag is as follows:

```
<HTML>
<HEAD>
<TITLE> This a test title with a imbedded image </TITLE>
</HEAD>
<BODY>
<H1> Level 1 header /<H1>
< P >
This is a test paragraph
</P>
<IMG SRC="test.gif">
</BODY>
</HTML>
```

This will give WWW page as shown in Figure 85 on page 154.
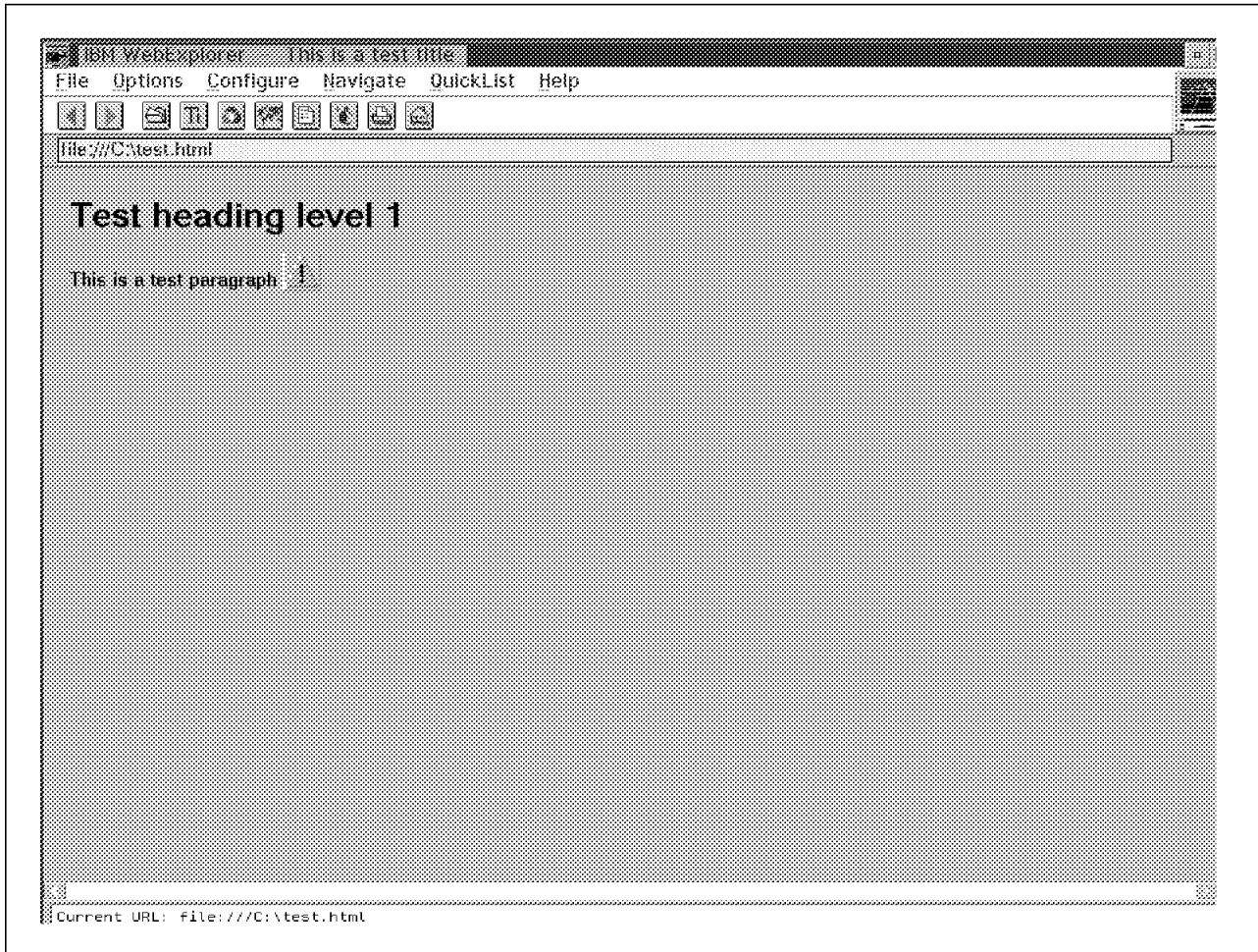
Figure 85. HTML Image Example

The image tags are very useful for using with other tag types. For example, you can imbed the images into your link tags as follows:

```
                                      Image to be loaded
                           ┌───────────────────────┐

<A HREF="HTTP://ibm.com/test.html" > < IMG SRC="test.gif" >
                     Test imbedded GIF</A>
```

Images can only be viewed using GUI-based browsers. To cater for readers using an ASCII browser, you should include a text-only option in your web page. This can be done using the ALT tag when imbedded in a <A> link tag. The ALT tag will display an alternative to the image if an ASCII browser is used. An example of the ALT tag is:

```
<A HREF="HTTP://ibm.com/test.html" >
<IMG SRC="test.gif" ALT="ASCII text" > Test imbedded GIF</A>

                        └───────────────┘
                        Text to display on an
                        ASCII only browser
```

Other basic HTML tags which you will encounter include:

```
<BR>                       A line break
<HR>                       A horizontal rule
<EM>...</EM>               Emphasize text
<STRONG>...</STRONG>       Stronger emphasize your text
<B>...</B>                 Bold text
<I>...</I>                 Italic text
<TT>...</TT>               Typewriter text
<SAMP>...</SAMP>           Sample text
```

7.2.3 HTML Summary

An example of using these HTML tags is included in Appendix H, "HTML Example" on page 185. Prior to submitting your data to the Web server, you should note the following:

- When you save your documents, they should have the .htm or .html file extensions.

- Before you release your Web document on the unsuspecting world, test it vigorously, using both a GUI and an ASCII browser.

- Save your file in a private area. Only move your document into a public area when you have tested it.

- Update your Web server as required.

- Keep your document as simple as possible.

- Update the document as required.

- Take note of copyright laws when using other HTML publishers data in your document.

- Announce your document to the world. You can do this by:

  - Advertising it on newsgroups on comp.infosystems.announce
  - Notifying your service provider who may wish to include it on their own home page, or they may supply a *What's new?* page.
  - Sending mail to:
    whats-new@ncsa.uiuc.edu
  - Registering with the ALIWEB. For more information see:
    http://web.nexor.co.uk/aliweb/doc/aliweb.html
  - Registering with CERN's Virtual Library at:

    http://info.cern.ch/hypertext/DataSources/
                    WWW/Geographical_generation/new-servers.html

If you are an IBM employee and are considering placing your information on the IBM internal World Wide Web, you should read *IBM Internet Cookbook: Placing Your Information On IBM's World Wide Web*. To request the LIST3820 format of this book, enter the following at the OV/VM command line:

```
TOOLS SENDTO KGNVMC CUSTOOLS HOMEPAGE GET COOKBOOK PACKAGE
```

More advanced detailed HTML descriptions can be found at the following URL:

http://www.ncsa.uiuc.edu/general/internet/www/htmlprimer.html

Chapter 8. Useful Internet Sites

This chapter will cover some useful Internet sites. These are dynamic and change from day to day.

Table 18 lists some useful IBM related WWW sites.

Table 18. Useful Sites	
Site	**Location**
IBM Home Page	http://www/ibm.com/
IBM BookManager	http://anynet.raleigh.ibm.com/frontdoor.html
IBM AIX Home Page	http://www.austin.ibm.com/
IBM AIX FixDist Server	ftp://aix.boulder.ibm.com/
OS2 Gopher Info Menu	gopher://os2info.gopher.ibm.com/
IBM ISSC South Information Network Home Page	http://w3.raleigh.ibm.com/
IBM T.J. Watson Research Center Software Support	ftp://software.watson.ibm.com/
Power PC News	http://power.globalnews.com/
IBM System User Bi-Weekly News	http://www.globalnews.com/ibmsu/
USENET Newsgroup where AIX Issues are Discussed	news:comp.unix.aix
USENET Newsgroup where OS2 Issues are Discussed	news:comp.os2
Anonymous FTP with AIX Freeware	ftp://aixpdslip.seas.ucla.edu/
Anonymous FTP with Freeware	ftp://ftp.funet.fi/
Raleigh Network Home Page	http://www.raleigh.ibm.com/
Official Olypic Games Web Server	http://www.atlanta.olmypic.org/
IBM PC Products Home Page	http://www.pc.ibm.com/
IBM AS/400 Products Home Page	http://as400.rochester.ibm.com/
IBM Large Scale Systems Home Page	http://lscftp.kgn.ibm.com/
IBM Large Scale Systems Home Page	http://lscftp.kgn.ibm.com/

8.1 Webcrawler Top 25 WWW Sites

The WebCrawler Top 25 is a list of the most frequently referenced URLs on the Web. Since the list is based on those documents that have been visited by the WebCrawler, it's only an estimate of the real truth. Every link to a particular document is counted once, except that multiple links from one document to another are counted only once. Links from a document to itself don't count.

This list is based on data from 103,000 documents on over 23,000 different servers. The document was created Monday, March 20, 1995. It changes regularly.

1. http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html (NCSA Mosaic Home Page (1271))
2. http://info.cern.ch/hypertext/DataSources/bySubject/Overview.html (The World-Wide Web Virtual Library: Subject Catalogue (1202))
3. http://info.cern.ch/hypertext/WWW/TheProject.html (http://info.cern.ch/hypertext/WWW/TheProject.html (1177))
4. http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/whats-new.html (What's New With NCSA Mosaic (1017))
5. http://akebono.stanford.edu/yahoo (Yahoo - A Guide to WWW (951))
6. http://www.ncsa.uiuc.edu/SDG/Software/ Mosaic/StartingPoints/NetworkStartingPoints.html (Starting Points for Internet Exploration (832))
7. http://wings.buffalo.edu/world (Virtual Tourist World Map (831))
8. http://webcrawler.cs.washington.edu/WebCrawler/WebQuery.html (WebCrawler Searching (797))
9. http://info.cern.ch/hypertext/DataSources/WWW/Servers.html (World-Wide Web Servers: Summary (741))
10. http://www.cs.colorado.edu/home/mcbryan/WWWW.html (WWWW - the WORLD WIDE WEB WORM (692))
11. http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/MetaIndex.html (Internet Resources Meta-Index (643))
12. http://www.whitehouse.gov/ (Welcome to the White House (598))
13. http://hypatia.gsfc.nasa.gov/NASA_homepage.html (NASA_Home Page (564))
14. http://www.sun.com/(Welcome to Sun Microsystems (531))
15. http://info.cern.ch/ (World-Wide Web Home (496))
16. http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html (A Beginner's Guide to HTML (489))
17. http://www.microsoft.com/ (Microsoft Corporation World-Wide-Web Server (472))
18. http://www.ibm.com/ (International Business Machines (469))
19. http://www.sgi.com/ (Silicon Graphics' SILICON SURF Home Page (413))
20. http://www.ncsa.uiuc.edu/demoweb/demo.html (NCSA Mosaic Demo Document (405))
21. http://sunsite.unc.edu/boutell/faq/www_faq.html (World Wide Web FAQ (378))
22. http://www.ncsa.uiuc.edu/demoweb/html-primer.html (A Beginner's Guide to HTML (378))
23. http://galaxy.einet.net/galaxy.html (EINet Galaxy (364))
24. http://www.novell.com/ (Novell Inc. World Wide Web Homepage (351))
25. http://rs560.cl.msu.edu/weather (Current Weather Maps/Movies (347))

Chapter 9. Commercial Usage

The Internet remained a complex, unfriendly system to use for some time. In recent times there has been a vast growth of easy-to-use graphical front ends developed to make accessing the Internet easier. This has now made it popular amongst even non-technical people who were not interested in it in the past. This has resulted in a huge growth of Internet users. There is a massive corporate race going on to use the Internet for electronic commerce. This will allow corporations to be able to do business more effectively and less expensively than traditional methods. Studies have reported that traditional marketing is four times more expensive than marketing through the Internet.

The growth of the Internet service companies have grown out of the massive market opportunities to:

- Provide Internet Connection Services

- Help companies set up connections into the Internet

- Set up company's firewall to the Internet

- Develop multimedia HTML marketing documents for the World Wide Web

- Perform online marketing and purchasing (once security problems have been addressed)

- Set up support lines for customers on the Internet

In terms of potential new customers who can be addressed on the Internet:

- 150 000 users are joining per month.

- There is potential for billions of users who can be contacted.

- Currently some 40 million people are contactable by Internet.

- It is an international communication medium.

- Fast connection and announcement time has been greatly reduced.

In terms of the demographics of people who use the Internet, they have an average income of around $54000 per year and are highly educated potential customers.

There are currently around 3.2 million servers on the Internet.

Issues which currently prohibit continued market growth are:

- Security. This issue is being addressed at the moment, and IBM amongst others will be able to address this shortly. (Chapter 6, "Security and Firewalls" on page 137).

- Privacy of mail. This is being addressed by utilities such as PGP (Pretty Good Privacy) protocol as discussed in Chapter 6, "Security and Firewalls" on page 137.

- Response time. Networks and communications are being upgraded continually. With BGP-compliant routers being installed, the TCP/IP communications will speed up over the Internet. Inter-company communications are being upgraded with faster access lines.

Numerous companies are setting up partnerships to be able to address problems as well as being able to provide consolidated marketing opportunities. IBM, for example, has gone into partnerships with Sears Roebuck to form both Prodigy and Advantis.

Some examples of companies using the Internet for commercial reasons:

- IBM posts announcement letters and product support.

- IBM posts online magazines.

- JP Morgan has set up an Internet based Risk Measurement tool.

- DEC has provided the ability to log onto an DEC Alpha UNIX workstation to test the system performance.

- Silicon Graphics does all worldwide support and communication using Internet. SGI also uses the Internet as a recruiting and job advertising tool.

- Some 4500 companies are on the Internet and provide home pages in the form of direct advertising of products and services.

- DOW Jones provides access to its share price listing.

- The Internet Shopping Network is a Web based catalogue which sells computer hardware and software. Would be customers place their orders, then phone through credit card details. This is located at http://www.internet.net/directories.html.

To see how popular the Internet is becoming, you only have to look at the top 25 WebExplorer sites on the Internet in 1.1, "What Is the Internet?" on page 1 to see the range of commercial sites that are being accessed.

Appendix A. Removing a Prior Version of TCP/IP for OS/2

If you had an existing TCP/IP installed on your workstation, and you have installed the Internet Connect software, you will need to remove the previous version of TCP/IP.

This section describes how to remove the previous version from your workstation.

1. Remove any TCP/IP related information from your CONFIG.SYS.

   Remove the entire statement for CONFIG.SYS statements that contain references to TCP/IP directories ONLY, such as:
       SET ETC
       SET TMP
       SET HOSTNAME
       RUN=D:\TCPIP\BIN\CNTRL.EXE

   Remove the reference to the directory in which TCP/IP is installed (do **NOT** remove the entire statement) for CONFIG.SYS statements that contain references to multiple directories, such as:
       SET PATH
       LIBPATH
       SET HELP
       SET BOOKSHELF
       SET READIBM

2. Remove the line or object that starts TCP/IP:

   If the STARTUP.CMD file, located in your boot drive, contains line CALL TCPSTART.CMD, delete the line.

   If the STARTUP.FOLDER, located in the OS/2 SYSTEM FOLDER, contains TCP/IP Startup objects, delete these objects.

3. Save any configuration-related file in a directory other than the directory in which your current TCP/IP software resides. Configuration related files include:
       BIN\SETUP.CMD
       BIN\TCPSTART.CMD
       BIN\SENDMAIL.CF
       BIN\SLIP.CMD
       BIN\X25.CMD
       BIN\SNALINK.CMD
       LA\MAILNICKNAME.NAM

4. Run LAPS and delete the TCP/IP protocols list box.

5. Restart the workstation.

6. Move the TCP/IP files to a backup directory or delete the whole TCP/IP directory structure.

Appendix B. IBM Global Network Service Provider Telephone Numbers

The IBM Global Network reaches some 90+ countries and 700 cities. Included is a list of the current Service provider contact list.

B.1 IBM Global Network Internet Dial Access Phone List

```
08-357-8794    Australia Adelaide
07-832-9188    Australia Brisbane
06-273-5269    Australia Canberra
03-690-3300    Australia Melbourne
09-321-7199    Australia Perth
02-899-3399    Australia Sydney
0222-2144020   Austria Vienna
02-721-17-33   Belgium Brussels
403-266-4013   Canada  Calgary
403-429-7125   Canada  Edmonton
902-492-8568   Canada  Halifax
519-667-2225   Canada  London
514-931-0180   Canada  Montreal
613-233-7330   Canada  Ottawa
418-648-8684   Canada  Quebec
306-525-4111   Canada  Regina
416-491-7112   Canada  Toronto
604-683-3416   Canada  Vancouver
604-380-2777   Canada  Victoria
204-956-4701   Canada  Winnipeg
1-800-270-9667 Canada  fee 800
369-811        Curacao N.A.
02-361771      Cyprus  Nicosia
45965170       Denmark Copenhagen
90-4582133     Finland Helsinki
161-43051999   France  Paris (east)
161-47760055   France  Paris (west)
030-7231021    Germany Berlin
0211-432155    Germany Dusseldorf
069-6668542    Germany Frankfurt
040-6301861    Germany Hamburg
089-334781     Germany Muenchen
0711-7800264   Germany Stuttgart
353-1-6607100  Ireland Dublin
03-695-2777    Israel Tel Aviv
02-70609200    Italy Milano
049-666311     Italy Padova
06-59648366    Italy Roma
011-7777870    Italy Torino
03-3505-5885   Japan Tokyo
020-6692333    Netherlands Amsterdam
030-804844     Netherlands Utrecht
079-219206     Netherlands Zoetermeer
09-356-3984    New Zealand Auckland
03-372-8954    New Zealand Christchurch
04-576-5998    New Zealand Wellington
66803850       Norway Oslo
011-7001188    South Africa Johannesburg
```

```
96-5924767      Spain  Alicante
93-3220505      Spain  Barcelona
94-4157922      Spain  Bilbao
981-226388      Spain  La Coruna
928-383688      Spain  Las Palmas
91-5190938      Spain  Madrid
91-4130003      Spain  Madrid
952-615200      Spain  Malaga
968-238800      Spain  Murcia
98-5275755      Spain  Oviedo
971-755195      Spain  Palma de Mallorca
948-177755      Spain  Pamplona
943-217577      Spain  San Sebastian
95-4280710      Spain  Sevilla
922-243288      Spain  Sta.Cruz de Tenerife
96-3930190      Spain  Valencia
986-231211      Spain  Vigo
976-212018      Spain  Zaragoza
08-6320224      Sweden Stockholm
01-433-0320     Switzerland Zurich
90-212-2823945 Turkey
0117-9292037    UK Bristol
0131-5570465    UK Edinburgh
01132-433878    UK Leeds
0181-575-7633   UK London (Greenford)
0171-9280771    UK London (South Bank)
0161-9621452    UK Manchester
01705-221287    UK Portsmouth
01926-497855    UK Warwick
1-205-970-0958 US AL Birmingham
1-205-380-9237 US AL Mobile
1-501-376-1963 US AR Little Rock
1-602-395-0039 US AZ Phoenix
1-602-747-5849 US AZ Tucson
1-714-545-8867 US CA Costa Mesa
1-213-687-7247 US CA Los Angeles
1-408-656-0522 US CA Monterey
1-310-864-6573 US CA Norwalk
1-415-856-0602 US CA Palo Alto
1-909-341-0998 US CA Riverside
1-916-441-0141 US CA Sacramento
1-619-550-0442 US CA San Diego
1-415-979-0319 US CA San Francisco
1-408-451-9457 US CA San Jose
1-510-867-0544 US CA San Ramon
1-408-464-0865 US CA Santa Cruz
1-209-478-2884 US CA Stockton
1-818-595-0018 US CA Woodland Hills
1-303-442-0842 US CO Boulder
1-203-778-8373 US CT Danbury
1-203-724-2302 US CT Hartford
1-203-876-1285 US CT Milford
1-203-845-0623 US CT Norwalk
1-203-348-0021 US CT Stamford
1-202-293-5076 US DC Washington
1-302-425-0116 US DE Wilmington
1-407-998-2650 US FL Boca Raton
1-305-771-1343 US FL Fort Lauderdale
1-904-565-2754 US FL Jacksonville
```

```
1-305-529-4700 US FL Miami
1-407-420-6876 US FL Orlando
1-813-362-9467 US FL Sarasota
1-813-877-1117 US FL Tampa
1-407-689-7329 US FL West Palm Beach
1-404-885-5580 US GA Atlanta
1-515-283-2561 US IA Des Moines
1-312-245-0156 US IL Chicago
1-309-797-6874 US IL Moline
1-708-240-5715 US IL Schaumburg
1-217-793-9788 US IL Springfield
1-317-464-0494 US IN Indianapolis
1-219-424-0670 US IN Fort Wayne
1-219-273-1104 US IN South Bend
1-606-276-0875 US KY Lexington
1-502-585-1120 US KY Louisville
1-504-524-8389 US LA New Orleans
1-617-247-6754 US MA Boston
1-413-827-8327 US MA Springfield
1-508-770-1449 US MA Worcester
1-410-332-4569 US MD Baltimore
1-810-827-7240 US MI Detroit
1-616-285-1288 US MI Grand Rapids
1-616-341-4749 US MI Kalamazoo
1-612-338-3988 US MN Minneapolis
1-816-474-0330 US MO Kansas City
1-314-621-9290 US MO ST. Louis
1-704-525-5036 US NC Charlotte
1-919-558-9471 US NC Durham
1-910-722-9659 US NC Winston Salem
1-919-380-4300 US NC Raleigh
1-402-398-1591 US NE Omaha
1-609-488-1919 US NJ Cherry Hill
1-201-265-0681 US NJ Paramus
1-609-987-9155 US NJ Princeton
1-201-325-8413 US NJ West Orange
1-518-436-9976 US NY Albany
1-716-853-4221 US NY Buffalo
1-607-748-2411 US NY Endicott
1-516-681-1576 US NY Jericho
1-212-644-4153 US NY New York
1-914-463-1103 US NY Poughkeepsie
1-716-227-5090 US NY Rochester
1-315-448-1002 US NY Syracuse
1-914-448-0235 US NY White Plains
1-216-384-0701 US OH Akron
1-513-241-6693 US OH Cincinnati
1-216-771-0741 US OH Cleveland
1-614-621-0779 US OH Columbus
1-513-224-4899 US OH Dayton
1-419-255-6064 US OH Toledo
1-216-747-0539 US OH Youngston
1-405-232-9211 US OK Oklahoma City
1-918-493-7479 US OK Tulsa
1-503-223-0904 US OR Portland
1-610-954-7750 US PA Bethlehem
1-717-541-0766 US PA Harrisburg
1-215-564-5918 US PA Philadelphia
1-412-237-0831 US PA Pittsburgh
```

```
1-717-969-0338 US PA Scranton
1-717-854-0466 US PA York
1-401-421-4870 US RI Providence
1-803-252-1806 US SC Columbia
1-615-392-9812 US TN Kingsport
1-615-525-2292 US TN Knoxville
1-901-680-9956 US TN Memphis
1-615-256-1268 US TN Nashville
1-512-479-0155 US TX Austin
1-214-620-9180 US TX Dallas
1-817-491-0218 US TX Fort Worth
1-713-993-7226 US TX Houston
1-806-788-1936 US TX Lubbock
1-210-229-1212 US TX San Antonio
1-801-530-0021 US UT Salt Lake
1-703-361-0018 US VA Manassas
1-804-624-8418 US VA Norfolk
1-804-644-5066 US VA Richmond
1-206-382-0552 US WA Seattle
1-608-273-1443 US WI Madison
1-414-223-3003 US WI Milwaukee
1-304-345-2161 US WV Charleston
1-800-933-3997 US fee 800
```

B.2 IBM Global Network Internet Registration Phone List

```
008-811-094    Australia Registration
0660-6832      Austria Registration
1-800-463-8331 Canada Registration
0800-1-1997    Belgium Registration
368-039        Curacao N.A. Registration
8001-8278      Denmark Registration
0800-114465    Finland Registration
0590-8561      France Registration
0130-821202    Germany Registration
1-800-709-905  Ireland Registration
1678-72031     Italy Registration
177-440-6299   Israel Registration
0120-120-2081  Japan Registration
060-228488     Netherlands Registration
0800-105765    New Zealand Registration
800-11783      Norway Registration
0800-998128    South Africa Registration
900-994443     Spain Registration
020-795181     Sweden Registration
155-9222       Switzerland Registration
00800-44914835 Turkey Registration
0800-614012    United Kingdom Registration
1-800-933-3997 US Registration
```

B.3 IBM Global Network Help Desk Telephone Numbers

Please dial the local phone number for your country to get IBM support for accessing the Internet via the IBM Global Network:

```
Australia               131-426 (local call)
Austria                 0660-5702
Belgium (Dutch)         0800-13270
Belgium                 0800-16521
Brazil                  0800-111-525
Canada (English)        1-800-727-2222
Denmark                 80018299
Finland                 0800-1-13151
France                  05-906088
Germany                 0130-821141
Ireland                 1-800-553175
Italy                   1678-76007
Netherlands             060222308
New Zealand             0800-801-800
Norway                  80011341
South Africa            11-320-9111
Spain                   900-993150
Sweden                  020-795701
Switzerland (French)    155-9169
Switzerland (German)    155-9170
Switzerland (Italian)   155-9173
United Kingdom          0800-963949
United States           1-800-727-2222
```

Appendix C. Internet Connection for OS/2 (Modem Support Telephone Numbers)

The IBM connection for OS/2 currently provides support for the following included modems. If you cannot find your modem in this list, use the default modem, at the speed which your modem supports.

Alliance V.32
AllSync V.32
Anchor 2400E
Angia PCMCIA 19.2 Smart Modem
AIWA Inteligent FAX   PV-AF144V5
AIWA Inteligent FAX   PV-AF96V5
Apex PCMCIA
Apex V.32, V.32bis Data/Fax
Apex 9600 Data/Fax
Arima
AT&T DataPort 14.4
AT&T Model 4000
AT&T KeepInTouch Models 3761 and 3762
ATI 2400etc
ATI 2400etc V.42
ATI 9600etc
ATI 14400etc
ATI 19200
Avatech 2400E
Avtek MegaDataFax 14.4
Banksia MyFastModem 28.8
Banksia MyModem 14.4
Boca V.32 14.4
Boca V.34 28.8
BSM Quik Com MNP
Calcom 14.4 V.32bis
Cardinal 14.4 DSP
Cardinal 14.4 V.32
Cardinal 2400 MNP
Cardinal V.34/V.FC 28.8 Data/Fax
Cermetek 2400 R/2400 SPC
Codex 2264
Codex 3261 Fast
Compaq Enhanced Int. V.42bis
Compaq Enhanced Internal Modem
CompuCom Speedmodem
Default
Digicom 9624LE
Digicom DSI9624
Digicom DSI9624 Plus
Digicom PC Classic 144 V.32bis
Dynalink 1414VQE and 1414VQI
Eagle V.32 Data/Fax
Etech P1496MX Ufomate
Everex Carrier 96/24
Everex EV941

Everex Evercom 24e
Everex Evercom 24e+ (MNP 5)
Forval IM14400
GVC Super Modem 2400 MNP-5
GVC Super Modem 9600 V.32
GVC Super Modem 14400 V.32
Hayes Accura 144 + FAX 144
Hayes Personal Modem 2400
Hayes Smartmodem 2400/2400B
Hayes Smartmodem Optima 144 + FAX 144
Hayes Smartmodem Optima 14400FX
Hayes Smartmodem Optima 28800
Hayes Smartmodem Optima 9600FX
Hayes Smartmodem V Series 2400
Hayes Smartmodem V Series 9600 V.32
Hayes Ultima Smartmodem 14400
Hayes Ultra 14400
Hayes Ultra 9600
Hayes V Series 2400/2400B V.42
Hayes V Series 9600/9600B V.42
IBM (PNB) 9600 Internal
IBM 7851
IBM 7855 (12000 bps)
IBM 7855 (9600 bps)
IBM MWave Windsurfer Adapter
IBM PCMCIA
IBM PS/1 Default for 9600
IBM PS/55 note
IBM PS/55 PCMCIA Data/Fax
IGER 14.4 PCMCIA
InfoMate 212X/PC
INFOTELL 14.4
INTEGRAN Fax Modem FAX MP96
Intel 2400B
Intel 2400B MNP
Intel 2400EX MNP
Intel 9600EX
Intel 14400EX
Intel 144e external modem
Intel 144i internal modem
Intel SatisFAXtion Board
InterLink Fastbit IIbis
Mastro Companion 9.6/14.4/28.8
Mastro Executive 9.6/14.4/28.8
Maxwell Modem 2400PC
MegaHertz 14.4 Data/Fax PCMCIA
MegaHertz C5144 and C596FM
MegaHertz EasyTalk 2400
MegaHertz JJ2288 PCMCIA 28.8
MegaHertz T3144 and T396FM
MegaHertz XJ1144
MegaHertz Z3144 and Z396FM
MicroCom AX/2400 MNP4
MicroCom AX/2400c MNP5
MicroCom AX/9612c

MicroCom AX/9612c-AX/9624c
MicroCom AX/9624c
MicroCom QX 2400t
Microcom QX/V.32c
Motorola LifeStyle 28.8
Motorola Power 28.8
Motorola UDS V.3224/V.3225
Motorola UDS V.34R
MultiTech MultiModem 224/224PC
MultiTech MultiModem 224E/224EC
MultiTech MultiModem 224E7 V.42bis
MultiTech MultiModem V.32
MultiTech MultiModem V.32 EAB V.42bis
NEC N2431/2431C
Netcomm AutoModem E7F
Netcomm Pocket   E7F
Netcomm Pocket   PA
Netcomm PCMCIA   E7F
Netcomm SmartModem M11F
Netcomm SmartModem M7F
Netcomm 1234E4
Netcomm 1234M4
Netcomm 1234S
Netcomm 1234SA
Novation Professional 2400
OKI PCLINK 2144
Okidata CLP 296
Okidata Okitel 2400 Plus/2400B Plus
Okidata Okitel 2400/2400B
Okidata Okitel 9600
OMRON FAX/DATA MD-144XT-10V
PNB (IBM) 9600 Internal
Panasonic TO-703B FAX & Data Modem
Practical Peripherals 2400SA
Practical Peripherals 2400SA MNP
Practical Peripherals 2400SA V.42bis
Practical Peripherals PM14400FXMT
Practical Peripherals PM14400FXSA
Practical Peripherals PM9600FXMT
Practical Peripherals PM9600SA V.32
Practical Peripherals Practical 2400
Premier Innovations P2400 / P2400E
Prometheus 2400 MCT-24I Half-card
Prometheus 9600 MNP
Prometheus LineLink 144e
PS/1 Default for 9600
Quickcomm Spirit II
Racal Milago RMD 3221
Racal Milago RMD 3222
Racal-Vadic 2400/PS
Racal-Vadic 2400LC
Racal-Vadic 2400PA Model 2
Racal-Vadic 2400VP
Racal-Vadic 9600VP
Racal-Vadic 9632PA

Racal-Vadic LC2400PC
Reveal 14.4
SmartONE 14.4
Spirit II
Spirit Pocket
Spirit SMI
Spirit Thunder
Spirit Viper V.34
Stowaway 14.4
Supra Fax V.32bis Internal Modem
Supra Fax Modem V.32
Supra Modem V.32bis
Supra Modem 2400
Sysdyne MDM 24H
Telebit Internal PC Card w/ MNP
TeleBit QBlazer 9600
Telebit T1000
Telebit T1500
Telebit T1600
Telebit T2000
Telebit T2500
Telebit T3000
Telebit Trailblazer
Telebit Trailblazer Plus
Telebit Worldblazer
TelePath 2 Data/Fax 14.4
Topline 1414VQE and 1414VQI
Trust 1414VQE and 1414VQEI
Twincom 14400
Ubiquity Cellular Communications Sys.
UDS Fastalk II
UDS V.3224/V.3225
Universal Data Systems Fastalk 2400
US Robotics 2400PC
US Robotics Courier 2400
US Robotics Courier 2400e/ 2400e/ps
US Robotics Courier 2400PC
US Robotics Courier V.32bis with ASL
US Robotics Courier V.34
US Robotics Dual Standard
US Robotics HST
US Robotics HST V.42
US Robotics Sportster 14400
US Robotics Sportster 2400/2400 PC
US Robotics Sportster 28800
US Robotics Sportster 9600FX
US Robotics Sportster 28800 PCMCIA
US Robotics TelePath 14.4
US Robotics V.32
US Robotics WorldPort 9600FX
Ven-Tel 212Plus
Ven-Tel 2400 Plus II
Ven-Tel 9600 Plus / Plus II
Ven-Tel Halfcard
Ven-Tel Halfcard 24

Ven-Tel Pathfinder
Ven-Tel PCM2400E
Viva 14.4
Zoltrix 14.4 modem
Zoom Modem PC 2400
Zoom V.32bis 14.4 data/fax
Zoom V.34 28,800
Zoom V.32
ZyXEL U-1496

Appendix D. Coexistence of TCP/IP V2.0 and Internet Connection for OS/2

The availability of Warp Connect, which includes TCP/IP for OS/2 V3.0, means that it is now possible to run TCP/IP connections to a LAN and to a SLIP or PPP connection concurrently. This was not possible with the earlier combination of Internet Connection for OS/2 and TCP/IP V2.0 for OS/2.

The coexistence of TCP/IP V2.0 and the Internet Connection for OS/2 is not supported by IBM. However, this combination can be made to work with some limitations. This appendix will help you use both of these products simultaneously.

IBM Internet Connection for OS/2 and TCP/IP V2.0 will encounter problems if run simultaneously on the same workstation. This is due to routing, IP name resolution problems, and security problems. TCP/IP V2.0 and the Internet Connection for OS/2 can coexist on the same workstation if you take the following precautions:

- The TCP/IP Base kit needs to be at Version 2.0, with the latest CSD (CSD UN64092).

- The TCP/IP V2.0 must be installed prior to installing the Internet Connection for OS/2.

- The TCP/IP and Internet Connection need to be installed in the same directory.

- The TCP/IP and Internet Connection use different routing tables. TCP/IP V2.0 will use the routing table information specified in your TCP/IP Configuration Notebook. The Internet Connection will use the route set to the default gateway machine on the Internet. When you are signed onto the Internet, the TCP/IP V2.0 default routing table will be inactive while this connection is active. Additional routing statements are needed, one for each subnet accessed.

- Back up the tcpipetc directory.

- While the Internet Connection is active, the Internet Domain server will be used. The TCP/IP V2.0 LAN Domain server will not be used. You can work around this by creating a *tcpipetchosts* file. You can manually add IP and name addresses into this host file for users whom you may access often. When you disconnect from the Internet, the resolv file in *tcpipetc* will be restored to its original state before the connection.

- The name restoration may fail. If you have problems, restore your backup resolv file.

- A security issue may occur when operating both SLIP and TCPIP V2.0 simultaneously. From earlier references you will realize that you are part of the Internet when signing on via SLIP. In the same way that you are signing in, you may have someone trying to break into your machine from the Internet. To eliminate this, enter the following command:

      C:>ipgate off

Appendix E. TCP/UDP Service Protocol Usage

The TCP/IP protocol suite is comprised of a collection of protocols, including the IP and TCP. In fact many TCP/IP applications use both TCP and UDP protocols, as follows:

```
echo            7/tcp
echo            7/udp
discard         9/tcp           sink null
discard         9/udp           sink null
systat          11/tcp          users
daytime         13/tcp
daytime         13/udp
netstat         15/tcp
qotd            17/tcp          quote
chargen         19/tcp          ttytst source
chargen         19/udp          ttytst source
ftp-data        20/tcp
ftp             21/tcp
telnet          23/tcp
smtp            25/tcp          mail
time            37/tcp          timserver
time            37/udp          timserver
rlp             39/udp          resource # resource location
nameserver      42/udp          name # IEN 116
whois           43/tcp          nicname
domain          53/tcp          nameserver # name-domain server
domain          53/udp          nameserver
mtp             57/tcp           # deprecated
bootps          67/udp           # bootp server port
bootpc          68/udp           # bootp client port
tftp            69/udp
rje             77/tcp          netrjs
finger          79/tcp
link            87/tcp          ttylink
supdup          95/tcp
hostnames       101/tcp         hostname # usually from sri-nic
iso_tsap        102/tcp
x400            103/tcp
x400-snd        104/tcp
csnet-ns        105/tcp
pop             109/tcp         postoffice
sunrpc          111/tcp
sunrpc          111/udp
auth            113/tcp         authentication
sftp            115/tcp
uucp-path       117/tcp
nntp            119/tcp         readnews untp # USENET News Transfer Protocol
ntp             123/tcp
NeWS            144/tcp
snmp            161/udp          # snmp request port
snmp-trap       162/udp          # snmp monitor trap port
smux            199/tcp          # snmpd smux port
src             200/udp          # System Resource controller
exec            512/tcp
biff            512/udp         comsat
login           513/tcp
who             513/udp         whod
```

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```
shell           514/tcp             cmd # no passwords used
syslog          514/udp
printer         515/tcp             spooler # line printer spooler
talk            517/udp
ntalk           518/udp
efs             520/tcp              # for LucasFilm
route           520/udp             router routed
timed           525/udp             timeserver
tempo           526/tcp             newdate
courier         530/tcp             rpc
conference      531/tcp             chat
netnews         532/tcp             readnews
netwall         533/udp              # -for emergency broadcasts
uucp            540/tcp             uucpd # uucp daemon
new-rwho        550/udp
remotefs        556/tcp             rfs_server rfs # Brunhoff remote filesystem
rmonitor        560/udp
monitor         561/udp
instsrv         1234/tcp                    # network install service
ingreslock      1524/tcp
writesrv        2401/tcp                    # temporary port number
kerberos5       88/udp              kdc
x_st_mgrd       9000/tcp                    #ibm X terminal
xmquery         2279/udp               xmquery
```

Appendix F. FixDist Installation Instructions

Use the following procedure to download the FixDist client code. The following
procedure must be run as root.

1. Create a directory for the client code.

   ```
   mkdir /tmp/fixdist
   cd /tmp/fixdist
   ```

2. Connect to the FixDist server

   ```
   ftp aix.boulder.ibm.com
   ```

3. At the login prompt, enter:

   ```
   anonymous
   ```

4. At the password, enter your E-mail address (for example guy@abc.com)

5. When the system displays the ftp> prompt, enter:

   ```
   bin
   cd fixdist_client_code
   get fd.tar.Z
   quit
   ```

Use the following procedure to install the FixDist Client code:

1. Change to the root directory (/)

   ```
   cd /
   ```

2. Uncompress the downloaded fd.tar.Z file

   ```
   zcat /tmp/fixdist/fd/tar.Z | tar -xpvf -
   ```

3. See the user's guide in directory /usr/lpp/fixdist/FixDist_ascii for more
   information.

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Appendix G. FTP Server Mail

We include below some information about the Ftpmail application. In particular, product usage and ownership are described.

```
==========================================================================
Received: from ftp-gw-1.pa.dec.com by vnet.IBM.COM (IBM VM SMTP V2R3) with TCP;
   Mon, 01 May 95 12:01:59 EDT
Received: by ftp-gw-1.pa.dec.com; id AA22756; Mon, 1 May 95 09:02:07 -0700
Date: Mon, 1 May 95 09:02:07 -0700
Message-Id: <9505011602.AA22756@ftp-gw-1.pa.dec.com>
From: "ftpmail service on ftp-gw-1.pa.dec.com" <nobody@pa.dec.com>
To: guyd@VNET.IBM.COM
Subject: your ftpmail request was in error
X-Complaints-To: ftpmail-admin@ftp-gw-1.pa.dec.com
X-Service-Address: ftpmail@ftp-gw-1.pa.dec.com
X-Job-Number: none
Precedence: bulk
Reply-To: <nobody@ftp-gw-1.pa.dec.com>


   -- Help --
>>> $Id: help-text,v 1.7 1993/05/05 00:49:43 vixie Exp $
>>>
>>> ftpmail is not a supported service. From time to time it stops working;
>>> we will tend to it when we get the time. Outages of a week or more are not
>>> abnormal.

>>> commands are:

    reply <MAILADDR>    set reply addr, since headers are usually wrong
    connect [HOST [USER [PASS [ACCT]]]]
                        defaults to gatekeeper.dec.com, anonymous
    ascii               files grabbed are printable ascii
    binary              files grabbed are compressed or tar or both
    chdir PLACE         "get" and "ls" commands are relative to PLACE
                        (only one CHDIR per ftpmail session,
                        and it executes before any LS/DIR/GETs)
    compress            compress binaries using Lempel-Ziv encoding
    compact             compress binaries using Huffman encoding
    uuencode            binary files will be mailed in uuencode format
    btoa                binary files will be mailed in btoa format
    chunksize SIZE      split files into SIZE-byte chunks (def: 64000  )
    ls (or dir) PLACE   short (long) directory listing
    index THING         search for THING in ftp server's index
    get FILE        get a file and have it mailed to you
                        (max 10 GETs per ftpmail session)
    quit                terminate script, ignore rest of mail message
                        (use if you have a .signature or
                        are a VMSMAIL user)

>>> notes:

    -> you should send complaints to the ftpmail-admin address.  our
       postmaster does not handle ftpmail problems and you can save her
       the trouble of forwarding your complaints by just mailing them to
       the right address.  the "ftpmail-request" address is gone; don't
       use it.
```

-> the "index" command depends on the "SITE EXEC INDEX" feature of
   some ftp servers. Gatekeeper.dec.com originated this feature,
   and ftp.uu.net duplicated it (with a format change to the output,
   naturally). Wuarchive.wustl.edu also has this feature, though
   their index seems to be empty. The source for an ftpd that
   supports this feature is on Gatekeeper.DEC.COM in /pub/DEC/gwtools.

-> a password of "" or '' will be sent as a null string. if you need
   this you will know it, if you don't, you won't.

-> the "Subject:" of your request will be contained in the "Subject:"
   of all of ftpmail's responses to you regarding that request. You
   can therefore use it to "tag" different requests if you have more
   than one outstanding at any given time.

-> you must give a "connect" command, default host is
   gatekeeper.dec.com, default user is anonymous, default
   password is your mail address with a hyphen prepended.

-> binary files will not be compressed unless 'compress' or 'compact'
   command is given; use this if at all possible, it helps a lot.
   note that many files are already compressed. if you use any of
   the binary-file qualifiers (compress, compact, uuencode, btoa)
   without setting 'binary' first, your session will abort in error.

-> binary files will always be formatted into printable ASCII
   with "btoa" or "uuencode" (default is "btoa"). if you don't
   use the "binary" command, ftpmail will cheerfully try to mail
   you the binary data, which will absolutely, positively fail.

-> all retrieved files will be split into chunks and mailed. the
   size of the chunk is 64000 characters unless you change it with
   the "chunksize" command. CompuServe users will need to set this
   to 49000. there is no way to set it higher than 100000, so please
   don't ask.

-> if you ask for more than 10 files in a session, you will receive
   an error message and your entire request will be rejected.

-> VMS/DOS/Mac versions of uudecode, atob, compress and compact
   are available, ask your LOCAL wizard about them if you can't
   locate them (but try gatekeeper.dec.com in /archive/pub/VMS
   if you're still using a VMS system.)

-> several mail unsplitters are hiding on gatekeeper.dec.com in
   /pub/mail/ua/misc/unsplit. there is one in c, one in perl,
   and one in VMS DCL.

-> there is no way to request only certain parts of a file and we
   do not plan to add one in the near future, so please don't ask.

-> there is no way to delete things from the queue or to find out
   the status of things in the queue, and we do not plan to add
   either feature in the near future, so please don't ask.

>>> examples:

-> connect to gatekeeper.dec.com and get a root directory listing:

```
                connect
                ls
                quit

        -> connect to gatekeeper.dec.com and get the README.ftp file:
                connect
                get README.ftp
                quit

        -> connect to gatekeeper.dec.com and get the gnuemacs sources:
                connect
                binary
                uuencode
                chdir /pub/GNU
                get emacs-18.58.tar.Z
                quit

        -> connect to ftp.uu.net as anonymous and get a root directory list:
                connect ftp.uu.net
                binary
                chdir /index/master
                get by-name.Z
                quit
```

Ftpmail was written by Paul Vixie while at the DEC Western Research Laboratory
and at the DEC Network Systems Laboratory, from 1989-1993. Ftpmail is not a
product or service of Digital Equipment Corporation and no support or warranty
is expressed or implied.
   -- End of Help --

   -- Ftpmail Submission Transcript --
<<< help
>>> Help is on the way.
<<< .
>>> COMMAND UNRECOGNIZED, TRY 'help'.
!!! (due to this error, the job will not be processed)
   -- End of Ftpmail Transcript --

   -- Full Mail Header From Request --
From guyd@VNET.IBM.COM Mon May 1 09:02:05 1995
Received: by ftp-gw-1.pa.dec.com; id AB22750; Mon, 1 May 95 09:02:05 -0700
Received: from vnet.ibm.com by inet-gw-2.pa.dec.com (5.65/24Feb95)
    id AA05371; Mon, 1 May 95 08:55:52 -0700
Message-Id: <9505011555.AA05371@inet-gw-2.pa.dec.com>
Received: from WTSCPOK by VNET.IBM.COM (IBM VM SMTP V2R3) with BSMTP id 0944;
   Mon, 01 May 95 11:53:36 EDT
Date: Mon, 1 May 95 11:54:10 EDT
From: guyd@VNET.IBM.COM
To: ftpmail@decwrl.dec.com
   -- End of Request Mail Header --

Appendix H. HTML Example

The following document includes examples of the HTML language. This document is the HTML document used to create the WWW.IBM.COM home page (see Figure 77 on page 116).

```
<HTML>
<HEAD>
<TITLE>IBM Internet Connection - Home</TITLE>
</HEAD>

<BODY>
<img src="/images/mast00.gif" alt="IBM Internet Connection - Home">
<BR>
<A HREF="/whatsnew">
<img src = "/images/icon13.gif" alt="What's New"></a><BR>
<i>(Last Updated: 17 April, 1995)</i><p><H4>
<A HREF="emea">IBM Internet Connection - <i>EMEA: Europe, Middle East,
Africa</i></a><BR>
<A HREF="http://www.ibm.co.jp/snsjinfo/sindex.html">IBM Internet
Connection - <i>in Japanese</i></a><BR>
</h4>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "userinfo">Welcome and New User Information</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "friends">Your Friends at IBM</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "library">Worldwide Reference Library</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "explore">Internet Exploration Toolkit</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "arts">Lively Arts</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "business">Business District</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "entrtain">Entertainment</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "travel">Travel Center</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "news">News Rack</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "mall">Cyber-Mall</a>
```

```
<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "sports"> Sports Scene</a>

<BR><img src="/images/bullet$2.gif" align=middle>
<A HREF = "arcade"> Arcade</a>

<HR>

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<a href="/tools/email.html"> webmaster@ibm.net</a>.
<BR>
If you have a <I>LINK</I> that you would like to see included on this
site, please send us a note at
<A HREF = "/tools/request.html"> <B>REQUEST</B></A>.
<BR>
<HR>

<a href="/tools/search.html"> Search</a>

<a href="/helpdesk/"> Help Desk</a>

<a href="/tools/copyrigh.html"> Copyright</a>

<a href="menu00.html"> Full Color Menu</a>

</BODY></HTML>
```

Appendix I. EXPLORE.INI Configuration File

We include below an example of an EXPLORE.INI file that is used to initialize the
OS/2 Warp WebExplorer.

```
; Web Explorer INI file
; (edit this file with care)

[screen.]
xleft=4
ybottom=0
width=1024
height=768
fontfamily=Helvetica
fontsize=Normal
textcolor=black
linkcolor=blue
visitcolor=pink
backcolor=palegray

[cache]
CacheOn=Yes
CacheMem=Yes
cachedocs=65
cacheimages=64

[options]
SaveToDisk=No
InlineImages=Yes
UnderlineLinks=Yes
InternalViewer=Yes
CustomAnimations=Yes
ShowURL=Yes

[network]
HomePage=http://www.ibm.net
AutoLoad=Yes
Email=guyd@vnet.ibm.com
Proxy=
News=sernews.raleigh.ibm.com
Socks=9.14.1.100

[advanced]
; advanced user settings - edit with care!
;
; mailcap= specifies full path to user mailcap file
; format is:  mime/type; program_name params %s
; example:    image/jpeg; jview -r %s
; no wildcards allowed, no piping, no unix commands
mailcap=
; extmap= specifies full path to user extension map file
; format is:  mime/type     extension_list
; example:    image/jpeg    jpg jpeg jpe
extmap=

[viewers]
; DO NOT edit this section
```

```
; data tags (e.g. viewer=gif) do not represent file extensions
; use mailcap in advanced section above to add NEW mime types
viewer=editor, e.exe
viewer=gif, ib.exe
viewer=jpeg, ib.exe
viewer=tiff, ib.exe
viewer=bmp, ib.exe
viewer=xbitmap, ib.exe
viewer=mpeg, vb.exe
viewer=quicktime, vb.exe
viewer=avi, vb.exe
viewer=avs, vb.exe
viewer=au, ab.exe
viewer=aif, ab.exe
viewer=wav, ab.exe
viewer=inf, view.exe

[quicklist]
quicklist= IBM BookManager
http://lumsdenr.cary.ibm.com/
quicklist= AnyNet frontdoor
http://anynet.raleigh.ibm.com/frontdoor.html
quicklist= IBM Networking
http://www.raleigh.ibm.com/nethome.html
quicklist= 800 numbers
http://att.net/dir800
quicklist= International Business Machines
http://www.ibm.com/
quicklist= Welcome to the ISSC South Information Network
http://w3.raleigh.ibm.com/
quicklist= IBM TCP/IP Organization Home Page
http://www.tcp.raleigh.ibm.com/
quicklist= Internic's net-happenings LISTSERV
http://www.mid.net/NET
quicklist= Internet Schoolhouse
http://www.openlab.advantis.net/fun/menu02.html
quicklist= Internet Shopping Network
http://www.internet.net/
quicklist= WorldWide Web Home - CERN Welcome
http://www.cern.ch/
quicklist= AT&T Welcome Page
http://www.hp.com/home.html
quicklist= American English Dictionary
gopher://gopher.niaid.nih.gov/77/deskref/.Dictionary/enquire
quicklist= Best of the Web '94 Award Recipients
http://wings.buffalo.edu/contest/awards/index.html
quicklist= CERN Welcome
http://info.cern.ch/
quicklist= CommerceNet Home
http://www.commerce.net/
quicklist= Hot Home Pages
http://www.spry.com/hotpages.html
quicklist= IBM Personal Software Products Developer Support
gopher://index.almaden.ibm.com/1os2dsn/os2dsn.70
quicklist= Information Infrastructure Task Force Web Server
http://iitf.doc.gov/
quicklist= Intel
http://www.intel.com/
quicklist= Interesting Business Sites on the Web
```

```
http://www.rpi.edu/okeefe/business.html
quicklist= Internet Distribution Services
http://www.service.com/
quicklist= Internet Multicasting Service
http://www.town.hall.org/
quicklist= Internet Talk Radio
http://www.ncsa.uiuc.edu/radio/radio.html
quicklist= Interserv Magazine
http://www.interserv.com/
quicklist= KGB Archives
gopher://path.net:8001/11/.local/soviet/archives
quicklist= Lucas Internet
http://www.mbnet.mb.ca/lucas/
quicklist= NCSA Mosaic Home Page
http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html
quicklist= OS/2 Electronic Developer's Magazine
gopher://index.almaden.ibm.com/1nonibm/os2nonib.70
quicklist= OS/2 FAQ List: User's Edition (4 Apr 94) Section 03.02
http://www.mit.edu:8001/activities/os2/faq/os2faq0302.html
quicklist= PC MAGAZINE Home Page
http://zcias3.ziff.com/%7Epcmag/
quicklist= PC Week Labs Web Server
http://zcias3.ziff.com/%7Epcweek/
quicklist= Roget's Thesaurus
gopher://odie.niaid.nih.gov/77/.thesaurus/index
quicklist= Silicon Graphics' SILICON SURF Home Page
http://www.sgi.com/
quicklist= THE CANADIAN INTERNET HANDBOOK
http://www.csi.nb.ca/handbook/handbook.html
quicklist= Tandem Computers - WWW Home Page
http://www.tandem.com/
quicklist= Team OS/2
gopher://index.almaden.ibm.com/1teamos2/teamos2.70
quicklist= The Computer Tailor
http://www.mbnet.mb.ca/tct/index.html
quicklist= The Electronic NewsStand
gopher://gopher.enews.com:2100/
quicklist= The InterNIC Home Page
http://www.internic.net/
quicklist= United Kingdom Based WWW Servers.
http://src.doc.ic.ac.uk/all-uk.html
quicklist= United Nations
gopher://nywork1.undp.org/1
quicklist= WWW Servers at U-Michagen
http://www.us.itd.umich.edu/UM-www-servers.html
quicklist= Welcome to the Natural History Museum's WWW Server
http://www.nhm.ac.uk/
quicklist= onLine Home Page
http://www.rednet.co.uk/
quicklist= IBM stock graph
http://www.secapl.com/secapl/quoteserver/ibm-1.gif
quicklist= AmeriCom Long Distance AREA DECODER
http://www.xmission.com/americom/aclookup.html
quicklist= The Smithsonian Internet Series
http://www.earthweb.com:2800/smithsonian/
quicklist= THOMAS: Legislative Information on the Internet
http://thomas.loc.gov/
quicklist= IBM Networking
http://wwwidd.raleigh.ibm.com/
```

```
quicklist= Web Communications - Publishing on the Web
http://www.webcom.com/html/
quicklist= Des Keane's Home Page
http://www.kings.cam.ac.uk/users/dak14/home.html
quicklist= Search the Guardian OnLine Archives
http://www.cityscape.co.uk/cgi-bin/kidofwais.pl
quicklist= IBM Internet Connection - Home
http://www.ibm.net/
quicklist= Welcome to HotWired
http://www.wired.com/
quicklist= Index of /pub/security/
ftp://ftp.win.tue.nl/pub/security/
quicklist= Where can I get Perl 5?
http://www.khoros.unm.edu/staff/neilb/perl/metaFAQ/entry-05.html
quicklist= Perl Meta-FAQ
http://www.khoros.unm.edu/staff/neilb/perl/metaFAQ
quicklist= WebCrawler Search Results
http://webcrawler.cs.washington.edu/cgi-bin/WebQuery
quicklist= IBM OS/2 Warp Version 3 OS/2 Warp Version 3 with WinOS2
http://www.ibmlink.ibm.com/oi/ann/alet/294667.html
quicklist= About Prodigy
http://www.astranet.com/abtprod2.html
quicklist= Search the World-Wide Web
http://w3.raleigh.ibm.com/search.html
quicklist= TRIANGLE ONLINE - Front Cover
http://www.trinet.com/online.html
quicklist= Info/Mgmt WWW
http://9.24.104.74:82/ihome.html
```

Appendix J. OS/2 and Internet Connection Frequently Asked Questions (FAQ)

The following FAQ list has been downloaded from comp.os.os2.networking.tcp-ip.

Does TCP/IP 2.0 work on WARP?

We are testing this, and we haven't found any problems yet. This is a supported combination, meaning that we will fix any problems that do arise.

Does the Internet Connection kit work with OS/2 2.1?

No. The Internet Connection kit can only be installed on OS/2 Warp.

I have OS/2 2.1 and TCP/IP 2.0. Can I run Web Explorer and Gopher?

Yes. You must have CSD UN64092 installed. Web Explorer can be downloaded from the Internet, via anonymous FTP from ftp01.ny.us.ibm.net, where it is in the subdirectory /pub/WebExporer. Gopher can be downloaded from the Internet, via anonymous FTP from software.watson.ibm.com, where it is in the subdirectory /pub/os2/ews. The version of Gopher on software.watson.ibm.com is not current, but it will be updated soon.

I have OS/2 Warp. Can I use the Internet Connection kit for TCP/IP LAN access?

No, the Internet Connection kit only supports dial-up access. You must install TCP/IP 2.0 for LAN-based TCP/IP access. A follow-on to OS/2 Warp is in the works that will include full LAN enablement. (There will be an upgrade charge.)

Can I install both TCP/IP 2.0 (for LAN access) and the Internet Connection kit?

Yes. This combination is not tested or supported, but it does work. You must install TCP/IP 2.0 first. Then you install CSD UN64092. Then you install the Internet Connection, in the same directory where TCP/IP 2.0 is installed. You will see a warning message that the combination is not supported.

The icons of the Internet Connection kit are configured to use a dial connection. How do I use these applications on the LAN?

Create program objects for WebExplorer (EXPLORE.EXE) and gopher (GOPHER.EXE) in your TCP/IP folder.

The UltiMedia Mail Lite package included with the Internet Connection kit is configured to be used with an Internet mail box. How do I use it on the LAN?

For LAN based mail, use the LaMail package that ships with TCP/IP 2.0.

I want to access TCP/IP hosts on the LAN and via a dial connection to the Internet simultaneously. When I dial the Internet, I can no longer get to the LAN TCP/IP hosts. The error message is ″host unknown″. What do I do about this?

While you are connected to the Internet, TCP/IP name resolution queries a host name server on the Internet to look up host addresses. The Internet name server will not know the names of your local hosts. You can use the TCP/IP

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configuration notebook to create a hosts file for hosts on your LAN. Or you can access hosts on your LAN by IP address instead of by name.

I have a default route to a router on my LAN. When I dial into the Internet, the LAN default route is inactivated, and I can no longer access TCP/IP hosts through my LAN router until I hang up the Internet connection. What do I do about this?

While you are connected to the Internet, your default route is to the Internet. You can create host, network, or subnet routes for TCP/IP hosts that you access through your LAN router, so that these hosts remain accessible while you are connected to the Internet. This can be done using the TCP/IP Configuration Notebook.

Appendix K. NSP/AS Service Provider Connectivity

The following list has been extracted from an article by Sue Hares and John Scudder, titled ″NSFNET Traffic Projections for NAP Transition″.

K.1 ANS:

```
17 NSS 152 Purdue - AS
204 PSCNET Regional Network
238 IBM Information Network
377 SNLA (Sandia National Laboratories)
574 PSCNET Regional Network - Test AS
689 AS-NSFNET-T3-BB-AS
1206 PSCNET Regional Network
1207 PSCNET Regional Network - Test AS
1312 VPI - ENSS 151
1321 ANS San Francisco - DNSS 11
1322 ANS Los Angeles - DNSS 19
1323 ANS Chicago - DNSS 27
1324 ANS New York City - DNSS 35
1324 ANS New York City - DNSS 35
1325 ANS Cleveland - DNSS 43
1326 ANS Hartford - DNSS 51
1327 ANS Washington D.C. - DNSS 59
1328 ANS Houston - DNSS 67
1329 ANS Greensboro - DNSS 75
1330 ANS St. Louis - DNSS 83
1331 ANS Seattle - DNSS 91
1332 ANS Denver - DNSS 99
1333 ANS Atlanta - DNSS 107
1334 ANS Albuquerque - CNSS 112
1335 ANS Honolulu - CNSS 120
1660 ANS, Elmsford, New York
1662 CUNY, New York, New York
1665 IBM Watson #2, Yorktown Heights, NY
1666 ANS-Ann Arbor
1670 ANS-BLK AS
1678 DOW AS
1681 ANS - Ann Arbor
1683 NYUFRAME
1747 IBM Watson, Yorktown Heights, NY
1751 Lexmark, Lexington, KY
1757 Mead Data Central
1757 Mead Data Central
1934 ANS, Reston, Virginia
1956 IBMEVS-AS
1957 ANSCIX-AS
1982 Northwest Nexus
1997 IBM Dallas Engineering &amp; Scientific
2002 IBM-PV-AS
2019 JP MORGAN
2020 HWWILSON-AS
2138 DOW Chemical, Midland, Michigan
2139 DOW Chemical, Houston, Texas
2140 ISSC-AS
2386 INS-AS
```

```
                2493 FONOROLA-EAST
                2493 FONOROLA-EAST
                2538 IBM-KINGS-AS
                2548 DIGEX-AS
                2649 NAS-DC
                2685 ADVANTIS-NET
                3381 MHPCC-AS
                3577 PREPnet-WEST
                9010 ANS/Gated Test-AS
```

K.2 MCI:

```
                3 MIT-GATEWAYS
                38 UIUC Regional Network
                73 NorthWestNet Regional Network
                86 SURANET Regional Network (College Park)
                93 MIDnet
                97 JvNCnet Regional Network
                104 NorthWestNet Regional Network
                114 SESQUINET Regional Network
                199 BARRNet Test AS
                200 BARRNet
                200 BARRNet
                233 UMnet (University of Michigan)
                237 MichNet (MERIT)
                266 CICNET at MERIT
                267 CICNET at UIUC
                279 SURANET Regional Network (Georgia Tech)
                560 NEARnet Regional Network
                577 CA-NET-AS
                577 CA-NET-AS
                577 CA-NET-AS
                600 OARNET, Cleveland, OH
                685 NorthWestNet Regional Network
                698 UIRNet
                1224 NCSA, Champaign, IL
                1225 CICNET at Argonne Labs
                1250 ENSS 137 - Princeton
                2648 NIST-BOULDER
                3561 MCI-RESTON
                3561 MCI-RESTON
```

K.3 Sprint

```
                174 NYSERNet Regional Network / PSI
                175 AFWL-AS (Air Force Weapons Laboratory)
                194 NCAR Regional Network
                195 SDSC Regional network
                209 Westnet Regional Network (Colorado Attachment) - ENSS 141
                210 Westnet Regional Network (Utah Attachment) - ENSS 142
                278 Mexican Networks at NCAR
                555 Minnesota Supercomputer Center Network (MSCNet)
                1239 SprintLink
                1740 CERFnet
                1838 CERFNET-2
                3354 THENET-AS-1
```

K.4 Other (Including MFSdatanet):

```
                19 Milnet (FIX-East)
                22 NOSC (Naval Ocean Systems Center)
                26 Cornell Regional network
                68 Los Alamos Regional Network
               183 Merit Route Server (MAE-East)
               185 MERIT-OFFNET
               283 Gated Testing
               293 Energy Science Network (ESnet)
               293 Energy Science Network (ESnet)
               297 Nasa Science Network (FIX-East)
               372 Nasa Science Network (FIX-West)
               568 Milnet (FIX-West)
               668 DREN (U.S. DoD Defense Research and Engineering Network)
               668 DREN (U.S. DoD Defense Research and Engineering Network)
               683 Argonne Labs
               701 Alternet
               701 Alternet
               771 Nasa Science Network (Houston)
              1133 CERN/DANTE
              1240 ICM-Pacific
              1262 Nasa Science Network (Boulder, CO)
              1263 NSN-TEST-AS
              1674 CERN/DANTE
              1800 ICM-Atlantic
              1849 PIPEX-AS
              1879 EUROPE-RS
              1972 DARPA
              2149 PSINET-2
              2150 CSUNET-SW
              2551 NETCOM
              2551 NETCOM
              2699 Defense Simulation Internet (DSI)
              2699 Defense Simulation Internet (DSI)
              3429 ESNET-AS-5</pre><hr>
```

Please note that these steps represent best guesses for when and which NSPs the given AS's will connect to; this should not be read as a representation of the AS's official policies. Corrections to this list are solicited.

Appendix L. Basic Troubleshooting for Internet Connection for Windows

If you are having problems using the Internet Connection programs, check the following basic troubleshooting information before calling for technical support. The problems you may have can be divided into four groups:

- Installation problems

- Registration information and modem problems

- Connection problems

- Application or service provider problems

L.1 Installation Problems

If you cannot start the Internet Connection, read the sections below to diagnose what is wrong. If you get unexpected results after installing, check the following:

- If you have the EMM386.EXE defined as a device in your CONFIG.SYS file, you may not be able to start the Internet Connection. Comment out the statement and reboot your system to see if the problem recurs.

- If you are using Windows for Workgroups, you may need to reorder the statements in your AUTOEXEC.BAT file so that the CALL IICSTART statement comes after the statement with the NET START command. Check your system files (AUTOEXEC.BAT, CONFIG.SYS, and SYSTEM.INI) to verify the changes made by the Internet Connection installation program.

- If you get an error saying ″INET not started,″ then exit Windows. Type IICSTART at the DOS prompt and restart Windows.

L.2 Registration Information and Modem Problems

If you cannot connect to your service provider, read the sections below to diagnose what is wrong. If your modem is not dialing your service provider, check the following:

- Your modem may be switched to silent mode. You can switch it so that you can hear it dial.

- If you are using an external modem, is the power switched on?

- Are the correct cables connecting it to your computer?

- Is the modem plugged in to the electrical socket?

- Is the modem connected to a phone jack?

- Is the phone line connected to the correct port on your modem?

- Is the phone line working?

- Did you specify the correct communication port (COM1, COM2, and so on) for the modem?

- Did you specify the correct modem type and speed? Check the documentation for the modem to make sure that you have specified the proper speed. For example, you may need to configure a 14,400 modem at

19,200 or 38,400. Also check with your service provider to see what modem speeds are supported.

- Is the communications port configured properly through Windows?
- Did you specify the appropriate special code (if there is one) before the phone number for your service provider? For example, if you normally have to dial 9 to get an outside phone line, you must also specify a 9 before the service provider phone number.
- Did your modem work with another program before you tried to use it with the Internet Connection?
- If you are getting no response or a busy signal when the modem does dial your service provider, please note that some service providers take their servers off-line from time to time for maintenance. Ask your service provider for a schedule. Keep trying at a later time in case the service provider is temporarily busy or unavailable.
- Are you are using the correct login name and password for the service provider? (If you are using IBM Internet Connection services, the number is correct because it was supplied for you.) A large number of Internet service providers put their servers on UNIX computers so the login name and password will probably be case sensitive. Make sure the login name and password are entered in the correct case in your connection definition.
- If the connect messages on the status bar go by too quickly for you to read them while you are trying to connect to your service provider, check the CONNECT.LOG file in the ETC directory for a complete list of messages from the most recent connection attempt.
- If the Connect Error window displays after selecting Connect on the IBM Internet Connection window, check your hardware connections as instructed. If you continue to experience the connection problem, do the following:

  1. Select Modify on the IBM Internet Connection window.
  2. Advance to page 4 of 5.
  3. Locate the Modem Initializations Strings fields.
  4. Search for the character string, &D2, in either of the two fields.
  5. If &D2 is found in either of the two strings, change &D2 to &D0.
  6. If &D2 is not found, add &D0 to the end of the second string.
  7. Save your changes and restart the connection process.

L.3 Connection Problems

If you have problems once you have connected to your service provider, read the sections below to diagnose what is wrong. If the Internet Connection applications seem to disconnect suddenly for no apparent reason, check the following:

- Do you have call waiting on your phone? Has someone else picked up the phone on the phone line your modem is using?
- Do your phone line connections have a lot of line noise (high-pitched whining or crackling)? Line noise can cause your phone connection to disconnect.

If your system hangs when you attempt to connect a second time, check the following:

- Are you using Windows for Workgroups Version 3.11 on a Pentium-based machine with a 16550 UART chip? If so, then your system stops responding

(hangs) when there is data in the chip when the Internet Connection tries to open the communications port. This is a problem with the SERIAL.386 file and you can get a fix from Microsoft Product Support Services.

If you get unexpected results and you are connecting to a service provider that is not currently in the Service Provider list, check the following:

- If the service provider allocates IP addresses dynamically, then you must contact the service provider for a script.

- If the service provider does not allocate IP addresses dynamically, then contact the service provider to ensure that you are entering the correct information.

- If your service provider changes the login sequence for their login, the automated login script may not work correctly.

L.4 Application or Service Provider Problems

If you have problems once you are using the Internet Connection programs, read the sections below to diagnose what is wrong. If an application is unable resolve a destination address, check the following:

- Do the other Internet Connection applications work? Did you specify the correct default server for the program (Gopher, News, World Wide Web)? Try pinging your servers to see if you are connected to them.

- If an application seems to be hung, try to be patient, particularly when bringing in the list of all the newsgroups or when displaying a large graphic image with WebExplorer Mosaic. If you decide you have waited long enough and the application does not seem to be receiving information, then cancel the retrieval process or close the application. The slow performance is probably due to heavy network usage through your service provider.

- Check the lights on your modem to see if the usual sets of lights are lit. Re-connect to determine if your service provider is currently offline.

If you are having problems with running the product, you can use TCPCheck to diagnose what may be wrong. Because TCPCheck uses the ping command, it may not be able to consistently test your connection if your modem is slow or if network traffic is heavy. If TCPCheck fails on a ping that you feel you have properly defined, then run TCPCheck a second time.

TCPCheck looks to see if the Windows Sockets program that is automatically loaded when the product is started is currently running. If this is not loaded, then call IICSTART.BAT. If the product is still not available, then make sure that your PATH statement in your AUTOEXEC.BAT includes an entry for drive:directoryBIN where the drive:\directory is where the product was installed. You may need to re-install the product.

TCPCheck looks to see if you have started the SLIP program that runs while you are connected to the network. If it is not running, then check to see if you correctly entered the information provided to you and are connected to the network. You may need to alter the SLIP statements in the TCPDOS.INI file.

TCPCheck looks to see if you have a correct service provider session set up. If not, then check to see if you correctly entered the information provided by your service provider.

TCPCheck pings the currently defined dotted decimal IP address. If you cannot ping your own computer, then some possible reasons why are as follows:

- SLIP is not running properly
- SLIP is not running properly
- The connection information is not correct
- You have a problem with your adapter

TCPCheck looks to see if you can contact other hosts on the Internet through a router. If you cannot ping your router/destination, then check to make sure that you have entered the correct router/destination IP address for your service provider in the Connect program.

TCPCheck looks to see if you can contact other hosts on the Internet by name. If you cannot ping your name server, then check to make sure that you have entered the correct IP address of the domain name server for your service provider in the Connect program.

If you receive a message similar to the following when trying to invoke one of the applications such as gopher:

```
There is insufficient memory to start the application.  Please close
some applications or leave Windows and re-enter it in order to free
up memory.  WinExec return code = 8.
```

This means that there is not enough memory to run the application you desire. Try the following steps:

- Close other Windows applications (except Connect) and try again.

- Close the connection, restart Windows, and try again.

- Try to maximize the amount of DOS and Windows memory available. For example, remove any unnecessary programs from CONFIG.SYS and AUTOEXEC.BAT to increase DOS memory (Windows does use some of this memory). Also, make sure your memory settings for Windows memory are correct, such as ensuring that the Swap file has sufficient space.

Appendix M. Removing IBM Internet Connection for Windows

If you decide that you need to remove the product from your computer, you can follow these steps.

1. Exit Windows.

2. Go to the root directory of the drive where the product is installed.

3. Delete the files using the DELTREE command. For example, if the product is installed to the TCPDOS directory, enter:

   ```
   DELTREE TCPDOS
   ```

4. Edit the AUTOEXEC.BAT file and delete the following lines:

   ```
   CALL IICSTART.BAT
   SET ETC=drive:\directory\ETC
   ```

5. Edit the CONFIG.SYS file and delete the following line:

   ```
   DEVICE=drive:\directory\BIN\DOSTCP.SYS
   ```

6. Edit the SYSTEM.INI file in your WINDOWS directory and make the following changes:

   Uncomment (remove the semicolon (;)) in the following line in the boot stanza:

   ```
   ;COMM.DRV=COMM.DRV
   ```

   Delete the following line in the boot stanza:

   ```
   COMM.DRV=drive:\directory\BIN\COMM.DRV
   ```

   Delete the following line in the 386Enh stanza:

   ```
   DEVICE=drive:\directory\BIN\GIFVXD.386
   ```

7. Reboot the workstation and restart Windows.

Glossary

Archie. An Internet Searching system for locating files that are stored on FTP servers. Dedicated Archie servers exist around the world, which scan FTP sites for new files. These are updated in a database which users can scan using a search tool to look for files.

ARPAnet. The original Internet developed by ARPA.

CSD. An IBM term meaning Corrective Service Diskette. This is a software fix.

Daemon. A background task.

EGP. Exterior Gateway Protocol. This is a reachability protocol used by gateways on the Internet outside an autonomous network region.

Finger. A software tool used to determine whether a user is logged on to the Internet. It can also be used to find out a users Internet E-mail address.

FTP. File Transfer Protocol

Gopher. A tool that presents data and information in a hierarchical menu format somewhat like a table of contents on data stored around the world. The data is cross referenced.

ICMP. Internet Control Message Protocol

IGP. Internet Gateway Protocol. This protocol used to exchange routing information between routers on the Internet.

IGMP. Internet Group Management Protocol

IP. Internet Protocol. This is a protocol standard that describes how packets of data are transported across the Internet.

NCFTP. An FTP program which provides automatic anonymous logon and password creation.

PINE. PINE, from the University of Washington, is a mail handling program. PINE is designed to act on simple one-key operations.

PKZIP, PKUNZIP. Shareware file compression and uncompression routines copyrighted by the PKWARE Inc. Commonly used on DOS PCs.

POP. Post Office Protocol 3. This is a protocol designed to handle the problem of having a mail client fetch mail from the mail server without too much complexity. A host must have a POP V3 server application running, usually on TCP socket 110. Handles mail transfer in a better method that the SNMP mail transfer protocol.

PPP. Point to Point protocol. A protocol that allows dial-up access to the the Internet through a serial link.

PTF. An IBM term meaning program temporary fix This is a software fix.

SLIP. Serial line IP. A protocol that allows dial-up access to the the Internet through a serial link.

SMTP. Simple Mail Transfer Protocol. The protocol that describes how mail messages are transported in a TCP/IP network, such as Internet. SMTP requires that the sender and receiver need to have their mail workstations running to ensure that they receive mail.

TCP. Transmission Control Protocol

UDP. User Datagram Protocol

UNZIP. Shareware file uncompression routine copyrighted by the PKWARE Inc. Commonly used on DOS PCs.

UUCODE and UUDECODE. Binary-ASCII file encoding/decoding. The Internet mail programs can only send ASCII formatted data. To enable users to send binary data around the Internet using the Mail facility, the binary files had to be ASCII encoded. To do this, the UUCODE to program is used. The receiver of the mail would then have to re-encode the data into a binary format again. The receiver would use the UUDECODE program to do this

Veronica. Very Easy Rodent-Oriented Netwide Index to Computerized Archives. A search tool which searches text that appears in Gopher Menus.

Wais. An Internet utility that maintains detailed information of contents of files at specific servers. The Veronica and Archie search utilities can only search the header description of documents. Many documents cover more data than their heading specifies. Wais stores cross referenced data about the contents of specific files on dedicated serves. To access that data, you would first scan the Internet for WAIS servers specific to your search topic. You would then scan the Wais server for the text you are interested in.

Whois. A TCP/IP utility that lets you query servers for detailed information about other Internet users who have been registered at whois servers.

WinSock. WinSock is a Windows socket support program. This specifies a set of calls that Applications can make to interface with TCP/IP software.

WWW. World Wide Web. A network of servers that use hypertext links to find and access files.

ZIP.   A Shareware file compression routine copyrighted by the PKWARE Inc.

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International Technical Support Organization
Accessing the Internet
August 1995

Publication No. SG24-2597-00

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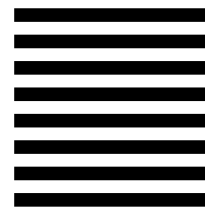Cut or Fold
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