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DDN NEW USER GUIDE

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(Revised November 1987)

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MILNET Geographic Map, 1 July 1987

SATELLITE CIRCUIT
○ C/30 IMP
△ C/30 TAC
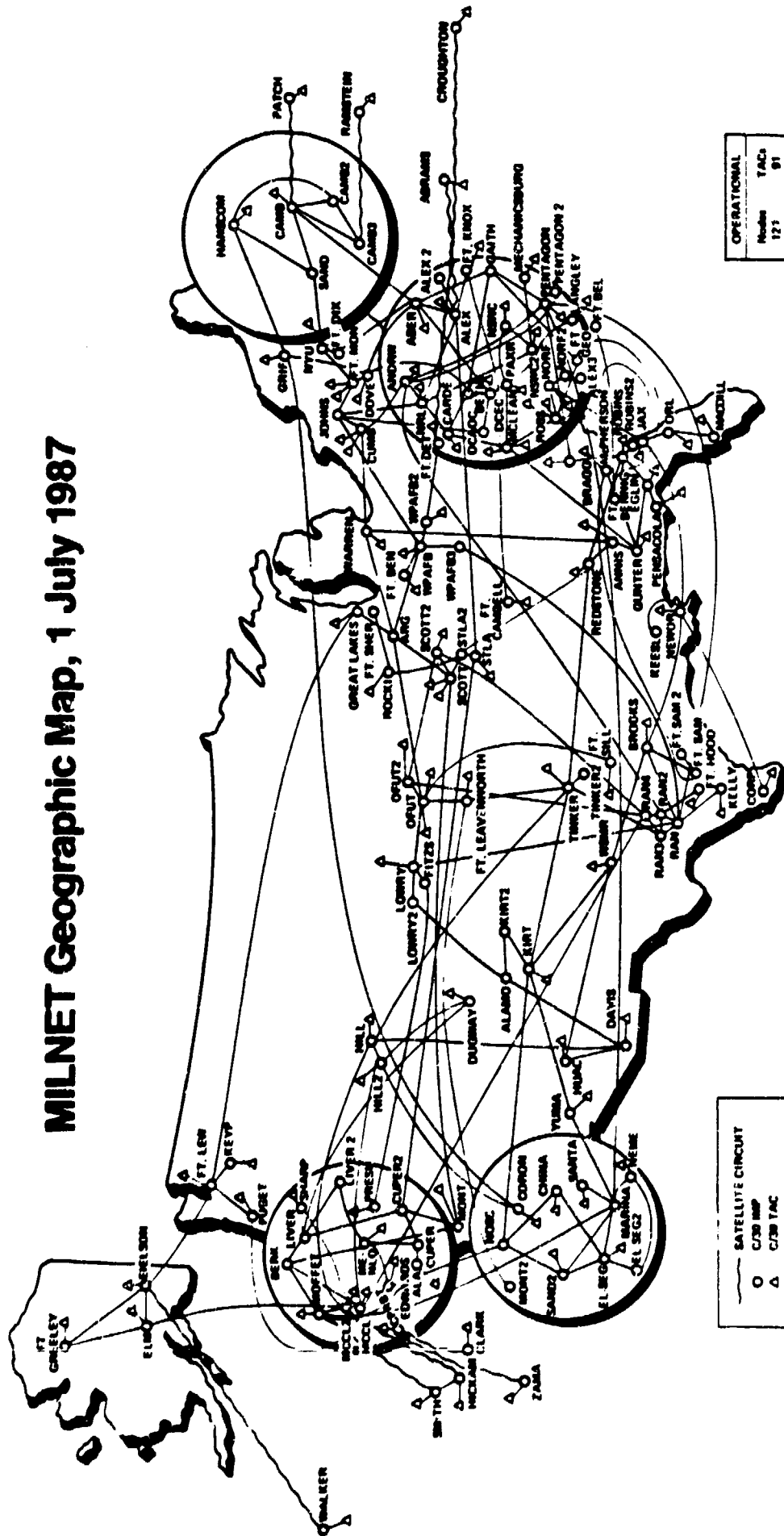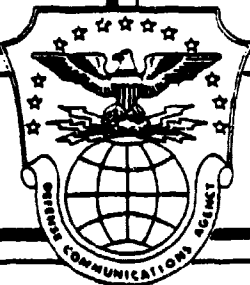
DEFENSE COMMUNICATIONS AGENCY

DDN NEW USER GUIDE

(Revised November 1987)

Supersedes AD-A166368

DECEMBER 1985

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DDN

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It is the intent of the DDN Network Information Center (NIC) to make the New User Guide widely available to DDN users at minimal cost. It may be obtained in hardcopy or machine-readable form from several sources. Military users may obtain hardcopy as a DCA Circular from the Defense Technical Information Center (DTIC). (Either the NIC or DTIC can provide the ordering number.) Non-military users such as contractors, systems personnel, and researchers, may obtain hardcopy from the NIC by sending $10.00 ($13.00 overseas) to the DDN Network Information Center, SRI International, Room EJ291, 333 Ravenswood Avenue, Menlo Park, CA 94025. Copies are available online to DDN users who have access to File Transfer Protocol (FTP). The file NETINFO:NUG.DOC contains an ASCII sequential text version. In addition, the NIC will make every effort to assist key military DDN POCs in providing copies of this Guide to their user communities.

ACKNOWLEDGEMENTS

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SECTION 1.   INTRODUCTION

1.1   Welcome

Welcome to the Defense Data Network, or the DDN as it is more commonly called. The DDN is a powerful operational military network. It might be thought of as an "umbrella" network composed of several large segments or subnetworks. The unclassified portion of the DDN is a subnetwork known as the MILNET. It is the MILNET on which this document will focus, and on which you are invited to try your hand.

The DDN New User Guide describes the policies, concepts, and conventions of the DDN, with major emphasis on the MILNET. The guide contains an overview and a tutorial introduction to the DDN, along with a description of some of its interesting network programs and services. It is not intended to be a highly technical document, and does not cover the process of attaching hardware, terminals, or other equipment to the network. This information is provided in other documents [1,2].

As you will subsequently learn, the MILNET recently split off from the unclassified DoD experimental research and development network known as the ARPANET; therefore, most of what is described in this document applies to the ARPANET as well as to the MILNET, although, as stated above, the emphasis of this guide is on MILNET.

A wealth of services and resources is available on the DDN. Many of your colleagues already work on the network, and you will be able to communicate easily and quickly with them, even though they may be hundreds of miles away. It is also easy to participate in discussions about topics of interest and to use network programs and tools to enhance your own capabilities.

Using a computer network is not difficult. However, as with any new tool, proficiency requires learning some procedures and guidelines, and practicing your new skills. The DDN New User Guide will provide the background information necessary to get you started. We hope you find it a useful orientation aid to the network.

1.2   Using This Guide

This Guide is written for the new user and should be supplemented with additional reading from other sources. Network-specific terms are defined both in context and in the Glossary (Section 8). Throughout the text, references appear in the form "[12]". These refer to citations listed in the Bibliography (Section 7) which describe documents containing additional explanatory or background information. Also check online HELP systems and the documentation that often accompanies network programs. (Watch for pointers to online HELP files when you first access a given program or service.) We encourage you to expand your knowledge of the network by consulting these and other additional information sources whenever you can.

The Guide is divided into sections and subsections, each covering topics of interest to a new user The following is a summary of what is contained in each section.

- Section 1 is a brief introduction to the GUIDE.

- Section 2 describes the structure of the DDN and how it is administered. The MILNET and the ARPANET are introduced. This section discusses the role of the Defense Data Network Program Management Office (DDN PMO) in managing the DDN. It also outlines the role of the Defense Advanced Research Projects Agency

(DARPA) in the development of the ARPANET and explains the current relationship between the two agencies with respect to the ARPANET and the MILNET.

- Section 3, Network Connection, gives step-by-step procedures for connecting to the network. Procedures for accessing the network through a Terminal Access Controller (TAC) are described in detail.

- Section 4, Network Registration, discusses the steps required to register as a new user and to obtain authorization to use a TAC.

- Section 5, Network Use, provides "how-to" instructions for some of the most useful services available on the DDN. It also describes the legal and courtesy standards of the network. Be sure to read the etiquette section (Section 5.3). The guidelines outlined there will decrease your chances of unwittingly offending other users during your first days on the net.

- Section 6 describes network services and the key people who manage them. The DDN Network Information Center (NIC) is the logical first place to ask for information unavailable at the local level. The NIC can help users solve network use problems, locate documents and resources, or identify appropriate points of contact (POCs) for further assistance.

- Sections 7 and 8 contain a Bibliography and a Glossary of terms used in this GUIDE.

- The appendices contain information about network Special Interest Groups (SIGs), a sample set of representative questions asked by new users, and a one-page list of useful contacts.

- Located at the back of the GUIDE is a feedback form. Readers are encouraged to use the feedback form to make suggestions or point out errors. We value your comments and suggestions, and will consider them for future versions of the New User Guide. Suggestions may also be sent online to SUGGESTIONS@SRI-NIC.ARPA.

1.3   Syntax

The following syntax conventions are used to describe user/machine interactions in the DDN
New User Guide.

[Text in brackets]	Machine response.
underlined lower-case	Literal user typein.
UPPER CASE	A variable to be typed by the user, such as a password. When the word "PASSWORD" appears, the user is expected to enter his actual password, rather than type the word "PASSWORD".
PASSWORD	A usually non-echoing string of characters, chosen by the user or by the system on behalf of the user, and required for authentication when logging into a computer.
...TEXT...	Text other than a command, variable, or a control character, to be supplied by the user, e.g., the actual contents of a message.
<Return>	A carriage return typed by the user.
<Control>X	A control character typed by the user, where "X" may be any character. To execute, the user must press two keys at once, the CONTROL key and the letter or symbol key indicated. NOTE: The CONTROL key is labeled "CTRL" on some keyboards.
; ...TEXT...	A comment added for clarification or explanation. Comments will be off to the right and preceded by a semi-colon. They are included for informational purposes only, and should not be typed.

SECTION 2.   THE DEFENSE DATA NETWORK

2.1   Network Overview

A person accessing a local computer is largely unaware of what kind of link connects his terminal to the computer he wishes to use. The terminal seems to be "the computer", since it prints or displays what is happening. As the user progresses in his work, he may need to move data from his local computer onto another computer, or he may wish to send a message to a colleague working on a computer at a distant location. At this point the usefulness of a communication network becomes apparent.

A communication network is a group of computers joined together by data-carrying links. A network may be as small as two or three personal computers in a building, tied together by local telephone lines, or it may be a vast complex of computers spread over the world, whose data links include long-haul telephone lines, satellite relays, fiber optic cables, or radio links. It is also possible for several different networks to be interconnected to each other to form an "internetwork".

Everyone is familiar with telephones. Phonesets inside the house connect to outside lines which lead into nearby local or regional telephone exchanges. The exchanges are connected together to make up one or more national telephone systems. The national telephone systems communicate with each other to make up an international telephone network. There are also private telephone systems, which are totally separate from the public telephone systems, and which own their own equipment.

Computer networks follow a similar pattern. Local area networks (called LANs) may connect computers within a building or in different buildings. A LAN may stay separate, or it may interconnect to regional, national or worldwide commercial or government networks. Many of these large and small networks are gradually interconnecting through "gateways" to form a worldwide system of data networks similar to the telephone system. Indeed, since many computer networks use telephone communication lines to carry data from one computer to the next, the two systems are closely interwoven.

Detailed knowledge of this technology is not needed to use a network, but it is necessary to understand the concept of going through layers of equipment and interconnections. Effective network use also requires knowing the online "addresses" of people or machines with which you wish to communicate, and knowing your own network address as well.

The DDN is a special kind of data network known as a packet-switched network. On this network a terminal or a source host computer (generally just called a "host") passes a "message" along with its destination address to the local Packet Switch Node (PSN) computer. The PSN breaks the message into "packets" or smaller chunks of data. Each of these packets has the same destination address as the original message, plus a sequence number indicating which piece of the whole message it originally represented. The packets are passed from PSN to PSN until they reach the destination PSN.

A packet-switched network differs from a circuit-switched network in that no predetermined, dedicated path exists for delivery of the data. Each packet takes the best route that it can find at the time, and all the packets in a given message do not necessarily take the same route. Once the packets arrive at the destination PSN, they are reassembled into the right sequence and are then delivered as a complete message to the destination host.

NOTE: PSNs were originally known as Interface Message Processors, or IMPs.
The DDN is comprised of a variety of equipment. Terminals, modems and host computers are provided by users. Node computers and leased telephone lines are supplied by the DDN. There are several ways a user can reach the network from his terminal using different combinations of hardware in conjunction with the network programs. These are shown in Figure 2-1.
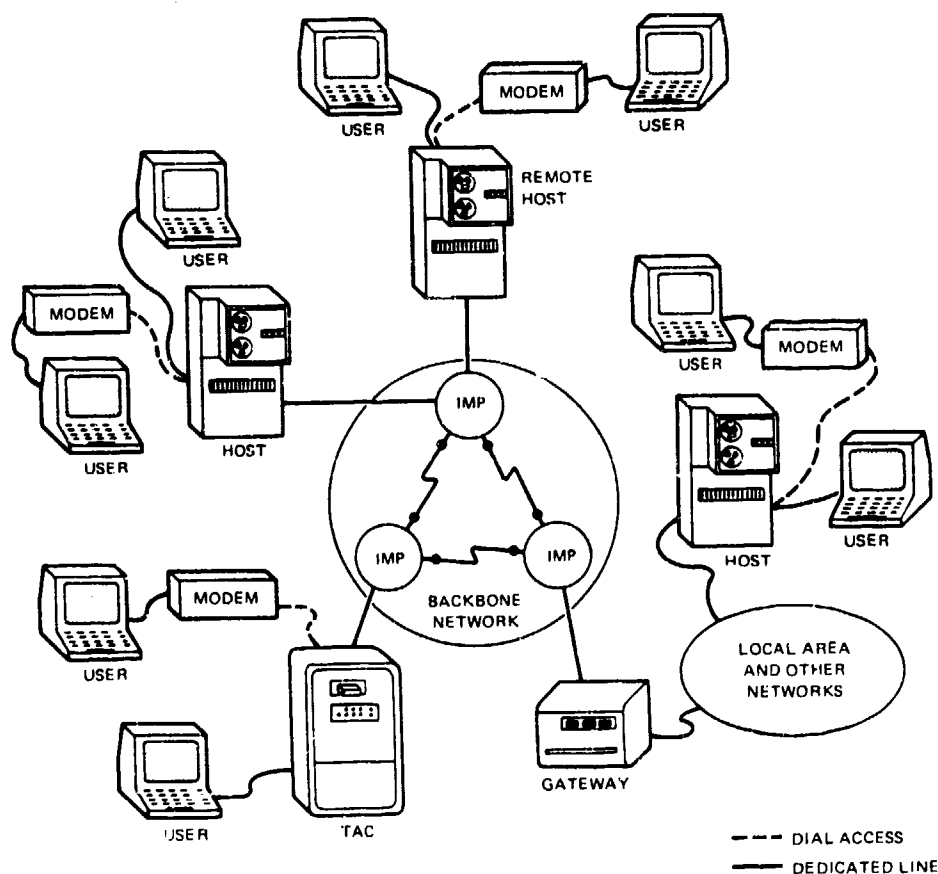
Figure 2-1: Methods of Accessing the Network

A terminal may reach a host in several ways. A wire or cable may run directly from the terminal to the computer; this is called a "hard-wired terminal". A terminal may also communicate with a computer via a telephone connected to the terminal through a modem or acoustic coupler. This arrangement uses ordinary telephone lines to reach the computer and is called a "dial-up terminal". Dial-up terminals generally connect to the network at 1200 bits per second (bps), although other speeds are possible.

NOTE: The speed settings of your terminal and modem must be the same for the two devices to properly communicate with each other.
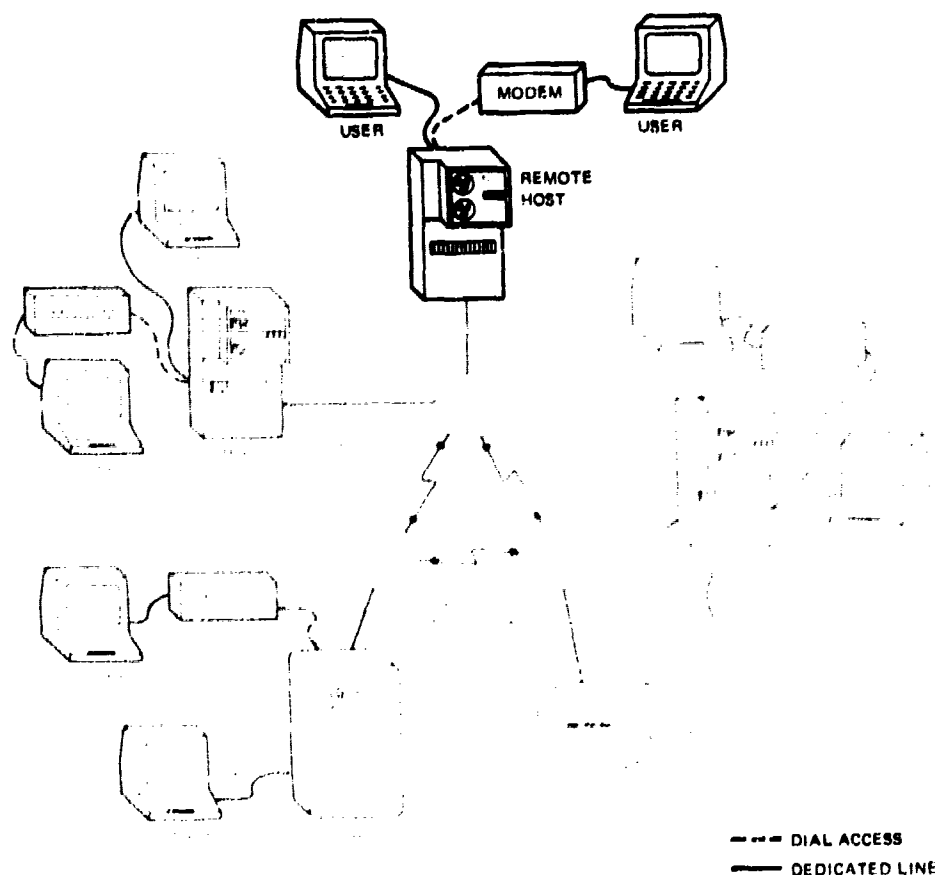
Figure 2-2: Direct Connection to a Remote Host

Personal computers with the appropriate equipment may also be used as terminals. In this case, the personal computer "emulates" or acts like a terminal when it is being used in terminal mode.

A terminal may be directly attached to a local area network (LAN), or to a local switch (similar to a telephone switch). The user can then potentially reach any computer on the LAN or any computer connected to the switch. The LAN may also be internetted to the DDN through a "gateway", which is a computer whose software determines whether the traffic from the LAN is suitable to pass out onto the larger, long-haul network and vice versa.

2.2 The DDN

The Defense Data Network (DDN) is a large military common-user data communications internetwork operated for the Department of Defense (DoD) by the Defense Data Network Program Management Office (DDN PMO) of the Defense Communications Agency (DCA). The DDN is made up of several networks. These networks have compatible hardware and software which lets them communicate with each other.

2.3 The MILNET and ARPANET

The MILNET and the ARPANET are two of the networks that make up the DDN. Both are unclassified military networks, but as we shall see, they have different uses.

The ARPANET was built in 1969 as an experiment by the Defense Advanced Research Projects Agency (DARPA) to determine the viability of a store-and-forward, host-to-host, packet-switched network. The designers of the network wanted to der ionstrate that computers, made by different manufacturers, of different sizes, and with different operating systems, could communicate with each other across a network. It was envisioned that users of such a network could share programs and communicate via the network with other users at distant locations. The experiment was successful, and today many data networks are modeled after the ARPANET.

In 1979 the Department of Defense decided to interconnect several DoD long-haul, computer networks through a set of internet protocols so that they could share the same "backbone" of node computers linked by high-speed telephone lines. These protocols, which are rules or standards by which networks communicate, were developed by researchers known as the Internet Working Group (IWG), under the sponsorship of the DARPA Information Processing Techniques Office (IPTO). The protocols were tested experimentally for several years on the ARPANET, and proved useful for creating the networking environment that DoD wanted.

In 1982 a directive was issued that adopted a single set of communication protocols [3] for the DoD based on the ARPANET protocols. This was followed in 1982 by a directive [4] to create the DDN as a parent or "umbrella" operational military network made up of several existing or planned DoD computer networks. (See Fig. 2-3.)

By 1983 the ARPANET, which was still considered an experimental network, had grown to over 300 computers, many used for day-to-day operational military purposes as well as research. Other military users were seeking networking services. The DoD evaluated several network architectures to meet the growing need for an operational military network and finally chose the DARPA Internet architecture as the model for its common-user communications network, the DDN.

In September 1984 the original ARPANET was split into two separate unclassified networks, a military research and development network (ARPANET) and a military operational communications network (MILNET). The split returned to DARPA a network for experimentation and established an unclassified military network able to accommodate the DoD's growing operational needs. Traffic, primarily electronic mail, still flows between the two networks, but will be increasingly controlled by gateways as the two networks evolve.
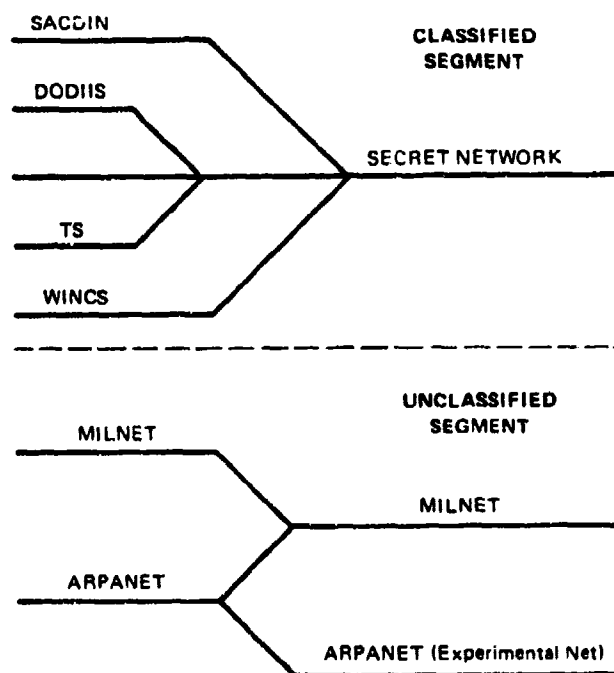
Figure 2-3: Projected Expansion of the DDN

2.4   The DDN Program Management Office

The DDN Program Management Office (DDN PMO) handles overall management, operations, and policy guidelines for the DDN. It assists new military subscribers in bringing their computers and related equipment onto the DDN. It also manages the ARPANET research and development network on behalf of DARPA.

The DDN PMO provides many services to network users and potential network subscribers. It is responsible for keeping the network up and running, providing user assistance, setting policies, anticipating growth and expansion, and assisting new subscribers. The DDN PMO also manages the access control and security of the network backbone, designates host and node contacts, and coordinates the military sponsors. In addition, it provides technical management of contracts for services, equipment, and software obtained from outside vendors.

To provide operational management support for DDN, the PMO has designated a person to act as the primary point of contact (POC) for operations for each of the DDN networks.

Fig. 2-4 shows the overall organization of the various divisions, branches, and codes within the DDN PMO. Specific PMO contacts are listed in Section 6.

2.5   The Role of DARPA

The primary role of DARPA in the government is to provide basic research, development and technology transfer for the DoD. From 1969 until 1973, while the ARPANET was developing, DARPA managed and operated the ARPANET. After 1973 the management and operation of
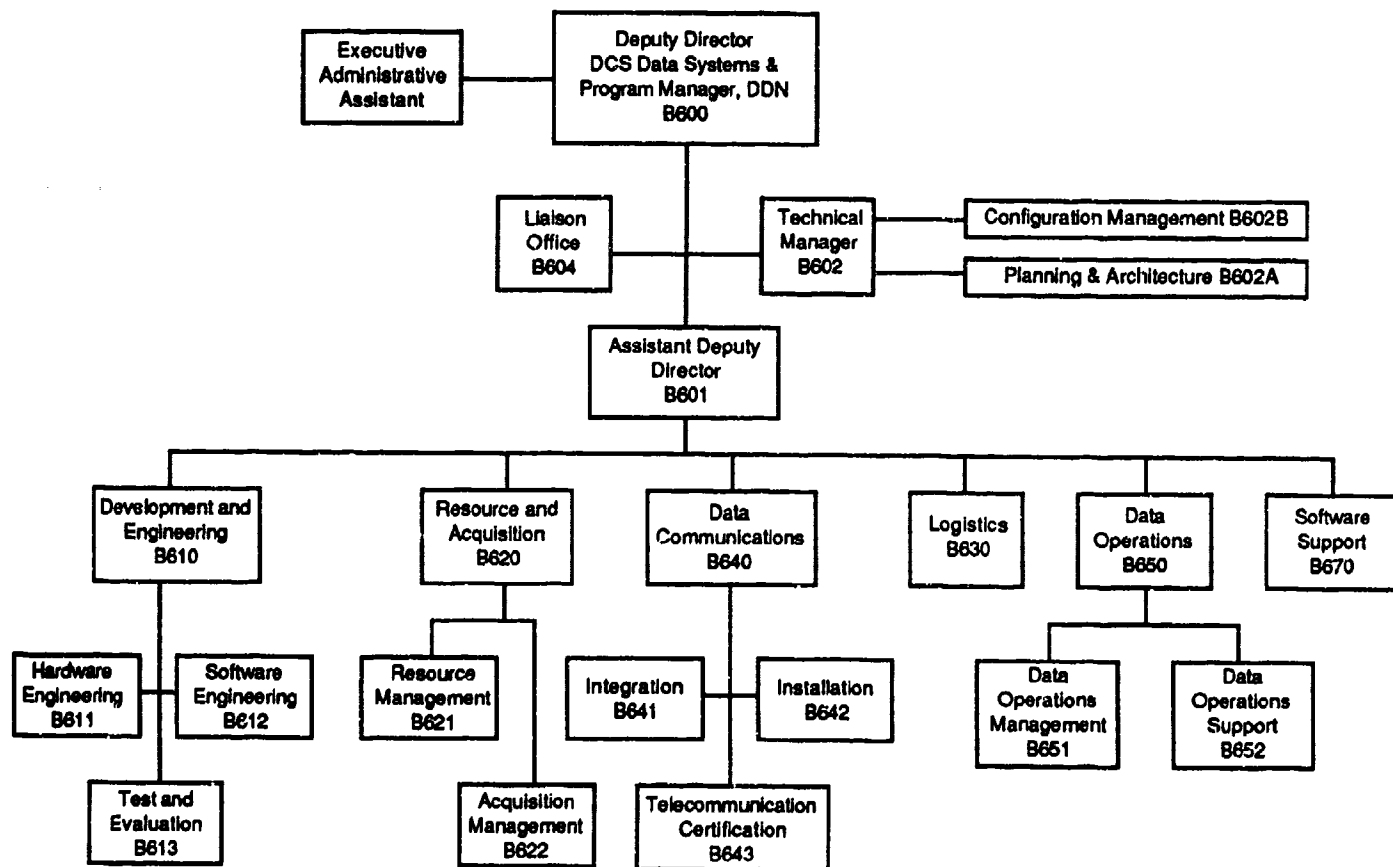
Figure 2-4: DDN PMO Organization Chart

the ARPANET was turned over to DCA, and today it is managed by the DCA on behalf of DARPA.

The long association of DARPA with the ARPANET, together with the network's name, have caused much confusion as to who manages the ARPANET now. Therefore, it is important to reiterate that the DDN PMO operates and manages the ARPANET, including the node software and hardware. DARPA sets specific policy for the ARPANET within the overall guidelines set by the DDN PMO. DARPA also pays the backbone operating costs of the ARPANET portion of the DDN, and authorizes ARPANET use. The two agencies, DARPA and DCA, work closely together to keep the DDN viable and on the cutting edge of network technology.

2.6   Requirements for Legitimate DDN Access

Only users engaged in U.S. government business or applicable research, or directly involved in providing operations or system support for government-owned or government-sponsored computer communications equipment may use the DDN. The network is not available for use by the general public, nor is it intended to compete with comparable commercial network services. Users of the DDN must not violate privacy or other applicable laws, and should not use the networks for advertising or recruiting purposes without the express permission of the DDN PMO.

Unauthorized use of the DDN is illegal. Persons who break into government networks or use government computer resources without authorization will be prosecuted. Hosts that permit this type of access will be disconnected from the network.

SECTION 3.   NETWORK CONNECTION

3.1   Host Access

To open a connection through the network from one host to another, a user must first "log in" to one of the hosts from a terminal. After logging in, he may "open a connection" across the network to a second host. Once this connection is established, it is possible to log in to the remote host computer and work there. When the user finishes and logs out of the remote computer, the network connection is closed, and he is back where he began, logged into the first host. In this way it is easy for a user to access more than one computer (assuming he has authorized access and a valid account on each).

This direct host-to-host connection (called a "TELNET" connection) is a very useful form of network access because it lets one use tools and programs on remote machines that may not be available locally. It is also possible to open a specialized host-to-host link called a file transfer or "FTP" connection, which allows copying of files from one host to another. Sections 5.1.2 and 5.1.3 provide specific details for executing host-to-host TELNET and FTP connections.
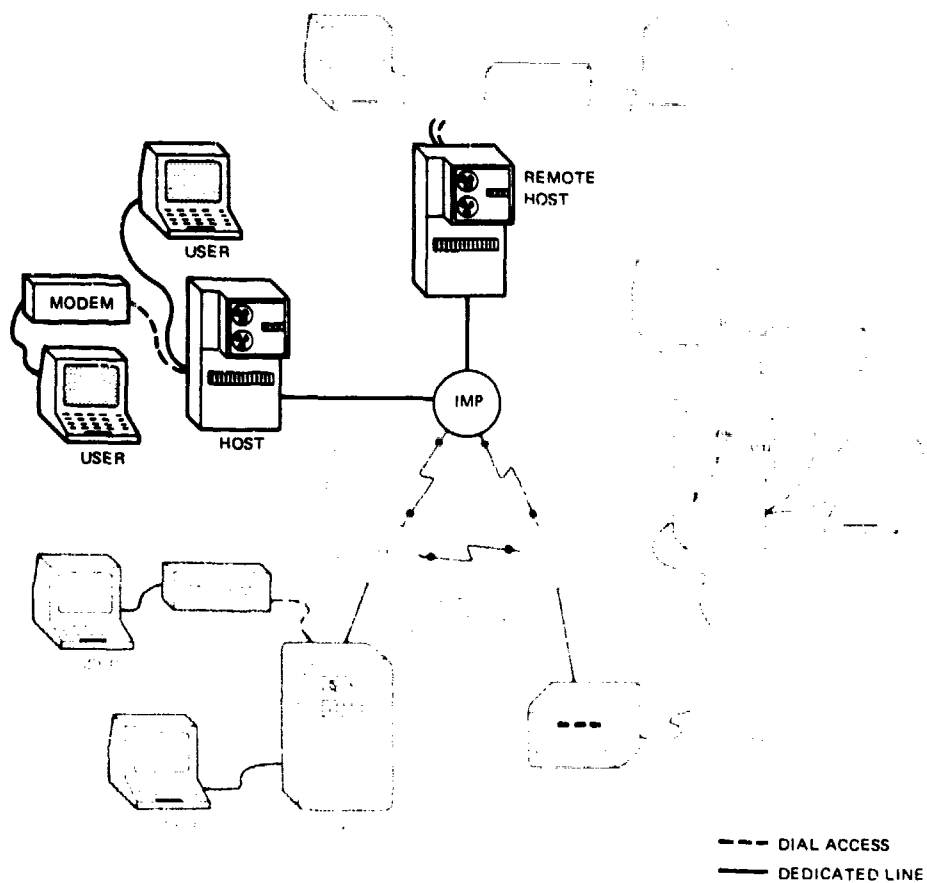
Figure 3-1: Host Connection to a Remote Host

3.2   TAC Access

Another way of accessing the network is by connecting a hard-wired or dial-up terminal to a
terminal access controller, or TAC, then logging into the TAC by providing a "Userid" and
"Access Code" (password). A TAC allows a wide variety of terminals to communicate with any
host on the network without going through an intervening host. After logging into the TAC, the
host is reachable by specifying its host address.

> NOTE: You must be a registered, authorized user to obtain a Userid and Access Code.
> See details in Section 4.2.
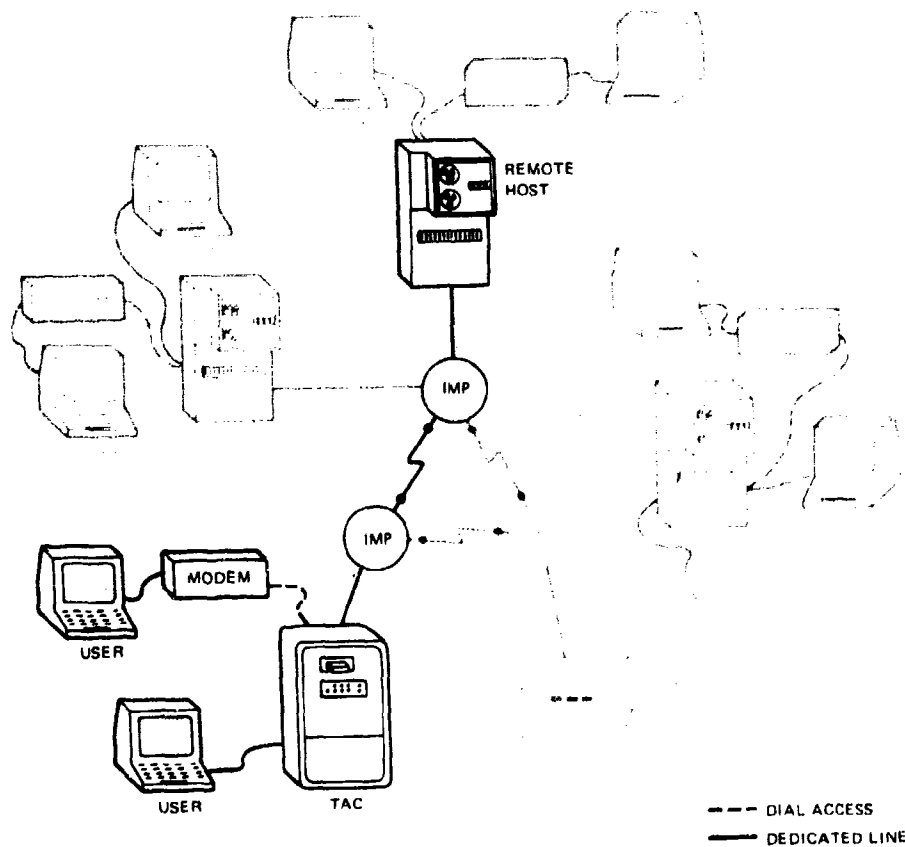
Figure 3-2:   TAC Connection to a Remote Host

3.3 Gateway Access

If a computer is attached to a local area network (LAN) or a non-DDN network, a "gateway" manages communication between it and the DDN. The gateway is "transparent", that is, the user will be largely unaware it is there. No special commands or syntax are needed for communication through a gateway. Figure 3-3 shows a gateway connection from a LAN to the DDN.
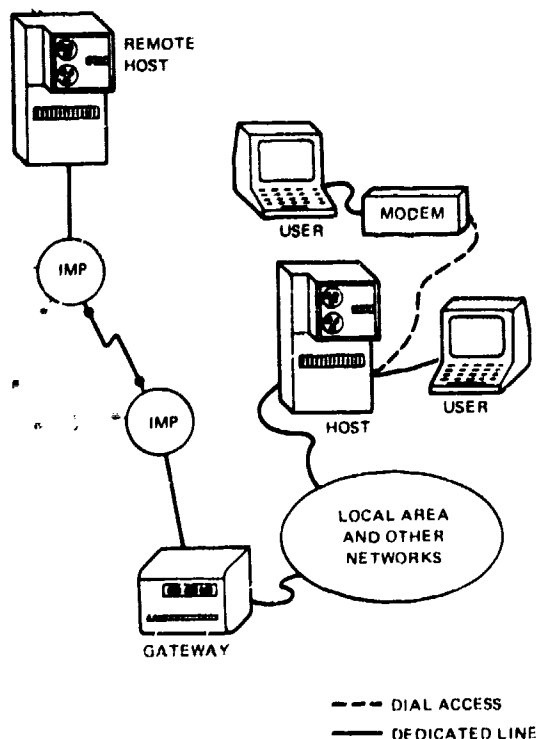
Figure 3-3: Gateway Connection to a Remote Host

3.4 Network Naming and Addressing

Each host on the DDN has a unique hostname and host address associated with it as a means of identification. This "address" tells network programs the location of a host, and on which network it resides. Thus, a hostname or address must be known in order to use network services, such as TELNET or FTP, or when opening a connection to a host from a TAC.

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The hostname is part of the address string known as the "network mailbox", and it is needed to send electronic mail across the network. The hostname is actually a synonym for the host address. Hostnames are used because they are easier to remember than the string of numbers that make up the host address. For each host address on the DDN, there is an equivalent hostname and vice versa.

Figure 3-4 is an example of a host address on the DDN. The hostname consists of the official name of the host computer, followed by one or more domain names. As of March 31, 1987, the hostname MUST include a domain, or it will be rejected by network programs.

```
        HOST NAME            HOST ADDRESS

     AMES-VMSB.ARPA        26.3.0.16
                                         PSN NUMBER
                                         RESERVED

       HOST    DOMAIN                    HOST PORT ON PSN

                                         NETWORK NUMBER
```
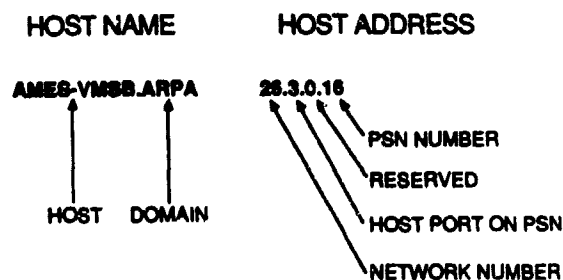
Figure 3-4:   Sample Host Name and Host Address

In the example shown, the host is on MILNET (network number 26 for MILNET, 10 for ARPANET). It occupies port "three" on PSN 16, and its network name is AMES-VMSB.ARPA. When using it, treat this string of numbers and periods (or the corresponding string of letters and separators) as an "address string" of characters. This string is important, and it must be correct otherwise mail cannot be delivered. (See Section 5.2.1.4 for how to look up host names and addresses.) At this point you need only understand the network address concept and be aware that each host and network has a unique name and address.

3.5   TAC Connection to the Network

The following is a simple scenario showing how to log in to a TAC. For more detailed instructions on using a TAC and setting terminal parameters, consult the *TAC Users' Guide* [1].

Before using a TAC for terminal access to a host on the DDN, you must:
- Register as a network user with the NIC
- Obtain permission to access a TAC
- Obtain a Userid and Access Code (password) (See Section 4.)
- Learn the address of the host or hosts to which you wish to connect (See Section 5.2.1.4.)

- Have a valid account on a MILNET or ARPANET host, so that you may log in once
  you are connected

- Make sure your terminal is one which may be connected to a TAC. (See the TAC
  Users' Guide [1] for details.)

3.5.1 Dial-up TACs

This section describes the procedures for connecting to a TAC using the telephone system.
Because the exact steps required to "dial up" the TAC depend on your local hardware setup,
check with local site representatives for details. An overview of the basic procedures is
presented in the next few sub-sections.

3.5.1.1 Locating the Closest TAC

The phone number of the nearest TAC may be obtained directly from the network by using the
TACNEWS service (see Section 5.2.3), or by calling the DDN Network Information Center at
(800) 235-3155. The phone number of a specific TAC may be obtained from the NIC WHOIS
server. (See Section 5.2.1.)

3.5.1.2 Using a Terminal With An Acoustic Coupler

Dial the TAC number on a telephone, and listen for a tone. When you hear the tone, put the
telephone handset into the coupler cuffs, being careful to observe the position indicated for the
hand set.

3.5.1.3 Using a Dial-up Modem

The modem will be wired to your telephone and your terminal. (Consult the instructions that
come with the modem to attach it to your terminal and set it properly.) In general, you will dial
the TAC number on the telephone and wait for the tone, switch the modem from "voice" to
"data", and set the handset back on the telephone cradle. Note that the speed of the terminal
must match the speed of the modem. Also note that some modems are "smart", i.e., you will not
have to use the telephone to dial the number, but instead will type some instructions to your
terminal, such as "DIAL 12345" or "D12345." The modem will then dial the number and make
the connection for you. See your modem instruction manual for exact details.

3.5.2 Hardwired TACs

Here you will need to consult a local user representative or the Node Site Coordinator to learn
the procedure for getting to the TAC. It will vary depending upon what equipment is being used
and how it is configured at your location.

3.6 TAC Login

Once you have successfully connected to the TAC, you must "get its attention". Do this by
pressing the <Control> key and the letter "Q" simultaneously. Note that a few TACs have been
programmed to "wake-up" as soon as a connection is made. If the TAC is of this variety, you
will get the TAC banner message immediately. Also note that you must use a host address, as a
hostname will not be accepted by the TAC.

NOTE: You will notice in the scenarios below that an "@" is typed before each TAC command.
The "@" is called the TAC intercept character. It tells the TAC to interpret as TAC commands
any characters that come immediately after it, rather than passing them through to the network.

However, once you have connected to your host, you may want to send an "@," for example, when you are typing a DDN mail address. To cause the TAC to pass the "@" on to the host rather than intercepting it, you must type two "@'s, i.e., "@@". When you do this, the TAC will intercept the first "@", transmit the second "@" to your host, and echo back that "@" to you, so your display will look like this "@@@". Remember: when you want to type an "@" for anything other than a command to the TAC, type it twice.

```
<Control>Q

[Welcome to...SRI TAC 112 # :24]
@o 26.0.0.73<Return>              ;Type an "@", followed by
                                  ;"o" for "open", followed by
                                  ;the address of the host
                                  ;you wish to reach, e.g.,
                                  ;26.0.0.73, the address of
                                  ;SRI-NIC.ARPA.
[TAC userid:]USERID<Return>       ;Type the Userid you have
                                  ;been assigned.

[Access Code:]ACCESS-CODE<Return> ;Type the TAC Access Code
                                  ;you have been assigned.
[Login OK
TCP trying...Open
SRI-NIC...etc.]                   ;Now you are at the SRI-NIC.ARPA
                                  ;machine, and can use the
                                  ;services there.
```

When you have finished using host SRI-NIC.ARPA, logging off will put you back at the TAC again. If you wish to connect to another host, type:

```
@c<Return>                        ;Type an "@" followed by "c"
                                  ;to close the previous
                                  ;connection.

@o HOST-ADDRESS<Return>           ;Proceed as before, giving
                                  ;another host address.
```

To disconnect from the TAC altogether, type:

```
@l<Return>                        ;You are now logged out of
[logged out                       ;the TAC; and will probably
connection closed.]               ;want to disconnect the
                                  ;telephone from the modem or
                                  ;coupler and hang up.
```

3.6.1   TAC Login Hints

When entering your TAC Userid and Access Code:

- A <Return> terminates each input line and causes the next prompt to appear.

- It does not matter whether you type your TAC Userid and Access Code in upper or lower case letters.

- The Access Code either does not print at all, or is printed over to obscure it from view.

- If you make a mistake, use the BACKSPACE key, <Control>H, to delete a single character. Use <Control>U to delete an entire line.

- If you make a mistake while entering either the TAC Userid or your Access Code, type <Control>C to abort the login process and return you to the TAC command mode so you can try again.

- You will remain logged in to the TAC as long as you have an open connection. If the connection is closed, you will have ten minutes to open another connection without having to log in again. If you do not open another connection within ten minutes, the TAC will attempt to hang up your connection and will automatically log you out.

3.6.2   Common TAC Login Problems

If you are logging into a MILNET TAC and the login sequence fails, examine your TAC Access Card carefully to be sure that you are entering the Userid and Access Code correctly. Note that Access Codes never contain a zero, a one, a "Q" or a "Z", since each of these characters may be mistaken for another. If you see what appears to be one of these characters on your card, it is really the letter "O" (oh), or "G" (gee), the letter "L" (el), or the number "2" (two).

If you follow all of the above steps, and you are sure you are entering your MILNET Userid and Access Code correctly, but still cannot log in, call the DDN Network Information Center at (800) 235-3155 for help.

If you are an ARPANET TAC user, you will not be issued a TAC Access Card. If you are having trouble accessing an ARPANET TAC, you may change your password using the ARPANET TAC User Database Tool described in Section 4.2, and try again. If you are not in the ARPANET TAC User Database, you should check with the Responsible Person (RP) (See Section 6.3) associated with your organization to get permission to be registered in the database. If the RP or his representative has not registered you already, you will then need to register yourself in the database in order to get your ARPANET Userid and Access Code. If, after these steps are taken, you are still experiencing difficulties accessing the TAC, call the NIC for assistance.

3.7   A Word About Personal Computers

The DDN PMO is currently studying the various means of connecting personal computers (PCs) to the network. PCs can be attached to the DDN in several ways, including as hosts. At present, however, *most* personal computers on the DDN are not hosts, i.e., they have not implemented the network protocols and are not attached directly to a PSN. Functioning simply as terminals, they have only terminal capabilities as far as the network is concerned.

Like a terminal, a PC can be connected to a host or TAC through either a dedicated line or a dial-up line. In both cases the PC will need software to make the PC imitate a terminal.

Once you have the proper equipment assembled, you will need to configure the software for your particular system. The following parameters will often need to be set:

speed	The baud rate (in bits/second) at which data is sent and received; usually 300 or 1200 baud if your connection is through a modem. For direct lines, check with your Node Site Coordinator.
data bits	Usually set at 7.
stop bits	Usually set at 1.
parity	Usually set to "even" or "none".

If these settings do not work, ask local user representatives or host personnel what your system requires. Consult the documentation that accompanies your personal computer, software, and/or modem for details of operation.

Local site representatives should be the first point of contact for PC-related problems. If you have no such representative, contact the Host Administrator for the host you are trying to reach. The NIC may also be able to help with some of the problems you encounter. Check to see if your organization has a PC users group, as other users can be a valuable source of advice. Also, there are a number of general and machine-specific PC interest groups on the net, which can provide a broad range of information and answers. (See Appendix A for information on these groups.)

SECTION 4. NETWORK REGISTRATION

4.1 Network User Registration

Each individual who has TAC access to DDN must be registered in the NIC WHOIS Database.
You will find it useful to be registered in this database, because it serves as an electronic "white
pages" for DDN users.

4.1.1 The Registration Template

To register in the NIC WHOIS Database, you will need to fill out a copy of the NIC registration
template (Figure 4-1) and send it to the network mailbox REGISTRAR@SRI-NIC.ARPA. This
template may be obtained via file transfer (FTP) from SRI-NIC.ARPA machine (26.0.0.73,
10.0.0.51) using the pathname NETINFO:USER-TEMPLATE.TXT, or you may key in the
information required yourself. In addition to the template, this file contains detailed instructions
and samples to help with completing the form. (Instructions for using FTP to retrieve a file are
included in Section 5.1.2.)

```
FULL NAME: Coleman, Jr., Arthur F.       ; Last name, first name, middle
                                          ; initials
U.S. MAIL ADDRESS: SRI International      ; Include codes, mail stops, etc.
                   Room EJ291
                   333 Ravenswood Avenue
                   Menlo Park, CA 94025
PHONE: (415) 859-0000                     ; Give both commercial and Autovon,
                                          ; if available, e.g. (AV) 123-4567.
AUTHORIZING HOST: SRI-NIC.ARPA            ; List the host on which you have
                                          ; your primary login account, or
                                          ; through which you directly access
                                          ; ARPANET or MILNET.
PRIMARY LOGIN NAME: Coleman                  ; Name you log in with.
PRIMARY NETWORK MAILBOX: COLEMAN@SRI-NIC.ARPA  ; Mailbox to which your
                                             ;mail is normally delivered.
ALTERNATE NETWORK MAILBOXES: COLEMAN@MIT.ARPA  ; If you have one.
MILNET TAC ACCESS? (y/n):                    ; Enter "y" if you need
                                             ; TAC access.
TERMINATION DATE:                         ; Enter date this assignment ends.[1]
```

Figure 4-1: DDN User Registration Template

4.2 TAC User Registration

TAC access requires official authorization, and a "Userid" and "Access Code" (Password). Note
that there are separate access systems for MILNET and ARPANET TACs. Authorization to use
TACs on one network does not provide access to TACs on the other network. To access TACs
on both networks, you must be authorized twice and have a separate Userid and Access Code for
each network. However, once you are registered and have obtained a Userid and Access Code,
the TAC login procedure is the same for any TAC, regardless of which network it is on (See
Section 3.6).

---

[1] The DEROS date (Date Eligible for Return from Overseas) for military users, estimated graduation date for students, end of contract
period for contractors, estimated elapse date for temporary users.

On the MILNET, the person authorizing MILNET TAC access is the Host Administrator. Each
MILNET TAC user is issued a TAC access card by the NIC containing his or her Userid and
Access Code. The NIC cannot issue a card until approval has been received from the Host
Administrator of the user's primary MILNET host. Cards are issued to individuals, not to groups
of users.

> NOTE: If you need a TAC card for a limited time, your Host Administrator can issue you
> a TAC "guest card" which is good for three months.

On the ARPANET, the person authorizing TAC access is known as the "Responsible Person."
After obtaining permission to use a TAC, each ARPANET TAC user must register or be
registered in the ARPANET TAC User Database Tool located on ARPANET host
TACAC.ARPA (10.0.0.82).

The two TAC authorization and registration schemes are separate, and each is handled
differently. Here are some points to remember about TAC access:

- If you require both ARPANET and MILNET TAC access, you must register twice --
  once in each system.

- You will be issued a card for MILNET TAC access on which is printed your Userid
  and Access Code. The card is automatically printed and sent in a sealed mailer, so it
  is seen only by the user to whom it is issued.

- You will not be issued a card for ARPANET TAC access. Rather, you will obtain
  your Userid and Access Code directly from the ARPANET TAC User Database
  Tool or from the Responsible Person.

- If you have problems with the TAC card you have been issued, or if you need
  assistance with TAC access procedures, call the NIC on (800) 235-3155.

It is beyond the scope of this document to give the details of each registration scheme [5, 6].
Contact the appropriate Host Administrator for MILNET or the Responsible Person for
ARPANET for specifics, or phone the NIC on (800) 235-3155 for documentation and further
assistance. See Section 5.2.4 for instructions on obtaining online lists of the Host Administrators
or Responsible Persons.

SECTION 5.   NETWORK USE

5.1   Network Tools

A computer attached to the DDN can reach a large community of users and access a wide variety
of software. Research tools, documents, files and mailing lists are all readily accessible through
the DDN. This section describes the procedures needed to use these network tools, three of
which are major network services: electronic mail, file transfer (FTP) and remote login
(TELNET). These services are integral to the DDN protocols, and thus are offered by any host
that has implemented the full set of network protocols.

Although the services discussed here perform the same functions on every host, what the user
sees may differ from host to host since the software is often customized to suit the characteristics
of the host operating system. For this reason it is important to read local online documentation
and consult online "HELP" files for specific details on using these services on any given host.
Check with the local Host Administrator or User Representative for more information. The
sections below describe in general terms how to use electronic mail, FTP, and TELNET.

Additional network services are provided for users by the NIC. Three of these --
WHOIS/NICNAME, NIC/Query, and TACNEWS -- are also described.

5.1.1   Electronic Mail

A most useful and the most used service on the DDN is the mail service, which lets users send
messages electronically to one another. System programs accept and store mail messages that
come in for users from other hosts. These programs automatically recognize the incoming traffic
as electronic mail, translate it to a format compatible with the receiving mail program, and direct
the message to the correct recipient. Most users have an online mail file where all messages
addressed to them are stored. Ask your local User Representative or Host Administrator what
this file is called on your machine, if you do not know.

Mail can be printed out, read, or deleted using the local mail program. Do not edit or alter the
structure of your mail file except through a mail program, as each message has unique
characteristics that identify it as "mail", such as a header, a character count, and a time stamp.
Editing the mail file directly alters these characteristics, so that the mail program will no longer
recognize this data as "mail".

Host computers usually provide one or more programs for reading and sending mail. Most mail
programs have these features in common:

    a. Reading messages

        Most mail programs have a command for reading incoming messages, usually with
        options for selecting and displaying specific messages from among the messages
        received.

    b. Printing, deleting, or moving messages

        Messages can be printed (if a printer is available), moved into other files or
        deleted. It is important to learn how to delete or move messages after reading
        them; otherwise your mail file may overflow your allotted space and prevent
        further mail from being delivered.

c. Sending messages

A user can send messages to other users on the same host, or to users on any host on the network that has a mail service. No passwords are required to send mail, but it is necessary to know the network mailbox or "address" of the person to whom you are sending the mail. Network mailboxes usually take the form USERNAME@HOSTNAME.DOMAIN, e.g., SMITH@SRI-NIC.ARPA.

DDN mail should have a network address made up of a username and a hostname. Occasionally the hostname can be omitted. For example, if you are sending a message to a user on the same host as the one you are using, you need not indicate the hostname. This is similar to an interoffice memo, which rarely needs the full name and address of the organization, since all interoffice memos are being sent within the same organization and therefore have the same address. On the other hand, a message sent to "John Smith, U.S.A." has little chance of being delivered without more information. The same is true of an electronic message without a valid address. The message will be returned to the sender with an error message. If mail is undeliverable due to network or machine problems, most mailers will try to resend the message several times before returning it to the sender.

Many mail programs allow the use of a local text editor to revise or correct the text of a message in preparation. The mail programs themselves usually have simple editing features such as backspacing a character or a word, or deleting a line. An entire file may be sent as the text of a message, assuming the file is not too large.

Following are examples of procedures for sending and reading mail, and getting help within three common network mail programs. The three programs illustrated are UNIX[1] MAIL, BBN's INFOMAIL[2], and TOPS20[3] MM. Remember these are generalized scenarios; your host may run a different program, or a different implementation than the one shown.

Only the bare essentials for using these mail programs are shown. Each is a very rich system with many useful features. We urge you to read the manuals for your mail system, and to explore the online "HELP" facilities to expand your knowledge of what it has to offer.

---

[1] UNIX is a registered trademark of AT&T Bell Laboratories

[2] INFOMAIL is a registered trademark of BBN Communications Corporation

[3] TOPS20 is a registered trademark of Digital Equipment Corporation

5.1.1.1   UNIX MAIL - Sending mail

NOTE: UNIX is case sensitive and most UNIX systems require that commands be entered as lower case typein.

```
[%]mail andrews@seismo.arpa<Return>      ;At the system prompt[%],
                                         ;the user types "mail",
                                         ;to start the mail program,
                                         ;followed by a <Space> and the
                                         ;recipient's network mailbox.


This is to remind you of our<Return>     ;Then the text of the
meeting at 2:00.<Return><Control>D       ;message is entered.
                                         ;<Control>D sends the message.
[%]                                      ;When the system prompt reappears
                                         ;the message has been sent.
```

5.1.1.2   UNIX MAIL - Reading mail

```
[%]mail<Return>                          ;Starts "mail" program,
[You have new mail                       ;and lists new mail received.

New mail:1) 16/Dec SMITH@USC-ISI.ARPA (292) Where is RFC 212?
         2) 17/Dec DAVID@SRI-NIC.ARPA (146) Re: Where is RFC 212?
         3) .....etc.]

[m:]p 1<return>                          ;"p" for print followed by
                                         ;a <Space> and a number
                                         ;displays the full message
                                         ;for that number.
```

5.1.1.3   UNIX MAIL - Getting Help

```
[%]man mail<Return>                      ;Connects you to the
                                         ;online Mail manual


[%]mail<return>


[m:]help<Return>                         ;Displays help or a
[m:]?<Return>                            ;list of Mail commands.
```

5.1.1.4   INFOMAIL - Sending Mail

NOTE: INFOMAIL runs under the UNIX operating system. Because UNIX is case sensitive, most systems require that commands be entered as lower case typein.

```
[DDN1->]infomail<Return>              ;Starts Infomail.


[Infomail -- Version...
Username:]CODEB999<Return>            ;Logs into Infomail.


[Password:]PASSWORD<Return>


[-->]compose<Return>                  ;At Infomail prompt
                                      ;user gives command
                                      ;to create a message.


[To:]COMMAND@DDN2.ARPA<Return>        ;Enter recipient's
                                      ;network mailbox.
[From:]CODEB999@DDN1.ARPA             ;Infomail fills in
                                      ;sender's mailbox.
[Subject:]Dial-ups<Return>            ;Enter subject.


[Date:12 April 1985]                  ;Infomail adds date.


[Text:]Request dial-ups<Return>
       for our site.<Return>          ;Enter message,
                                      ;ending each line
                                      ;with "<Return>".
                                      ;End message by
.<Return>                             ;typing a period on
                                      ;the left margin
                                      ;followed by a
                                      ;<Return>
[-->]quit<Return>                     ;Type "quit" to exit Infomail.
```

5.1.1.5 INFOMAIL - Reading Mail

```
[DDN2->]infomail<Return>                    ;Starts Infomail.


[Infomail -- Version...
Username:]COMMAND<Return>                    ;Logs into Infomail.


[Password:]PASSWORD<Return>


[INBOX.
 1 FROM: CODEB999 / SUBJECT: DIAL-UPS / 12 Apr;Info on new messages
 2 FROM: AF@DDN1.A/ SUBJECT: SCHEDULE / 12 Apr;received is displayed


-->]next<Return>                            ;At Infomail prompt
                                            ;user gives command
[To: COMMAND@DDN2.ARPA                      ;to display first
From: CODEB999@DDN1.ARPA                     ;message
Subject: DIAL-UPS
Date: 12 April 1985
Text:
Request dial-ups for our site.


----------END OF DOCUMENT----------


-->]next<Return>                            ;At Infomail prompt
                                            ;user gives command to
[To: COMMAND@DDN2.ARPA                      ;display next message,
From: AF@DDN1.ARPA                          ;etc., down through
Subject: SCHEDULE                           ;the list.
Date: 12 April 1985
Text:
What is the planned schedule for the Infomail demo?]


----------END OF DOCUMENT----------


-->]quit<Return>                            ;Type "quit" to exit Infomail.
```

5.1.1.6 INFOMAIL - Getting Help

```
-->]?<Return>                               ;Lists all possible
                                            ;commands at that point


-->]COMMANDNAME ?<Return>                   ;Lists possible
                                            ;input to complete
                                            ;a given command


-->]describe COMMANDNAME<Return>            ;Tells what a command
                                            ;does and how to use it


-->]example COMMANDNAME<Return>             ;Prints an example
                                            ;for a given command
```

INFOMAIL manuals are available from BBN Communications Corporation,
10 Moulton St., Cambridge, MA 02238.

5.1.1.7   MM - Sending Mail

NOTE: MM runs under the TOPS20 operating system.

```
[@]mm<Return>                          ;Loads MM mail program
                                       ;and displays MM> prompt
[MM>]send<Return>                      ;Enters message-sending mode

To:]DAVID@SRI-NIC.ARPA<Return>         ;Type recipient's network mailbox

[Subject:]Where is RFC 792?<Return>;Type subject of message

[Message (end with ESC or CTRL/Z):]
Where can I find an <Return>           ;Enter text of message
online copy of RFC 792?<Control>Z      ;End each line of text
                                       ;with a <Return>
                                       ;Type <Control>Z to send
                                       ;the message.


[MM>]quit<Return>                      ;Exits from MM back to the
[@]                                    ;Exec prompt, "@".
```

5.1.1.8   MM - Reading Mail

```
[@You have a message from SUE]         ;At login, the system
                                       ;notifies the user
                                       ;that new mail exists.
[@]mm<Return>                          ;The user enters MM.
                                       ;Next he enters read mode.
[MM>]r<Return>                         ;The system scrolls
                                       ;all unseen messages.
[R>]q<Return>                          ;The 1st "quit" returns
                                       ;the user to "MM>",
[MM>]q<Return>                         ;the 2nd "quit" exits
[@]                                    ;from MM back to the Exec prompt, "@"
```

5.1.1.9   MM - Getting Help

```
[@]mm<Return>

[MM>]help<Return>                      ;Displays help or a
     ?<Return>                         ;list of available commands.


[MM>]help COMMANDNAME<Return>          ;Will print a brief
                                       ;explanation of that
                                       ;command.
```

5.1.2 FTP

The File Transfer Protocol (FTP) makes it possible to move a file from one computer to another, even if each computer has a different operating system and file storage format. Files may be data, programs, text -- anything that can be stored online.

Using FTP requires that you know the hostname or host address of the remote host, a username and password on that host, and the name of the file to be retrieved. You can then copy available files either to or from the remote host. Several hosts provide the username "anonymous" for FTP retrieval of files from their system. This is called the FTP "anonymous login convention".

Any string of characters will be accepted as the password for an anonymous login. Anonymous login works ONLY with FTP, and is not an account that can be accessed for general use. Also, you cannot use the "anonymous" convention to send files to a remote host, as this requires a login account. You may only pull files from a host on which you do not have a login account to your local workspace. Finally, not every file can be FTPed. Only files that have a protection permitting transfer, i.e., allowing public "read access", can be FTPed.

These are the general steps for transferring a file:

- Log in to the local host, and invoke the FTP program
- Provide the hostname or host address for the remote host
- Once connected to the remote host, log in with username and password
- Issue commands to copy or send files
- When finished, log out from the remote host, and exit from the FTP program.

Depending upon the implementation of FTP at the user's host and the remote host, it may also be possible to display a directory listing of public files on the remote host, as well as system status information.

The first scenario below demonstrates copying ("FTPing") a file from a remote host. The user is logged in to a computer that has a TOPS20 operating system. He connects to another TOPS20 computer, SRI-NIC.ARPA, copies over a file, then breaks the connection and exits FTP.

5.1.2.1   How to FTP a File (TOPS 20)

```
[@]ftp sri-nic.arpa<Return>

[[Assuming 36-bit connections, paged transfers] <SRI-NIC.ARPA FTP Server
Process...
FTP!]login anonymous<Return>              ;Some systems use "log"
                                          ;instead of "login".

[Password:]guest<Return>

[< User ANONYMOUS logged in at Wed 6-Jun-84 14:36-PDT, job 17.
FTP!]get rfc:rfc931.txt<Return>           ;Here the user will be asked
                                          ;what to name the new copy of
                                          ;the file being transferred.
                                          ;Typing <Return> causes local
                                          ;filename to be the same as the
                                          ;original file.
[ PS:<NETINFO>RFC931.TXT.1 (to local file)]  <Return>
[ PS:<NETINFO>RFC931.TXT.1 => <SMITH>RFC931.TYT.1;P777700 !! [OK]
FTP!]quit<Return>

[< QUIT command received. Goodbye.
FTP>]quit<Return>                          ;the 2nd "quit" exits from
[@]                                        ;FTP back to the Exec prompt [@].
```

Now a file named "RFC931.TXT" should be in the user's workspace on his local host.

5.1.2.2   How to FTP a File (UNIX)

In this example both hosts are UNIX systems.

   NOTE: Unlike TOPS 20, you must supply a local filename.

```
[%] ftp tsca.istc.sri.com<Return>

[Connected to tsca.istc.sri.com.
220 SRI-TSC FTP Server Process
Name (tsca.istc.sri.com:Smith):] anonymous<Return>

[Password (sri-nic.ARPA:anonymous):] guest<Return>

[331 ANONYMOUS user ok, send real ident as password.
230 User ANONYMOUS logged in at Thu 4-Apr-85 09:47-PST, job 29.

ftp>] get public/readme<Return>            ;User must type in
   localfile: filename                     ;the actual file name
[200 Port 6.167 at host 128.18.0.201 accepted   ;of the file to which
150 ASCII retrieve of public/readme started.    ;the transfer will be made.
226 Transfer completed.
9259 bytes received in 2.4 seconds (3.8 Kbytes/s)

ftp>] quit<Return>

[221 QUIT command received. Goodbye.
%]
```

5.1.2.3   How to FTP a Directory Listing

This scenario demonstrates how to get a listing of public directory filenames.
(This feature is not provided by all hosts; check with the online help system or local user
representative to find out if it is supported.) The user is logged in to a host running the UNIX
operating system. He uses FTP to connect to the host SRI-NIC.ARPA, then logs in under the
username "anonymous", with the password "guest". He enters the "dir" (directory) command for
the directory RFC: to see the names of accessible files. (Since the directory is long, only the first
few files and the last file are shown for the sake of example.)

After the directory listing has been displayed, the user then can copy a file or files from the
remote host directory. He issues the FTP commands "bye", and "quit", which break the
connection to the remote host and returns him to the operating system.

```
[0] ftp<Return>

[FTP>] sri-nic.arpa<Return>

[[Assuming 36-bit connections, paged transfers] < SRI-NIC.ARPA FTP Server
Process...
FTP>] login anonymous<Return>

[Password:] guest<Return>

[< User ANONYMOUS logged in at Wed 6-Jun-84 14:14-PDT, job 31.
FTP>] dir rfc:<Return>


[< List started.
PS:<RFC>
rfc-index.TXT.114
rfc189.TXT.1
rfc407.TXT.1
    .
    .

    .
rfc931.TXT.1
FTP>] bye<Return>

FTP>] quit<Return>
[< QUIT command received. Goodbye.

[0]
```

5.1.3   TELNET

Another common way to use the network is to log in to a remote host from a local host by using
TELNET. Once connected and logged in to the remote host, the user can enter data, run
programs, or do any other operation, just as if he were logged in directly.

The steps for running TELNET may be summarized as follows:

   • Log in to an initial host.

   • Invoke the TELNET program on that host.

- Identify by hostname or host address the remote host you wish to access.

- Once connected to the remote host, log in with username and password for that host.

- When finished working on the remote host, type the command to log out. Then break the connection (if it is not broken automatically upon logout). You are now back where you began on the initial host.

A specialized use of TELNET is to connect to a particular assigned "port" or "socket" on a given host. This type of connection takes the user directly to the program or service offered on that socket. The socket will have an assigned socket number (see the RFC Index for the the latest list of Assigned Numbers). To connect to a socket, use its number with the hostname or host address. (See Sections 5.1.3.3 and 5.1.3.4).

TELNET has many other advanced features, too numerous to discuss here. Check your local TELNET user program for online documentation, or talk to your local Host Administrator or User Representative for more information.

In the following example, a user "TELNETs" from a local UNIX host to a remote TOPS20 host. Once the connection is made, the prompts, commands, etc., are those of the TOPS20 environment. It looks to the user as though he or she is logged directly in to the TOPS20 computer.

After completing work on the remote host, the user gives the TOPS20 logout command. This returns the user to the TELNET program on the local computer, ends TELNET, and displays the local operating system prompt ("%").

5.1.3.1 TELNET Using Hostname

        [%]telnet sri-nic.arpa<Return>

        [trying...
        connected to sri-nic.arpa
        escape character is '^]'.

        SRI-NIC.ARPA 2060, TOPS20...]
        [@]login USERNAME PASSWORD<Return>

        ...USER SESSION...

        [@]logout<Return>

        [Connection closed by remote host
        %]

5.1.3.2   TELNET Using the Host Address

The user can also use a host address to establish a connection to a host via TELNET. This
example shows a user on a TOPS20 system connecting to a remote UNIX host.

NOTE: The network address must be enclosed in brackets.

```
[@]telnet [128.18.0.201]<Return>

  [tsca.istc.sri.com]

  Trying...  Open

4.3 BSD UNIX (tsca)

login:]USERNAME<Return>

[Password:]PASSWORD<Return>
                                    ;User now logged in with full
...USER SESSION...                  ;use of the local system.

[%]logout<Return>

[Connection closed by foreign host
@]                                  ;User is returned to the
                                    ;local system.
```

5.1.3.3   TELNET to a Socket Using the Host Address

This example shows the user connecting to the ARPANET TAC User Database Tool (socket 65)
on host TACAC.ARPA.

```
[@]telnet [10.0.0.82] 65<Return>   ;Note blank space between the
[TACAC.ARPA]                                ;command, the host net address, and
  Trying... Open                   ;the socket number.

ARPANET TAC Access Control, Version 2.0.212, 23-Dec-86 14:53:21-EST

WELCOME to the ARPANET TAC Access Control (TACAC) User Database Tool.
For help type 'Help'.  Use '?' for options in commands.
Use ESCAPE for command recognition and completion.

...USER SESSION...

[TACAC>]logout <Return>            ;Where "TACAC>" is the TAC
                                   ;User Database Tool prompt.
                                   ;User logs out.

[ Logged out at 21-Nov-84 12:45:10
Connection closed by foreign host ]
```

5.1.3.4   TELNET to a Socket Using the Hostname

```
[@]telnet tacac.arpa 65<Return>     ;Remote host name and socket number used.
                                    ;Socket 65 is the socket
                                    ;providing the ARPANET TAC
                                    ;User Database Tool
[TACAC.ARPA]
 Trying... Open

ARPANET TAC Access Control, Version 2.0.212, 23-Dec-86 14:53:21-EST

WELCOME to the ARPANET TAC Access Control (TACAC) User Database Tool.
For help type 'Help'.  Use '?' for options in commands.
Use ESCAPE for command recognition and completion.

...USER SESSION...

[TACAC>]logout<Return>

[ Logged out at 21-Nov-84 12:46:03
Connection closed by foreign host
[@]
```

5.2   NIC Network Services

NOTE: The NIC provides the "server" portion of the services described below. Local hosts
provide the user program that accesses the server. Implementations of the user programs may
vary depending on the local environment; therefore, it is important to consult online
documentation or "HELP" programs on a given host computer for specific instructions on using
these user programs.

5.2.1   WHOIS/NICNAME

WHOIS/NICNAME is the NIC program that looks up information in an electronic "white pages"
of network users. It lists name, network mailbox, U.S. mail address, telephone number, and host
for each entrant in its database[1]. The "user" portion of this program runs on a local host. It
passes its query to the NIC "server" program, which reaches into the NIC WHOIS Database and
sends the answer back to the server, then back to the local user program, and finally to the user's
terminal. This movement back and forth across the network is transparent to the user, so that the
service seems as if it were local. This is known as a "query-response" service.

The user supplies WHOIS with either the name or the NIC "handle" of the person or
organization he is trying to identify. The NIC handle is a unique identifier assigned by the NIC
to each person or organization in the database. WHOIS responds to a query in one of three
ways:

- If a unique record for the desired individual or organization is found, the name, NIC
  handle, organization, mailing address, and network mailbox are displayed
  immediately.

---

[1] This information is also available in hardcopy in the DDN Directory; however, WHOIS provides
the most current set of data.

- If several records match the name given, a brief list of the matching entries is displayed and the user is asked to choose the correct match by using the handle (a unique string of characters in parentheses following the name). A search by handle will produce the expanded entry for the individual or organization matching that handle.

- If no record matches the request, WHOIS will display the message "?No record for name USERNAME", where "USERNAME" is the name of the person or organization being requested.

The following examples show the search capabilities of WHOIS.

5.2.1.1   WHOIS Search by Name

```
[@]whois roscoe<Return>                    ;Note that on some
                                           ;UNIX machines, the
                                           ;command "nicnam" is
                                           ;used rather than
                                           ;"whois".

[Accessing NICNAME server at SRI-NIC.ARPA...

   ROSCOE, Joe A. (JAR)          JROSCOE@HOST-1.DOMAIN
   Air Force Data Systems
     Design Center/SDTS                    ;There is only one
   Willits Air Force Base, W.Va. 12345     ;"Roscoe", so a
   Phone: (123) 456-7890 (AV) 654-7890     ;complete entry is
   MILNET TAC user                         ;displayed for him.
```

5.2.1.2   WHOIS Search by Partial Name

You may search for partial names by using the partial name followed by three dots (...).

NOTE: This feature will only work if the three dots follow the partial spelling. Also, this kind of search is apt to produce multiple "hits".

For example:

```
[@]whois ros...<Return>

[Accessing NICNAME server at SRI-NIC.ARPA...

Rosati, David (DR16)            Rosati@BAR.FOO        (234) 567-8901
Rosales, Alphonso L.   (ALR)    Rosales@SRI-NIC.ARPA  (345) 678-9011
Roscoe, Joe A. (JAR)            Roscoe@HOST-1.DOMAIN  (123) 456-7890
  .
  .
Schuman, Richard O. (ROS)       Schuman@FOO.ARPA      (456) 789-0123

There are 25 more entries.  Show them? (Y/N)] N<Return>
```

Note that the partial search also finds any NIC handles that begin with "ros" as in the Schuman entry. To obtain a full entry for any one of these, search on the handle (the text in parentheses just after the name).

5.2.1.3   WHOIS Search by Handle

In case of multiple "hits" to a query, search by the unique handle to get the full entry of the exact
hit you wish to display.

```
[@]whois jar<Return>                          ;"JAR" is the Handle for
                                              ;the "Roscoe" entry

[Accessing NICNAME server at SRI-NIC.ARPA...

   ROSCOE, Joe A. (JAR)           JROSCOE@HOST-1.DOMAIN
   Air Force Data Systems
     Design Center/SDTS
   Willits Air Force Base, W.Va. 12345
   Phone: (123) 456-7890 (AV) 654-7890
   MILNET TAC user
```

5.2.1.4   WHOIS Search by Hostname

You may use WHOIS to quickly obtain a host address, if you know the hostname. To do this
type:

```
[@]whois ddn1.arpa<Return>                    ;Where DDN1.ARPA is an
                                              ;example of a HOSTNAME.
[Accessing NICNAME server at SRI-NIC...       ;The system returns
   Bolt Beranek and Newman Inc. (DDN1)        ;information about the
   Suite 400                                  ;organization where the
   1300 North 17th Street                     ;host is located, as well
   Arlington, Virginia 22209                  ;as the host's network
                                              ;address, nickname and
NetAddress: 26.4.0.106                        ;key network contacts.
NickName: DDN-1.ARPA

Host Administrator:
    Schutz, Michelle L.      (MLS6)    mschutz@ddn1.arpa
    (703) 524-4870
```

To see the list of registered USC-ISI users, repeat the command, preceding the argument with a star.

```
[@]whois *c.isi.edu<Return>

University of Southern California (USC-ISI)
   Information Sciences Institute
   4676 Admiralty Way
   Marina Del Rey, California 90292-6695

   NetAddress: 26.3.0.103
   Nicknames: USC-ISIA,ISIA,ISI

   Host Administrator:
      Gordon, Vicki L.  (VLG)  VGORDON@C.ISI.EDU
         (213) 822-1511 ext 284

There are 1103 individual members:

Aaron, P. D. (PDA)              AAPD@C.ISI.EDU        (408) 626-2626
Ackroyd, Bluto B. (BBA5)        BACKROYT@C.ISI.EDU    (213) 555-5575
.

.
Zulu, Robert (RZ7)              ZULUR@C.ISI.EDU       (714) 866-2942
Zylofone, Samuel (SZ2)          ZYLOS@C.ISI.EDU       (408) 666-2323
```

5.2.1.5   WHOIS Search by TAC Name

You may use WHOIS to quickly obtain a TAC telephone number, if you know the TAC's name. To do this type:

```
[@]whois menlopark-mil-tac.arpa<Return>    ;MENLOPARK-MIL-TAC.ARPA is an
                                           ;example of a TAC name.
SRI International (SRI-MIL-TAC)             ;The system returns
   Network Information Center              ;information about the
   333 Ravenswood Avenue                   ;organization where the
   Menlo Park, California 94025            ;TAC is located, the TAC
                                           ;dial-up number, host address,
                                           ;and the name and phone number
                                           ;of the Node Side Coordinator.

   Phone: (415) 327-5440 (R3) [300/1200 bps] (B)

   NetAddress: 26.3.0.73

   Coordinator:
      Neou, Vivian  (VN)  VIVIAN@SRI-NIC.ARPA
         (415) 859-4781
```

5.2.1.6   WHOIS Search by Node Name

WHOIS may be used to search by node (PSN) name. To do this type:

```
[@]whois menlo-park-imp<Return>        ;Where MENLO-PARK-IMP is an
                                       ;example of a PSN name.


SRI International (MENLO-PARK-IMP)      ;The system returns information
  Room EK289                           ;about the organization,
  333 Ravenswood Avenue                ;where the PSN is located,
  Menlo Park, California  94025
  Phone:  (415) 859-5921 [A]           ;PSN phone numbers,
  (415) 859-3550 or 859-5921


MENLO-PARK IS PSN/IMP 73 on network 26 (MILNET)   ;PSN address.

  Coordinator:                                ;The name, address and phone
     Neou, Vivian  (VN)  VIVIAN@SRI-NIC.ARPA  ;number for the Node Site
        (415) 859-4781                        ;Coordinator is also provided

  26.0.0.73      SRI-NIC.ARPA
    SRI-NIC.ARPA                 26.0.0.73, 10.0.0.51  ;hosts attached to
    SRI-WARF.ARPA                26.1.0.73             ;that PSN.
    SRI-MILNET-GW.ARPA           10.4.0.51, 26.2.0.73
    MENLOPARK-MIL-TAC.ARPA       26.3.0.73
    TWG.ARPA                     26.5.0.73
```

For more information on using WHOIS, type:

```
[@]whois help<Return>
```

If your local host does not run WHOIS/NICNAME, ask the Host Administrator to install it. The
NIC can give him/her guidelines and sample user programs on request. If the program is not
available locally, you can also access it by establishing a TELNET connection to
SRI-NIC.ARPA (26.0.0.73 or 10.0.0.51), and then invoking WHOIS there, although this is less
convenient than using it locally.

5.2.2   NIC/QUERY

NIC/Query is a browsing system containing general information about the Defense Data
Network (DDN). Each list of topics included under NIC/Query is presented to the user as a
numbered menu.

The program is easy to use and largely self-explanatory. A login account on the NIC machine is
not required. To access NIC/Query, open a TELNET connection to SRI-NIC.ARPA.

```
Open a TELNET connection to the SRI-NIC.ARPA Host.

[ Trying... Open

SRI-NIC.ARPA, TOPS20 ...
@]nic<Return>                                    ;or "query<Return>"

[TOP

NIC/Query is a NIC database system containing information about the
Defense Data Network (DDN), including MILNET and ARPANET.  Each list of
topics is presented to the user as a numbered menu of selections.

- To see more detail on any of the topics below, type its corresponding
number followed by a carriage return, <CR>.

- To leave NIC/Query, type 'quit<CR>'.

- For more help and additional commands, type 'help<CR>'.

1. INTERNET PROTOCOLS -- Describes Internet protocols
2. PERSONNEL -- Directory of DDN users
3. HOSTS -- Describes DDN hosts
4. RFCS -- Lists Requests For Comments technical notes
5. IENS -- Lists Internet Experiment Notes
6. NETWORK DOCUMENTS -- Lists Documents available from the NIC

_ for back, ^ for up, + for top, or menu # (1-7):]

...USER SESSION...

[_ for back, ^ for up, + for top, or menu # (1-7):]quit<Return>

[Bye now!

Connection closed by foreign host]
```

5.2.3   TACNEWS

TACNEWS is a NIC online service that offers login help to TAC users (including the current list
of MILNET and ARPANET TAC phone numbers), and provides a mechanism for reading the
DDN Newsletters and DDN Management Bulletins. Users should read these publications
regularly to stay current on DDN policies, announcements, and network news items. Access
TACNEWS by logging into a TAC and typing:

```
@n<Return>
[TAC Userid:] USER-ID<Return>
[Access Code:] ACCESS-CODE<Return>
[Login OK
TCP Trying...Open

 SRI-NIC.ARPA, TOPS-20 Monitor 5.3(5751)-1
***
*  For TACNEWS, enter:  tacnews<RETURN>
*  To find the host administrator for host xy-z, enter:  whois xy-z<RETURN>
*  Report system problems to Action@SRI-NIC.ARPA or call (415) 859-5921
***
@] tacnews<Return>
SRI-NIC TACnews 1.3(34)-2...
Send bugs or comments to TACNEWS@SRI-NIC.ARPA
Stop output every 24 lines? (Y/N/length/?) Yes<Return>
  1. Announcements (updated 12-Aug-85)
* 2. Dial-Ups (MILNET & ARPANET TAC telephone numbers, updated
     3-Dec-85, 9K chars)
* 3. Login (Help with TAC login, updated 22-Nov-85, 5K chars)
  4. Newsletters (DDN News, updated 15-Jan-86)
  5. Bulletins (DDN Management bulletins, updated 14-Jun-85)
Type a menu number ('HELP<CR>' for more info): ]
```

Alternatively you may also open a TELNET connection to SRI-NIC.ARPA from a local host to
read TACNEWS as follows:

```
Open a TELNET connection to the SRI-NIC.ARPA Host.

[Trying... Open
 SRI-NIC.ARPA, TOPS-20 Monitor 5.3(5751)-1
***
*  For TACNEWS, enter:  tacnews<RETURN>
*  To find the host administrator for host xy-z, enter:  whois xy-z<RETURN>
*  Report system problems to Action@SRI-NIC.ARPA or call (415) 859-5921
***
 There are 7+7 jobs with load average  0.36

@]tacnews<Return>
SRI-NIC.ARPA TACnews 1.3(34)-2...
```

If you wish to have newsletters and management bulletins delivered online to your network
mailbox, send a message to NIC@SRI-NIC.ARPA containing your name and address and
indicating that you wish to be on the online distribution for the newsletters and bulletins.

5.2.4   Useful Online Reference Files at the NIC

Several public files on the SRI-NIC.ARPA host are useful to network users. The pathnames for these are listed below. These files may be retrieved via FTP, using USERNAME = "anonymous", PASSWORD = "guest" (see Section 5.1.2 for FTP instructions), by mail using the NIC Mail Service program (see Section 5.2.4.2 below), or via the NIC Kermit Server (see Section 5.2.4.3 below).

5.2.4.1   List of NIC Files

NETINFO:ARPA-NSC.TXT

> Lists the Node Site Coordinators for each node or PSN on the ARPANET.

NETINFO:MIL-NSC.TXT

> Lists the Node Site Coordinators for each node or PSN on the MILNET.

NETINFO:ARPA-HOST-ADMINISTRATORS.TXT

> Lists the ARPANET Host Administrators for each ARPANET host. ARPANET Host Administrators can authorize MILNET TAC Access for ARPANET users.

> NOTE: Host Administrators cannot authorize ARPANET TAC access for any users. This must be done by the Responsible Persons.

NETINFO:MIL-HOST-ADMINISTRATORS.TXT

> Lists the MILNET Host Administrator for each MILNET host. MILNET Host Administrators can authorize MILNET TAC Access for MILNET users.

NETINFO:RESPONSIBLE-PERSONS.TXT

> Lists the ARPANET Responsible Person who authorizes TAC access for users of ARPANET TACs.

NETINFO:HOSTS.TXT

> This file contains the Official Internet DoD Hostnames Table which lists the names and numbers of domains, networks, gateways, and hosts on the DoD internet. It is designed to be machine-readable and so is not as "user-friendly" as the preceding lists.

NETINFO:TAC-LOCATION.TXT

> This file gives the geographical location for each TAC. It is very useful for locating the TAC closest to you.

NETINFO:TAC-PHONES.LIST

> Lists the telephone numbers needed to dial up MILNET and ARPANET TACs.

RFC:RFCnnn.TXT ;where "nnn" is the RFC number.

> Network technical notes, known as Requests for Comments, or RFCs, are online in the directory RFC: on the SRI-NIC.ARPA host. New RFCs are announced to network users via an online distribution list maintained by the NIC. Individuals wishing to be added to the RFC notification list should send a message to NIC@SRI-NIC.ARPA

RFC:RFC-INDEX.TXT

> Lists all the RFCs in numerical order. Includes author, title, date of issue, and RFC number for each RFC.

NETINFO:INTEREST-GROUPS.TXT

Lists most network special interest groups (SIGs), with a description and network mailbox for each.

NOTE: Because file NETINFO:INTEREST-GROUPS.TXT has grown so large, it has been broken into three files to accomodate mail systems:

> NETINFO:INTEREST-GROUPS-1.TXT
> NETINFO:INTEREST-GROUPS-2.TXT
> NETINFO:INTEREST-GROUPS-3.TXT

5.2.4.2   NIC Automated Mail Service

This is an automated service provided by the DDN Network Information Center. It allows access to NIC documents and information via ordinary electronic mail. This is especially useful for people who do not have access to the NIC via a direct Internet link, such as BITNET, CSNET and UUCP sites.

To use the mail service, send a mail message to SERVICE@SRI-NIC.ARPA. In the SUBJECT field, request the type of service you wish followed by any needed arguments. The message body is normally ignored. Large files will be broken into smaller separate messages. The information you request will be sent back to you as soon as possible.

The following services are currently available:

HELP	This message; a list of current services.
RFC nnn	nnn is the RFC number or the word INDEX.
IEN nnn	nnn is the IEN number or the word INDEX.
NETINFO xxx	xxx is a file name or the word INDEX.
SEND xxx	xxx is a fully specified file name.
HOST xxx	Returns information about host xxx.
WHOIS xxx	Returns information about xxx from the WHOIS service. Use "WHOIS HELP" for information on using WHOIS.

Sample SUBJECT lines:

> HELP
> RFC 822
> RFC INDEX
> NETINFO DOMAIN-TEMPLATE.TXT
> SEND RFC:ASSIGNED-NUMBERS.TXT
> HOST SRI-NIC.ARPA
> WHOIS MKL

5.2.4.3   NIC Kermit Server

For PC users who cannot use FTP from their host, the NIC now has available an anonymous Kermit server. To use it you should be familiar with the Kermit file transfer protocol and have a PC communications program that supports that protocol.

To download a file from the NIC using the Kermit server:

- Set the receive packet size on your PC Kermit to 60.

- Connect to SRI-NIC.ARPA (26.0.0.73 or 10.0.0.51) through the DDN.

- Once you get the NIC login prompt ("@"), put the TAC in binary mode by typing (in this order) the TAC commands:

        @B O S<Return>
        @B I S<Return>

- Type <Return> to get the NIC prompt ("@"), then type Kermit<Return>.

- Kermit will start on the NIC in the server mode.

- Drop back to your PC Kermit and "get" the file that you want from the NIC.

    When you are finished, type "bye" to your PC Kermit to end the session.

For more information on using Kermit through a TAC, see the files NIC@SRI-NIC.ARPA for the files NETINFO:KERMIT-TAC-INFO.TXT and KERMIT-NICSERVER.TXT on SRI-NIC.ARPA.

5.3   Guidelines for Network Conduct

The network environment is very different from the traditional workplace. Rules for proper conduct are gradually emerging to fit this new environment. The rules presented here are guidelines relating to four areas: passwords, file protection, plagiarism, and mail.

5.3.1   Passwords

Since use of the network is restricted, passwords, access codes, and TAC cards should never be shared without the express permission of the original owner and the person who authorized or issued them. Change your host login password regularly, and report any unauthorized use of passwords to your Host Administrator. MILNET TAC cards and records of host userids and passwords should be kept in a safe place. Users should be familiar with and follow local security guidelines.

5.3.2   File Protection

Most operating systems have a method of protecting files from network read and write access. The recommended file protection default for directories is "no read and no write to outside users". In this case, a user can still make files accessible to outside users over the network, but must knowingly set file and directory protections to make this happen.

As a new user, you should find out what the protection default is on your host, and be sure that files you don't want accessible to other users are protected. Ask the Host Administrator on the host you are using about default file and directory protection settings, and how to protect and unprotect files.

5.3.3   Plagiarism

Even if a file is unprotected, that is not an invitation to copy or read it without first asking permission. It is as inappropriate to read online mail or rummage through online files without permission as it would be to read a colleague's hardcopy mail or rummage around in his desk.

Electronic plagiarism of another's work is just as unethical as plagiarism by any other means. Be sure to credit users whose work you cite or ideas you express. Copyright laws must also be carefully observed and obeyed.

It is very easy and convenient to exchange code and programming across the network. Many of the developers of such code are extremely generous in sharing their work. Even so, before copying or using someone else's code, be sure to get permission from the developer or maintainer, and credit the source in your documentation. Under no circumstances should programming or code from anywhere on the network be used (verbatim or edited) commercially, without the owner's explicit permission.

5.3.4 Mail

Electronic mail is a powerful communication tool that must be used with care. The following guidelines will help you avoid offending other users and overloading the network.

It is easy to forward mail you receive; but the writer may never have intended that anyone else read the message. For this reason, it is wise to check with the sender before forwarding a private message of any significance.

The DDN is a business environment, so try to keep your messages short and to the point. It is easy to send off a quick message, only to realize a moment later that you needed to say more. To avoid this, organize your thoughts and send a single message rather than several incomplete ones. This will make your mail far more useful to the recipients, and minimize the load on the network.

Online mail tends to change a person's style of communication. Sending mail is so quick that it is tempting to send your immediate reaction to a message, rather than a more considered, appropriate response. Do not use derogatory or inappropriate language in messages, especially those sent to discussion groups. Keep in mind that no one likes to be offended or embarrassed by careless comments.

Finally, if you regularly send mail to a large group, learn how to create a mailing list. Otherwise, each recipient must scroll through a list of the mailboxes of all other recipients as a part of the message header.

Remember, use of the network is a privilege. It is the duty of each network user to use the network responsibly for its intended purposes, and to obey general network policies. In return, the network provides access to many useful tools and to an online community of colleagues and other users.

5.4 If You Have a Network Use Problem

For Questions on:	Contact:
Terminal settings	Host Administrator or User Representative
Host login	Host Administrator or User Representative
MILNET TAC access	Host Administrator for your host
ARPANET TAC access	Responsible Person for your organization
TAC login procedure	Network Information Center
TAC line problems	Node Site Coordinator for the TAC
TAC phone numbers	NIC TACNEWS program
General DDN information	Network Information Center

SECTION 6. NETWORK SERVICE CENTERS AND CONTACTS

The three main service centers on the DDN and the ARPANET are:

- The DDN Network Information Center (NIC)

- The DDN Network Monitoring Centers (NMC) for the United States, Pacific, and European areas

- The DDN Program Management Office (DDN PMO).

This section of the Guide describes the services provided by these organizations and gives a list of key contacts for each center.

Instructions are also given on how to obtain the names of other key network contacts, including:

- The Host Administrators

- The Node Site Coordinators

- The ARPANET Responsible Persons

- The Military Communications and Operations Command Contacts

- DARPA

- Contacts for ARPANET Administration.

These people and places will be key sources of information and help, so it is important for you to familiarize yourself with them.

6.1   The DDN Network Information Center (NIC)

The DDN Network Information Center (NIC) is located at SRI International, Menlo Park, CA, and is funded by the DDN PMO to provide general reference services to DDN and AR' ANET users via telephone, electronic mail, and U.S. mail. The NIC is the first place to turn if you are not sure who provides the service you need, or who is the right person to contact.

The NIC supplies general information and assistance to network users, particularly new users, on behalf of the DDN PMO. NIC personnel work closely with BBNCC, the network Host Administrators, Node Site Coordinators, Responsible Persons, network protocol groups, vendors, contractors, government agencies, and military sponsors to assist new users and potential subscribers to obtain and disseminate pertinent network information.

Databases and information servers of general interest to network users are provided by the NIC, including the WHOIS registry of network users, the NIC/Query browsing system, TACNEWS, and the official DoD Name Service. (Some of these services were described in Section 5.) The NIC also serves as the DDN Protocol Repository, and will soon be providing a BIBLIO server for identifying network documents.

6.1.1   General Reference Service Provided by the NIC

<div align="center">(800) 235-3155</div>

is the toll-free telephone number to call for user assistance. Service is available
Monday - Friday, 7 am to 4 pm, Pacific time.

Users who experience problems w[   ]g the network, in general, and with terminal-to-TAC use, in particular, are encourage[   ]   use of this service.

The NIC host computer is a DEC-2065, running the TOPS20 operating system, and its hostname is SRI-NIC.ARPA. It has two network addresses, and so is accessible from either the MILNET or the ARPANET. The network addresses are:

> SRI-NIC.ARPA   26.0.0.73 (MILNET)
>   10.0.0.51 (ARPANET)

NIC online services are available 24 hours a day, 7 days a week. Operations personnel are in attendance from 4 am - 11 pm weekdays, and 8 am - 12 pm weekends, Pacific time.

6.1.2   NIC Online Contacts

Contact	Network Mailboxes
General user assistance and feedback	NIC@SRI-NIC.ARPA
User registration and WHOIS updates	REGISTRAR@SRI-NIC.ARPA
Hostname changes and updates	HOSTMASTER@SRI-NIC.ARPA
SRI-NIC computer operations	ACTION@SRI-NIC.ARPA
Comments on NIC publications and services	SUGGESTIONS@SRI-NIC.ARPA
Manager, NIC	FEINLER@SRI-NIC.ARPA

6.1.3   NIC U.S. Mail Address

DDN Network Information Center
SRI International - Room EJ291
333 Ravenswood Avenue
Menlo Park, CA 94025

6.1.4   Documents Published by the NIC

The NIC also edits, publishes and distributes the following documents:

THE ARPANET INFORMATION BROCHURE.

> A review of ARPANET subscriber requirements and guidelines for attaching equipment to the ARPANET. Available for $10.00 prepaid from the NIC.

THE DDN DIRECTORY (formerly the ARPANET Directory).

> A directory of users and hosts on the network. It includes the name, address, network mailbox, and telephone number for each network user included. Available for $10.00 prepaid from the NIC.

> NOTE: Use the NIC WHOIS program, Section 5.2.1, for the most up-to-date directory information.

THE DDN PROTOCOL HANDBOOK.

> A multi-volume reference set of experimental ARPANET and official DoD network protocols together with implementation details and related background information. It can be ordered prepaid from the NIC for $110.00.

> NOTE: The NIC publishes the *DDN Protocol Handbook* as a source book for

implementors and network researchers for informational purposes. Individual military standards (MIL STDS) for DoD protocols in use on the DDN are available from the Naval Publications and Forms Center, Code 3015, 5801 Tabor Ave., Philadelphia, PA 19120, (215) 697-3321.

THE DDN NEW USER GUIDE.

A brief guide to DDN network tools and services designed to introduce users to the network. Available for $10.00 prepaid from the NIC. The Guide is also available online as [NETINFO:NUG.DOC].

THE DDN PROTOCOL IMPLEMENTATIONS AND VENDORS GUIDE.

The Vendors Guide lists software and hardware implementations of the DDN protocols, based upon information supplied by vendors. It is available for $30.00 prepaid from the NIC. This document is for information purposes only. Entry on this list does not imply endorsement. Also available online as [NETINFO:VENDORS-GUIDE.DOC].

RFCs (hardcopies).

Requests for Comments or RFCs are a set of network technical notes. Hardcopies of RFCs are available from the NIC for $5.00 if the RFC is under 100 pages, $10.00 if the RFC is 100 pages or longer. Also available online as [RFC:RFCnnn.txt].

A RFC Hardcopy Subscription Service is also available from the NIC for $200 per year (domestic) or $230 per year (overseas).

NOTE: All of the above documents have also been deposited at the Defense Technical Information Center (DTIC).

6.2 Network Monitoring Centers (NMCs)

There are four Network Monitoring Centers.

- The CONUS MILNET Monitoring Center (CMMC) located at DCA headquarters in Washington, DC

- The Pacific MILNET Monitoring Center (PMMC) located at Wheeler AFB in Hawaii

- The European MILNET Monitoring Center (EMMC) located in Vaihingen, Germany

- The ARPANET Monitoring Center (AMC) located within the Network Operations Center (NOC) at BBN Communications Corporation (BBNCC).

All provide operations support for several DoD packet-switching networks. The NMCs concentrate on real-time network management, with the primary objective of maximizing each network's operating efficiency.

BBNCC provides support for DDN in the areas of operations and technical support, configuration management, software maintenance and enhancement, hardware maintenance, and hardware requirements.

6.2.1 NMC Services

NMC services include remote status monitoring, coordination of network outage troubleshooting efforts, and 24 hour per day/ 7 day per week technical assistance to users for network problems. The NMCs typically work on backbone-related outages consisting of node and circuit problems, and provide help in determining whether or not host connectivity problems are network-related.

Your Host Administrator will contact the appropriate NMC for all network hardware problems, hardware field service, problems with host interfaces, or suspected node software problems.

6.2.2 NMC Contacts

Title	Telephone	Network Mailbox
CONUS MMC	(202) 692-2268	DCA-MMC@DCA-EMS.ARPA
European MMC	011 49 711 687 7766	STT-CONTROL@VHN.ARPA
Pacific MMC	(808) 655-1255	DCAPACOP@HAWAII-EMH.ARPA
ARPANET MC	(800) 492-4992	CONTROL@BBN.COM
	(617) 873-2900	
Manager, NOC	(617) 873-3117	JBURKE@BBN.COM

6.2.3 NMC U.S. Mail Addresses

CONUS MILNET Monitoring Center
1300 North 17th Street, Suite 400
Arlington, VA 22209
Attn: Dan O'Brien

Pacific MILNET Monitoring Center
Defense Communications Agency
Wheeler AFB, HI 96854-5000
Attn: P-430

European MILNET Monitoring Center
BBNCC
DCA-Europe
Box 1000
APO NY 09131

ARPANET Monitoring Center
50 Moulton Street
Cambridge, MA 02238
Att: Jeffrey L. Burke
Network Operations Manager

6.3 Host Administrators, Node Site Coordinators, and Responsible Persons

Each host also has an appointed representative, the Host Administrator, who serves as the technical and administrative contact for that host. The Host Administrator collaborates with the DDN PMO on security matters involving hosts, interprets network policies as they apply to his/her host, and decides which users may access the network (within the guidelines set down by the DDN PMO). The Host Administrator also authorizes user access to the MILNET Terminal Access Controllers (TACs). Finally, the Host Administrator helps network users with technical problems involving hosts, and works with the Network Information Center and the Network Monitoring Centers to provide information and technical assistance.

Each PSN has a person associated with it known as the Node Site Coordinator (NSC). The Node Site Coordinator is the local site representative having access control, accountability and coordination responsibility for the DDN-owned network hardware, software, and circuits located at the node site.

One person may serve in one or both roles; however, hosts or nodes may not have more than one Host Administrator and one Node Site Coordinator.

DARPA has also appointed representatives called Responsible Persons (RPs) who authorize ARPANET TAC use. Unlike other site personnel, the RP is not associated with a node or specific host, but rather represents an organization on behalf of DARPA. There are no RPs on the MILNET.

To find the names, addresses, telephone numbers, and network mailboxes for these contacts, see Section 5.2.4.

6.4 Military Communications and Operations Command Contacts

Each military department has designated an organization to serve as the primary DDN point-of-contact. Requests for information or assistance should be directed to the following organizations:

Service	Telephone	Autovon
Air Force ASPO/PGD Gunter AFS, AL 36224-6340	(205) 279-4074/3290	446-4074
Army OSAISC, AS-PLN-RF Fort Huachuca, AZ 85613-5000	(602) 538-6915	879-6915
Navy COMNAVTELCOM, Code N521 Washington, DC 20390-5290	(202) 282-0381/2	292-0381

6.5 Defense Data Network Program Management Office (DDN PMO)

The Defense Communications Agency, Defense Data Network Program Management Office (DDN PMO) is responsible for overall management of the Defense Data Network (DDN) and the ARPANET.

6.5.1 DDN PMO Contacts

Code	Title	Telephone[1]	Network Mailbox
B641	Subscriber Req. & Integration Branch	(703) 285-5027	DCAB641@DDN1.ARPA
B651	Data Operations Management Branch	(202) 692-7582	DCAB651@DDN1.ARPA
B641	Air Force	(703)285-5025	DDN-USAF@DDN1.ARPA
B641	Army	(703)285-5037	DDN-ARMY@DDN1.ARPA
B641	Navy	(703)285-5137	DDN-NAVY@DDN1.ARPA
B641	Other DoD Elements	(703)285-5028	JACK@DDN1.ARPA
B641	ARPANET POC	(202)692-9034	ARPANETMGR@DDN1.ARPA

Postal Mail:

> Defense Communications Agency
> B651, Data Operations Management Branch
> Washington, DC 20305

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[1] Area Code (703), Autovon 356-xxxx; Area Code (202), Autovon 222-xxxx

6.6   Defense Advanced Research Projects Agency (DARPA)

The Defense Advanced Research Projects Agency (DARPA) through its Information Processing
Techniques (IPTO) and Management Information Systems (MIS) Offices sets policy for the
ARPANET, and also administers the ARPANET TAC access system. IPTO heads the Internet
Advisory Board and monitors the work of its associated Working Groups. DARPA is the
research arm of the DoD and supports basic research programs in a number of scientific
disciplines.

6.6.1   DARPA Contacts

Title	Telephone	Network Mailbox
DARPA POC	(202) 694-4002	
Internet Activities Board	(202) 694-4002	PERRY@VAX.DARPA.MIL

Postal Mail:

> Defense Advanced Research Projects Agency
> Information Processing Techniques Office
> Attn: Major Brian Boesch
> 1400 Wilson Boulevard
> Arlington, VA 22209-2389

SECTION 7.   BIBLIOGRAPHY

These manuals and documents are either cited in this guide, or are helpful in understanding the DDN. When known, the ordering number is given for items available from the Defense Technical Information Center (DTIC)[1] or as a DCA Circular.

Documents marked (NIC) are available from the NIC. When an online version is available, the resident host and the online filename are given and enclosed in brackets.

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1. *TAC Users' Guide*[2]. Bolt Beranek and Newman Communications Corporation, Cambridge, MA, 1982. [AD-A147 366]

2. *DDN Subscriber Interface Guide*. Defense Data Network, Program Management Office, Defense Communications Agency, Washington, DC. 1983. [AD-A132 877] (NIC)

3. DeLauer, R.D. DoD Policy on Standardization of Host-to-Host Protocols for Data Communications Networks. Office of the Secretary of Defense, Washington, DC, March 1982. (NIC) [IEN:IEN-207.TXT]

4. Carlucci, F. C. *Autodin II Termination, Memorandum for Secretaries of the Military Departments*, Deputy Secretary of Defense, Washington, DC, April 1982.

5. *Instructions for Network User Registration Drive [MILNET]*. DDN Network Information Center, SRI International, Menlo Park, CA, October 1983 (under revision).
   (NIC) [NETINFO:MIL-TACACS-INSTRUCTIONS.TXT]

6. *ARPANET Access Control, User Manual for the User Database Tool*. Defense Advanced Projects Research Agency, Arlington, VA, July 1984.
   (NIC) [NETINFO:ARPA-TACACS.MAN]

Auxiliary User Documentation

DEC-20 User's Manual. Digital Equipment Corporation, Maynard, MA, 1982.

INFOMAIL User Guide. Bolt Beranek and Newman Inc., Cambridge, MA, 1982.

Keene. *MINET INFOMAIL Primer*. Bolt Beranek and Newman Inc., Cambridge, MA, 1983.

Keene. *MINET User Guide*. Bolt Beranek and Newman Inc., Cambridge, MA, 1983.

Mooers, Charlotte. *The HERMES Guide*. Bolt Beranek and Newman Inc., Cambridge, MA, 1982.

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[1] Order from: DTIC, Cameron Station, Alexandria, VA. 22314, (202) 274-7633.

[2] The April 1987 version of the TAC Users' Guide is available as DCA Circular 310-P70-74 from DCA, Code H316, Washington, DC 20305-2000, (202) 692-6972/6965 or (AV) 222-6972/6965

General references

Bolt Beranek and Newman Inc. *A History of the ARPANET: the First Decade.* Report No. 4799, Defense Advanced Research Agency, Arlington, VA, 1981. [AD-A̶1̶1̶1̶5̶-̶4̶4̶0̶].
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Cerf, V. and Lyons, R. Military Requirements for Packet-Switched Networks and Their Implications for Protocol Standardization. *Computer Networks*, vol. 7, no. 5, 293-306 (October 1983).

Chou, W. (Ed.). *Computer Communications.* Prentice-Hall, Inc., Englewood Cliffs, NJ, 1983.

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DDN Directory. DDN Network Information Center, SRI International, Menlo Park, CA, 1984. [AD-A148 213] (NIC) $10.00 prepaid.

DDN Protocol Handbook, 3 volumes. DDN Network Information Center, Menlo Park, CA. 1985. (NIC) $110.00 prepaid.

DDN Subscriber Security Guide. Defense Data Network, Program Management Office, Defense Communications Agency, Washington, DC. 1983. [AD-A152 524] (NIC)

Hinden, R., Haverty, J. and Sheltzer, A. The DARPA Internet: Interconnecting Heterogenous Computer Networks with Gateways. *Computer*, vol. 16, no. 9, 38-48 (September 1983).

Kleinrock, L. Value-Added Networks (VANS) Come of Age. *MIS Week*, vol. 4, no. 5, 29 (2 February 1983).

Newell, A. and Sproull, R. F. Computer Networks: Prospects for Scientists. *Science*, vol. 215, 843-852 (12 February 1982).

DDN Protocol Implementations and Vendors Guide. DDN Network Information Center, Menlo Park, CA. 1985. (NIC) [NETINFO:VENDORS-GUIDE.DOC] $30.00 prepaid.

Uhlig, R. P. *Computer Message Systems.* Elsevier, New York, NY, 1981.

Vallee, J. *Computer Message Systems.* McGraw-Hill Publications, New York, NY, 1984.

Wallich, P. Putting It Together. *IEEE Spectrum* vol. 20, no. 11, 105-109 (November 1983).

SECTION 8.   GLOSSARY

acoustic coupler	A type of modem which converts digital signals into sound for transmission through telephone lines, and performs the reverse operation when receiving such signals. Acoustic couplers generally have cups into which the telephone handset is placed to make the connection.
AMC	ARPANET Network Monitoring Center, located at BBNCC, Cambridge, MA.
Anonymous Login Convention	Standard username ("anonymous") and password ("guest") which allows login within FTP for the purpose of retrieving an unprotected file.
ARPA	See DARPA.
ARPANET	Packet-switched network developed by the Defense Advanced Research Projects Agency.
backbone	The nodes (PSNs), TACs, and the telephone lines connecting them, forming the core of the DDN.
BBNCC	Bolt Beranek and Newman Communications Corporation; a major hardware and software developer for the DDN, and early contributor to the development of the DDN.
BPS	Bits per second is the unit used for measuring line speed, the number of information units transmitted per second.
case dependent	Software differentiation between upper and lower case characters.
circuit-switched	A type of network connection which establishes a continuous electrical connection between calling and called users for their exclusive use until the connection is released.
DARPA	Defense Advanced Research Projects Agency.
DCA	Defense Communications Agency.
DDN	Defense Data Network, the DoD long-haul packet-switched computer communications network which includes the MILNET and the ARPANET as two of its subnetworks.
DDN PMO	Defense Data Network Program Management Office.
DoD	Department of Defense.
DTIC	Defense Technical Information Center, Cameron Station, Alexandria, VA 22314, a depository for many DoD technical reports.
FTP	File Transfer Protocol, used to copy files across the network.
gateway	Computer which interconnects networks.
Handle	Unique character string identifier assigned to each entry in the NIC WHOIS database.
HERMES	Electronic mail program developed at BBNCC for DARPA.
host	Computer connected to a PSN on the DDN.
hostname	Name which officially identifies each computer attached to the DDN.
IMP	Interface Message Processor; see PSN.
INFOMAIL	Electronic mail program developed by BBNCC.
Internetwork	A network, such as the DDN, that connects other networks.
Internet Protocol	Standard that allows dissimilar hosts to connect to each other through the DDN.
IPTO	Information Processing Techniques Office, the DARPA office that developed and built the ARPANET.
IWG	Internet Working Group; a DARPA-sponsored research team involved in the design and implementation of Internet protocols.

kermit	An error-checking file-tranfer protocol used to copy files from one computer to another. Also the name given to the public domain software distributed by Columbia University that supports this protocol.
LAN	Local Area Network; network of directly connected machines usually located within 10 miles of each other.
long-haul net	Network spanning long geographic distances, usually connected by telephone lines or satellite radio links.
MH	Rand Corporation Mail Handling program for electronic mail.
MIL STD	Military Standard; official military version of a specification.
MILNET	The DDN unclassified operational military network.
MM	Electronic mail program developed at SRI International.
modem	Device which converts digital signals into analog signals (and back) for transmission over telephone lines (modulator and demodulator).
NIC/Query	General information program on SRI-NIC.ARPA.
NIC	DDN Network Information Center, located at SRI International, Menlo Park, CA.
NICNAME	See "WHOIS".
NMC	Network Monitoring Center; the ARPANET NMC is located at BBNCC (Cambridge, MA) and the MILNET NMC is located in Washington, DC. Others are located in Europe and Hawaii.
node	Packet switch; a PSN.
NSC	Node Site Coordinator; local DDN contact responsible for node or TAC equipment.
NTIS	National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22151, (703) 487-4650, national depository for unclassified technical documents.
operating system	Software that supervises and controls tasks on a computer.
packet-switching	Data transmission process, utilizing addressed packets, whereby a channel is occupied only for the duration of the packet transmission.
OSD	Office of the Secretary of Defense.
PMO	See DDN PMO.
POC	Point Of Contact
protocol	Technical specifications which govern the format and timing of information exchange between two communicating software processes.
PSN	Packet Switch Node; a store-and-forward packet switch (formerly called an IMP).
REGISTRAR	Mailbox at NIC for DDN user registration additions and changes.
RFC	Request For Comments; technical note series describing DARPA and DDN research and development, particularly in the areas of protocol design and internetworking.
RP	Responsible Person; person in charge of ARPANET TAC Registration for an organization.
SIG	Special Interest Group; online mailing group whose members exchange information on a particular topic of interest.
site	Organization or facility where a host is located.
SMTP	Simple Mail Transfer Protocol.
socket	Logical address of a communications access point to a specific device or program on a host.
SRI-NIC.ARPA	DDN Network Information Center host located at SRI; the general information computer for the DDN.

SRI	SRI International, Menlo Park, CA, location of the DDN Network Information Center and early contributor to the development of the DDN.
TAC	Terminal Access Controller; special type of host attached to a PSN that allows direct terminal access to the DDN backbone.
TAC Access Code	Password assigned to MILNET TAC users for TAC login.
TAC Userid	Alphanumeric character string that identifies a TAC user upon TAC login.
TACAC.ARPA	Machine on which the ARPANET TAC User Database Tool (UDB) is located.
TACACS	TAC Access Control System; password system that limits use of TACs to authorized users.
TACNEWS	NIC program for reading DDN Newsletters and Bulletins and other items.
TCP/IP	Transmission Control Protocol/Internet Protocol; DoD standard network protocols.
TELNET	Protocol for opening a transparent connection to a distant host.
terminal	Communication device that lets a user send information to a computer by typing on a keyboard, and prints responses from the computer on paper or a screen.
TIP	Terminal Interface Processor; predecessor of the TAC, serving a similar function. See TAC.
TOPS20	Digital Equipment Corporation proprietary operating system which runs on the DEC 20 series of machines.
UDB	User Database Tool for registering for ARPANET TAC Access.
UNIX	An AT&T Bell Laboratories proprietary operating system which runs on large and small computers.
WHOIS	NIC program used to access the NIC electronic "white pages" database.

APPENDIX A.   SPECIAL INTEREST GROUPS (SIGS)

A unique aspect of the network are its many online Special Interest Groups (SIGs), which discuss topics ranging from Artificial Intelligence to Zenith PCs. Anyone can contribute to a SIG by simply sending mail, and they are a good way for a new user to learn more about the network. Information on network SIGS can be found in a file nicknamed the "List-of-Lists", a master list of SIGS with a brief description of each group.

For users who have never done a file transfer before, this is a perfect first opportunity. The List-of-Lists may be FTPed from the SRI-NIC.ARPA host by logging in with USERID = "anonymous" and PASSWORD = "guest" and using the pathname NETINFO:INTEREST-GROUPS-1.TXT, NETINFO:INTEREST-GROUPS-2.TXT, or NETINFO:INTEREST-GROUPS-3.TXT.

Note that many individual hosts do mail redistribution for their users, i.e., mailing list messages or digests are delivered once to one local mailbox, then they are announced or forwarded to a list of interested local users. Mail redistribution eliminates the need for the local mailer to process myriad copies of the same message going to different users and so conserves local computer resources. Before adding your name to a SIG distribution list, ask your Host Administrator or User Representative if SIG or digest mail is redistributed on your host or posted in a centralized place to be read by all local users.

With the network information sources and contacts just outlined, and the tools introduced in the previous section, you are now ready to explore the network on your own.

APPENDIX B. QUESTIONS COMMONLY ASKED
BY NETWORK USERS

These are some of the most-commonly asked questions and representative answers selected from mail the NIC receives. (See Sections 6.1.2, 6.1.3 for NIC network and postal addresses.)

Q: I want to send mail to my colleague, John Smith. What is his network mailbox?

A: The NIC provides an online program called "WHOIS" or "NICNAME", which contains
      the names, addresses, phone numbers, and online mailboxes of network users. Since some
      Host Administrators install this program on their host, you should ask your host
      representative if it is available locally. Alternatively, you may make a TELNET
      connection to SRI-NIC.ARPA and use the WHOIS program running on our host. (Login
      to SRI-NIC.ARPA is not required.)

Q: I am interested in joining special interest groups on the IBM and Macintosh personal
      computers. How can I do this?

A: FTP the files called NETINFO:INTEREST-GROUPS-1.TXT,
      NETINFO:INTEREST-GROUPS-2.TXT, NETINFO:INTEREST-GROUPS-3.TXT, from
      SRI-NIC.ARPA. They are a compendium of mailing lists on the network. The Interest
      Groups list describes the list INFO-IBMPC and INFO-MAC. Send requests to be added to
      these lists to INFO-IBMPC-REQUEST@C.ISI.EDU and to
      INFO-MAC-REQUEST@SUMEX-AIM.ARPA, giving your name and network mailbox.

Q: There are a number of old RFC documents I would like to obtain, specifically RFCs: 123,
      231, and 312. They don't appear to be online at the NIC. Could you arrange to get copies
      for me? I prefer online copies if you have them.

A: Many of the older RFCs have never been online. Hardcopies of RFCs can be ordered from
      the NIC. There is a $5.00 copying charge for each RFC under 100 pages, and a $10.00
      copying charge for each RFC of 100 or more pages. Checks or purchase orders, made
      payable to SRI International, should be sent to the NIC.

Q: I am on a host on MILNET, but want to FTP a file from a host on ARPANET. I've heard
      that there are restrictions on crossing networks? What are they?

A: As of this writing, most services (i.e. Mail, FTP, and TELNET) are open between the two
      networks. At some as yet unspecified time, specific host-to-host restrictions will be
      applied. Mail, however, will remain unrestricted.

Q: I have a colleague at Anystate University; can he/she get on the DDN?

A: Subscribers to the network must be working on a DoD contract that requires network
      access, and be sponsored by a government agency. If your colleague doesn't meet this
      requirement, he or she might explore the possibility of using another network, such as
      CSNET, which can exchange mail with the DDN.

Q: This TAC phone number doesn't work. What should I do?

A: The Network Information Center can test the TAC from our site to determine whether the
      problem is in the TAC or relates to your equipment or procedure. If the problem is the
      TAC, we can give you phone numbers for other TACs.

Q: Can I get a printout of the WHOIS   tabase of DDN users?

A: The 1984 edition of the DDN Directory, is available for purchase. To obtain a copy, send
      your check, money order, or purchase order for $10.00 to: DDN Network Information

Center, Room EJ291, 333 Ravenswood Avenue, Menlo Park, CA 94025. We do not distribute, or otherwise make available, machine-readable copies of the WHOIS database.

APPENDIX C.   USEFUL NETWORK CONTACTS

Defense Data Network Program Management Office (DDN PMO)

Code	Office	Telephone[1]	Network Mailbox
B641	Subscriber Req. & Integration Branch	(703) 285-5035	DCAB641@DDN1.ARPA
B651	Data Operations Management Branch	(202) 285-7582	DCAB651@DDN1.ARPA
B641	Air Force	(703) 285-5025	DDN-USAF@DDN1.ARPA
B641	Army	(703) 285-5026	DDN-ARMY@DDN1.ARPA
B641	Navy	(703) 285-5137	DDN-NAVY@DDN1.ARPA
B641	Other DoD Elements	(703) 285-5028	JACK@DDN1.ARPA
B641	ARPANET POC	(202) 692-9034	ARPANETMGR@DDN1.ARPA

Defense Advanced Research Projects Agency (DARPA)

Office	Telephone	Network Mailbox
DARPA POC	(202) 694-4002	
	(AV) 224-4002	

Network Information Center (NIC)

Information	Telephone
(Mon - Fri, 7 am - 4 pm, PST)	(800) 235-3155

Office	Network Mailboxes
General user assistance and feedback	NIC@SRI-NIC.ARPA
User registration and WHOIS updates	REGISTRAR@SRI-NIC.ARPA
Hostname changes and updates	HOSTMASTER@SRI-NIC.ARPA
SRI-NIC computer operations	ACTION@SRI-NIC.ARPA
Comments on NIC documents and services	SUGGESTIONS@SRI-NIC.ARPA
Manager, NIC	FEINLER@SRI-NIC.ARPA

Network Monitoring Centers (NMC)

Office	Telephone	Network Mailbox
CONUS MMC	(202) 692-2268	DCA-MMC@DCA-EMS.ARPA
European MMC	011 49 711 687 7766	STT-CONTROL@VHN.ARPA
Pacific MMC	(808) 655-1255	DCAPACOP@HAWAII-EMH.ARPA
ARPANET MC	(800) 492-4992	CONTROL@BBN.COM
	(617) 873-2900	
Manager, NOC	(617) 873-3117	JBURKE@BBN.COM

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[1] Area Code (703), Autovon 356-xxxx; Area Code (202), Autovon 222-xxxx

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READER'S COMMENT FORM

DDN NEW USER GUIDE

December 1985

Here is your opportunity to let us know who you are and what you need as a new DDN user. Comments can also be sent to SUGGESTIONS@SRI-NIC.ARPA. We would like to know:

Which section(s) of the guide did you find most helpful?

What information were you expecting to find in this document that wasn't included?

What site-specific problems have you had which were not addressed in this document?

What terms would you like indexed that weren't?

Any other comments:

Position:

Name (Optional):

Address (Optional):

Network mailbox (Optional):

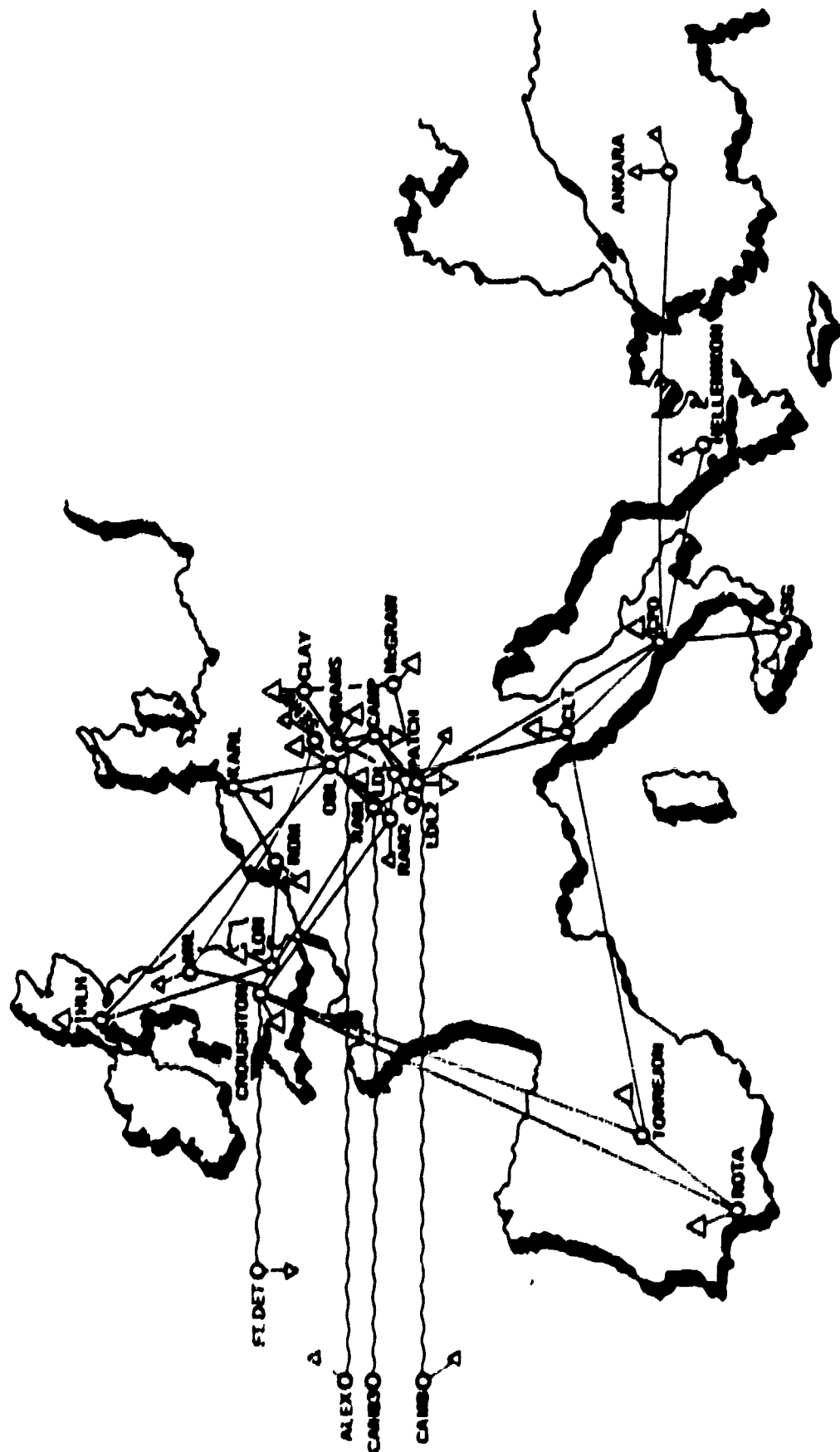Approximate date you received your network privileges:

Thanks for your help!

---------- fold ----------

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stamp

To: DDN Network Information Center
    SRI International
    333 Ravenswood Avenue, EJ291
    Menlo Park, California 94025

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European MILNET Geographic Map, 1 July 1987

OPERATIONAL	
Nodes	TAC
24	24

	SATELLITE CIRCUIT
O	C30 IMP
△	C30 TAC