

Network Working Group  
Request for Comments: 1594  
FYI: 4  
Obsoletes: 1325  
Category: Informational

A. Marine  
NASA NAIC  
J. Reynolds  
ISI  
G. Malkin  
Xylogics  
March 1994

FYI on Questions and Answers  
Answers to Commonly asked "New Internet User" Questions

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Abstract

This FYI RFC is one of two FYI's called, "Questions and Answers" (Q/A), produced by the User Services Working Group of the Internet Engineering Task Force (IETF). The goal is to document the most commonly asked questions and answers in the Internet.

New Questions and Answers

In addition to updating information contained in the previous version of this FYI RFC, the following new questions have been added:

Questions about Internet Organizations and Contacts:

What is the InterNIC?

Questions About Internet Services:

What is gopher?

What is the World Wide Web? What is Mosaic?

How do I find out about other Internet resource discovery tools?

## Table of Contents

1. Introduction.....	2
2. Acknowledgements.....	2
3. Questions About the Internet.....	3
4. Questions About TCP/IP.....	5
5. Questions About the Domain Name System.....	5
6. Questions About Internet Documentation.....	6
7. Questions about Internet Organizations and Contacts.....	13
8. Questions About Services.....	18
9. Mailing Lists and Sending Mail.....	24
10. Miscellaneous "Internet lore" questions.....	26
11. Suggested Reading.....	28
12. References.....	29
13. Condensed Glossary.....	31
14. Security Considerations.....	44
15. Authors' Addresses.....	44

## 1. Introduction

New users joining the Internet community have the same questions as did everyone else who has ever joined. Our quest is to provide the Internet community with up to date, basic Internet knowledge and experience.

Future updates of this memo will be produced as User Services members become aware of additional questions that should be included, and of deficiencies or inaccuracies that should be amended in this document. Although the RFC number of this document will change with each update, it will always have the designation of FYI 4. An additional FYI Q/A, FYI 7, is published that deals with intermediate and advanced Q/A topics [11].

## 2. Acknowledgements

The following people deserve thanks for their help and contributions to this FYI Q/A: Matti Aarnio (FUNET), Susan Calcari (InterNIC), Corinne Carroll (BBN), Vint Cerf (MCI), Peter Deutsch (Bunyip), Alan Emtage (Bunyip), John Klensin (UNU), Thomas Lenggenhager (Switch), Doug Mildram (Xylogics), Tracy LaQuey Parker (Cisco), Craig Partridge (BBN), Jon Postel (ISI), Matt Power (MIT), Karen Roubicek (BBN), Patricia Smith (Merit), Gene Spafford (Purdue), and Carol Ward (Sterling Software/NASA NAIC).

### 3. Questions About the Internet

#### 3.1 What is the Internet?

The Internet is a collection of thousands of networks linked by a common set of technical protocols which make it possible for users of any one of the networks to communicate with or use the services located on any of the other networks. These protocols are referred to as TCP/IP or the TCP/IP protocol suite. The Internet started with the ARPANET, but now includes such networks as the National Science Foundation Network (NSFNET), the Australian Academic and Research Network (AARNet), the NASA Science Internet (NSI), the Swiss Academic and Research Network (SWITCH), and about 10,000 other large and small, commercial and research, networks. There are other major wide area networks that are not based on the TCP/IP protocols and are thus often not considered part of the Internet. However, it is possible to communicate between them and the Internet via electronic mail because of mail gateways that act as "translators" between the different network protocols involved.

Note: You will often see "internet" with a small "i". This could refer to any network built based on TCP/IP, or might refer to networks using other protocol families that are composites built of smaller networks.

See FYI 20 (RFC 1462), "FYI on 'What is the Internet?'" for a lengthier description of the Internet [13].

#### 3.2 I just got on the Internet. What can I do now?

You now have access to all the resources you are authorized to use on your own Internet host, on any other Internet host on which you have an account, and on any other Internet host that offers publicly accessible information. The Internet gives you the ability to move information between these hosts via file transfers. Once you are logged into one host, you can use the Internet to open a connection to another, login, and use its services interactively (this is known as remote login or "TELNETing"). In addition, you can send electronic mail to users at any Internet site and to users on many non-Internet sites that are accessible via electronic mail.

There are various other services you can use. For example, some hosts provide access to specialized databases or to archives of information. The Internet Resource Guide provides information regarding some of these sites. The Internet Resource Guide lists facilities on the Internet that are available to users. Such facilities include supercomputer centers, library catalogs and

specialized data collections. The guide is maintained by the Directory Services portion of the InterNIC and is available online in a number of ways. It is available for anonymous FTP from the host ds.internic.net in the resource-guide directory. It is also readable via the InterNIC gopher (gopher internic.net). For more information, contact admin@ds.internic.net or call the InterNIC at (800) 444-4345 or (908) 668-6587.

Today the trend for Internet information services is to strive to present the users with a friendly interface to a variety of services. The goal is to reduce the traditional needs for a user to know the source host of a service and the different command interfaces for different types of services. The Internet Gopher (discussed more in the "Questions about Internet Services" section) is one such service to which you have access when you join the Internet.

### 3.3 How do I find out if a site has a computer on the Internet?

Frankly, it's almost impossible to find out if a site has a computer on the Internet by querying some Internet service itself. The most reliable way is to ask someone at the site you are interested in contacting.

It is sometimes possible to find whether or not a site has been assigned an IP network number, which is a prerequisite for connecting an IP network to the Internet (which is only one type of Internet access). To do so, query the WHOIS database, maintained by the Registration Services portion of the InterNIC. You have several options about how to do such a query. The most common currently are to TELNET to the host rs.internic.net and invoke one of the search interfaces provided, or to run a WHOIS client locally on your machine and use it to make a query across the network.

The RIPE Network Coordination Center (RIPE NCC) also maintains a large database of sites to whom they have assigned IP network numbers. You can query it by TELNETing to info.ripe.net and stepping through the interactive interface they provide.

### 3.4 How do I get a list of all the hosts on the Internet?

You really don't want that. The list includes more than 1.5 million hosts. Almost all of them require that you have access permission to actually use them. You may really want to know which of these hosts provide services to the Internet community. Investigate using some of the network resource discovery tools, such as gopher, to gain easier access to Internet information.

#### 4. Questions About TCP/IP

##### 4.1 What is TCP/IP?

TCP/IP (Transmission Control Protocol/Internet Protocol) [4,5,6] is the common name for a family of over 100 data-communications protocols used to organize computers and data-communications equipment into computer networks. TCP/IP was developed to interconnect hosts on ARPANET, PRNET (packet radio), and SATNET (packet satellite). All three of these networks have since been retired; but TCP/IP lives on. It is currently used on a large international network of networks called the Internet, whose members include universities, other research institutions, government facilities, and many corporations. TCP/IP is also sometimes used for other networks, particularly local area networks that tie together numerous different kinds of computers or tie together engineering workstations.

##### 4.2 What are the other well-known standard protocols in the TCP/IP family?

Other than TCP and IP, the three main protocols in the TCP/IP suite are the Simple Mail Transfer Protocol (SMTP) [8], the File Transfer Protocol (FTP) [3], and the TELNET Protocol [9]. There are many other protocols in use on the Internet. The Internet Architecture Board (IAB) regularly publishes an RFC [2] that describes the state of standardization of the various Internet protocols. This document is the best guide to the current status of Internet protocols and their recommended usage.

#### 5. Questions About the Domain Name System

##### 5.1 What is the Domain Name System?

The Domain Name System (DNS) is a hierarchical, distributed method of organizing the name space of the Internet. The DNS administratively groups hosts into a hierarchy of authority that allows addressing and other information to be widely distributed and maintained. A big advantage to the DNS is that using it eliminates dependence on a centrally-maintained file that maps host names to addresses.

##### 5.2 What is a Fully Qualified Domain Name?

A Fully Qualified Domain Name (FQDN) is a domain name that includes all higher level domains relevant to the entity named. If you think of the DNS as a tree-structure with each node having its own label, a Fully Qualified Domain Name for a specific node

would be its label followed by the labels of all the other nodes between it and the root of the tree. For example, for a host, a FQDN would include the string that identifies the particular host, plus all domains of which the host is a part up to and including the top-level domain (the root domain is always null). For example, atlas.arc.nasa.gov is a Fully Qualified Domain Name for the host at 128.102.128.50. In addition, arc.nasa.gov is the FQDN for the Ames Research Center (ARC) domain under nasa.gov.

## 6. Questions About Internet Documentation

### 6.1 What is an RFC?

The Request for Comments documents (RFCs) are working notes of the Internet research and development community. A document in this series may be on essentially any topic related to computer communication, and may be anything from a meeting report to the specification of a standard. Submissions for Requests for Comments may be sent to the RFC Editor (RFC-EDITOR@ISI.EDU). The RFC Editor is Jon Postel.

Most RFCs are the descriptions of network protocols or services, often giving detailed procedures and formats for their implementation. Other RFCs report on the results of policy studies or summarize the work of technical committees or workshops. All RFCs are considered public domain unless explicitly marked otherwise.

While RFCs are not refereed publications, they do receive technical review from either the task forces, individual technical experts, or the RFC Editor, as appropriate. Currently, most standards are published as RFCs, but not all RFCs specify standards.

Anyone can submit a document for publication as an RFC. Submissions must be made via electronic mail to the RFC Editor. Please consult RFC 1543, "Instructions to RFC Authors" [10], for further information. RFCs are accessible online in public access files, and a short message is sent to a notification distribution list indicating the availability of the memo. Requests to be added to this distribution list should be sent to RFC-REQUEST@NIC.DDN.MIL.

The online files are copied by interested people and printed or displayed at their sites on their equipment. (An RFC may also be returned via electronic mail in response to an electronic mail query.) This means that the format of the online files must meet the constraints of a wide variety of printing and display

equipment.

Once a document is assigned an RFC number and published, that RFC is never revised or re-issued with the same number. There is never a question of having the most recent version of a particular RFC. However, a protocol (such as File Transfer Protocol (FTP)) may be improved and re-documented many times in several different RFCs. It is important to verify that you have the most recent RFC on a particular protocol. The "Internet Official Protocol Standards" [2] memo is the reference for determining the correct RFC to refer to for the current specification of each protocol.

## 6.2 How do I obtain RFCs?

RFCs are available online at several repositories around the world. For a list of repositories and instructions about how to obtain RFCs from each of the major U.S. ones, send a message to rfc-info@isi.edu. As the text of the message, type "help: ways\_to\_get\_rfcs" (without the quotes).

An example of obtaining RFCs online follows.

RFCs can be obtained via FTP from ds.internic.net with the pathname rfc/rfcNNNN.txt (where "NNNN" refers to the number of the RFC). Login using FTP, username "anonymous" and your email address as password. The Directory Services portion of the InterNIC also makes RFCs available via electronic mail, WAIS, and gopher.

To obtain RFCs via electronic mail, send a mail message to mailserv@ds.internic.net and include any of the following commands in the message body:

document-by-name rfcnnnn	where 'nnnn' is the RFC number The text version is sent.
file /ftp/rfc/rfcnnnn.yyy	where 'nnnn' is the RFC number. and 'yyy' is 'txt' or 'ps'.
help	to get information on how to use the mailserver.

## 6.3 How do I obtain a list of RFCs?

Several sites make an index of RFCs available. These sites are indicated in the ways\_to\_get\_rfcs file mentioned above and in the next question.

#### 6.4 What is the RFC-INFO service?

The Information Sciences Institute, University of Southern California (ISI) has a service called RFC-INFO. Even though this is a service, rather than a document, we'll discuss it in this section because it is so closely tied to RFC information.

RFC-INFO is an email based service to help in locating and retrieval of RFCs, FYIs, STDs, and IMRs. Users can ask for "lists" of all RFCs and FYIs having certain attributes ("filters") such as their ID, keywords, title, author, issuing organization, and date. Once an RFC is uniquely identified (e.g., by its RFC number) it may also be retrieved.

To use the service, send email to: RFC-INFO@ISI.EDU with your requests as the text of the message. Feel free to put anything in the SUBJECT, the system ignores it. All input is case independent. Report problems to: RFC-MANAGER@ISI.EDU.

To get started, you may send a message to RFC-INFO@ISI.EDU with requests such as in the following examples (without the explanations between brackets):

```
Help: Help           [to get this information]

List: FYI            [list the FYI notes]
List: RFC            [list RFCs with window as keyword or
                    in title]

    keywords: window
List: FYI            [list FYIs about windows]
    Keywords: window
List: *              [list both RFCs and FYIs about windows]
    Keywords: window
List: RFC            [list RFCs about ARPANET, ARPA NETWORK,
                    etc.]

    title: ARPA*NET
List: RFC            [list RFCs issued by MITRE, dated
                    1989-1991]

    Organization: MITRE
    Dated-after: Jan-01-1989
    Dated-before: Dec-31-1991
List: RFC            [list RFCs obsoleting a given RFC]
    Obsoletes: RFC0010
List: RFC            [list RFCs by authors starting with
                    "Bracken"]
    Author: Bracken* [* is a wild card]
List: RFC            [list RFCs by both Postel and Gillman]
    Authors: J. Postel [note, the "filters" are ANded]
```



Authors: R. Gillman  
List: RFC [list RFCs by any Crocker]  
Authors: Crocker  
List: RFC [list only RFCs by S.D. Crocker]  
Authors: S.D. Crocker  
List: RFC [list only RFCs by D. Crocker]  
Authors: D. Crocker

Retrieve: RFC [retrieve RFC-822]  
Doc-ID: RFC0822 [note, always 4 digits in RFC#]

Help: Manual [to retrieve the long user manual,  
30+ pages]  
Help: List [how to use the LIST request]  
Help: Retrieve [how to use the RETRIEVE request]  
Help: Topics [list topics for which help is available]  
Help: Dates ["Dates" is such a topic]  
List: keywords [list the keywords in use]  
List: organizations [list the organizations known to the  
system]

#### 6.5 Which RFCs are Standards?

See "Internet Official Protocol Standards" (currently RFC 1540) [2]. This RFC documents the status of each RFC on the Internet standards track, as well as the status of RFCs of other types. It is updated periodically; make sure you are referring to the most recent version. In addition, the RFC Index maintained at the ds.internic.net repository notes the status of each RFC listed.

#### 6.6 What is an FYI?

FYI stands for For Your Information. FYIs are a subset of the RFC series of online documents.

FYI 1 states, "The FYI series of notes is designed to provide Internet users with a central repository of information about any topics which relate to the Internet. FYI topics may range from historical memos on 'Why it was done this way' to answers to commonly asked operational questions. The FYIs are intended for a wide audience. Some FYIs will cater to beginners, while others will discuss more advanced topics."

In general, then, FYI documents tend to be more information oriented, while RFCs are usually (but not always) more technically oriented.

FYI documents are assigned both an FYI number and an RFC number.

As RFCs, if an FYI is ever updated, it is issued again with a new RFC number; however, its FYI number remains unchanged. This can be a little confusing at first, but the aim is to help users identify which FYIs are about which topics. For example, FYI 4 will always be FYI 4, even though it may be updated several times and during that process receive different RFC numbers. Thus, you need only to remember the FYI number to find the proper document. Of course, remembering titles often works as well.

FYIs can be obtained in the same way RFCs can and from the same repositories. In general, their pathnames are `fyi/fyiNN.txt` or `fyi/fyiNN.ps`, where NN is the number of the FYI without leading zeroes.

#### 6.7 What is an STD?

The newest subseries of RFCs are the STDs (Standards). RFC 1311 [12], which introduces this subseries, states that the intent of STDs is to identify clearly those RFCs that document Internet standards. An STD number will be assigned only to those specifications that have completed the full process of standardization in the Internet. Existing Internet standards have been assigned STD numbers; a list of them can be found both in RFC 1311 and in the, "Internet Official Protocol Standards" RFC.

Like FYIs, once a standard has been assigned an STD number, that number will not change, even if the standard is reworked and re-specified and later issued with a new RFC number.

It is important to differentiate between a "standard" and "document". Different RFC documents will always have different RFC numbers. However, sometimes the complete specification for a standard will be contained in more than one RFC document. When this happens, each of the RFC documents that is part of the specification for that standard will carry the same STD number. For example, the Domain Name System (DNS) is specified by the combination of RFC 1034 and RFC 1035; therefore, both of those RFCs are labeled STD 13.

#### 6.8 What is the Internet Monthly Report?

The Internet Monthly Report (IMR) communicates online to the Internet community the accomplishments, milestones reached, or problems discovered by the participating organizations. Many organizations involved in the Internet provide monthly updates of their activities for inclusion in this report. The IMR is for Internet information purposes only.

You can receive the report online by joining the mailing list that distributes the report. Requests to be added or deleted from the Internet Monthly Report list should be sent to "imr-request@isi.edu".

In addition, back issues of the Report are available for anonymous FTP from the host ftp.isi.edu in the in-notes/imr directory, with the file names in the form imryymm.txt, where yy is the last two digits of the year and mm two digits for the month. For example, the July 1992 Report is in the file imr9207.txt.

6.9 What is an Internet Draft? Are there any guidelines available for writing one?

Internet Drafts (I-Ds) are the current working documents of the IETF. Internet Drafts are generally in the format of an RFC with some key differences:

- The Internet Drafts are not RFCs and are not a numbered document series.
- The words INTERNET-DRAFT appear in place of RFC XXXX in the upper left-hand corner.
- The document does not refer to itself as an RFC or as a Draft RFC.
- An Internet Draft does not state nor imply that it is a proposed standard. To do so conflicts with the role of the IAB, the RFC Editor, and the Internet Engineering Steering Group (IESG).

An Internet Drafts directory has been installed to make draft documents available for review and comment by the IETF members. These draft documents that will ultimately be submitted to the IAB and the RFC Editor to be considered for publishing as RFCs. The Internet Drafts Directories are maintained on several Internet sites. There are several "shadow" machines which contain the IETF and Internet Drafts Directories. They are:

West Coast (US) Address: ftp.isi.edu (128.9.0.32)  
East Coast (US) Address: ds.internic.net (198.49.45.10)  
Europe Address: nic.nordu.net (192.36.148.17)  
Pacific Rim Address: munnari.oz.au (128.250.1.21)

To access these directories, use anonymous FTP. Login with username "anonymous" and your email address as password (or "guest" if that fails). Once logged in, change to the desired

directory with "cd internet-drafts". Internet Draft files can then be retrieved. Once logged in, if you change to the directory "ietf", you can retrieve a file called "lid-guidelines.txt", which explains how to write and submit an Internet Draft.

#### 6.10 How do I obtain OSI Standards documents?

OSI Standards documents are NOT available from the Internet via anonymous FTP due to copyright restrictions. These are available from:

Omnicom Information Service  
501 Church Street NE  
Suite 304  
Vienna, VA 22180 USA  
Telephone: (800) 666-4266 or (703) 281-1135  
Fax: (703) 281-1505

American National Standards Institute  
11 West 42nd Street  
New York, NY 10036 USA  
Telephone: (212) 642-4900

However, the GOSIP specification which covers the use of OSI protocols within the U.S. Government is available from the National Institute of Standards and Technology (NIST). The final text of GOSIP Version 2 is now available from both sites.

#### Online sources:

Available through anonymous FTP from [osi.ncsl.nist.gov](ftp://osi.ncsl.nist.gov)  
(129.6.48.100) as:

./pub/gossip/gossip_v2.txt	-- ascii
./pub/gossip/gossip_v2.txt.Z	-- ascii compressed
./pub/gossip/gossip_v2.ps	-- PostScript
./pub/gossip/gossip_v2.ps.Z	-- PostScript compressed

#### Hardcopy source:

Standards Processing Coordinator (ADP)  
National Institute of Standards and Technology  
Technology Building, Room B-64  
Gaithersburg, MD 20899  
(301) 975-2816

## 7. Questions about Internet Organizations and Contacts

### 7.1 What is the IAB?

The Internet Architecture Board (IAB) is concerned with technical and policy issues involving the evolution of the Internet architecture [7]. IAB members are deeply committed to making the Internet function effectively and evolve to meet a large scale, high speed future. The chairman serves a term of two years and is elected by the members of the IAB. The IAB focuses on the TCP/IP protocol suite, and extensions to the Internet system to support multiple protocol suites.

The IAB performs the following functions:

- 1) Reviews Internet Standards,
- 2) Manages the RFC publication process,
- 3) Reviews the operation of the IETF and IRTF,
- 4) Performs strategic planning for the Internet, identifying long-range problems and opportunities,
- 5) Acts as an international technical policy liaison and representative for the Internet community, and
- 6) Resolves technical issues which cannot be treated within the IETF or IRTF frameworks.

The IAB has two principal subsidiary task forces:

- 1) Internet Engineering Task Force (IETF)
- 2) Internet Research Task Force (IRTF)

Each of these Task Forces is led by a chairman and guided by a Steering Group which reports to the IAB through its chairman. For the most part, a collection of Research or Working Groups carries out the work program of each Task Force.

All decisions of the IAB are made public. The principal vehicle by which IAB decisions are propagated to the parties interested in the Internet and its TCP/IP protocol suite is the Request for Comments (RFC) note series and the Internet Monthly Report.

## 7.2 What is the IETF?

The Internet has grown to encompass a large number of widely geographically dispersed networks in academic and research communities. It now provides an infrastructure for a broad community with various interests. Moreover, the family of Internet protocols and system components has moved from experimental to commercial development. To help coordinate the operation, management and evolution of the Internet, the IAB established the Internet Engineering Task Force (IETF).

The IETF is a large open community of network designers, operators, vendors, and researchers concerned with the Internet and the Internet protocol suite. The activity is performed in a number of working groups organized around a set of several technical areas, each working group has a chair, and each area is managed by a technical area director. The IETF overall is managed by its chair and the Internet Engineering Steering Group (IESG), which is made up of the area directors.

The IAB has delegated to the IESG the general responsibility for the resolution of short- and mid-range protocol and architectural issues required to make the Internet function effectively, and the development of Internet standards.

## 7.3 What is the IRTF?

To promote research in networking and the development of new technology, the IAB established the Internet Research Task Force (IRTF). The IRTF is a set of research groups, generally with an Internet focus. The work of the IRTF is governed by its Internet Research Steering Group (IRSG).

In the area of network protocols, the distinction between research and engineering is not always clear, so there will sometimes be overlap between activities of the IETF and the IRTF. There is, in fact, considerable overlap in membership between the two groups. This overlap is regarded as vital for cross-fertilization and technology transfer.

## 7.4 What is the Internet Society?

The Internet Society is a relatively new, professional, non-profit organization with the general goal of fostering the well-being and continued interest in, and evolution and use of the Internet. The Society (often abbreviated ISOC) is integrating the IAB, IETF, and IRTF functions into its operation.

The following goals of the Society are taken from its charter:

- A. To facilitate and support the technical evolution of the Internet as a research and education infrastructure, and to stimulate the involvement of the scientific community, industry, government and others in the evolution of the Internet;
- B. To educate the scientific community, industry and the public at large concerning the technology, use and application of the Internet;
- C. To promote educational applications of Internet technology for the benefit of government, colleges and universities, industry, and the public at large;
- D. To provide a forum for exploration of new Internet applications, and to stimulate collaboration among organizations in their operational use of the global Internet.

More information about the Internet Society is available for anonymous FTP from the host: isoc.org in the directory: isoc. Information is also available via the ISOC gopher, accessible via "gopher isoc.org" if you are running a gopher client.

#### 7.5 What is the IANA?

The task of coordinating the assignment of values to the parameters of protocols is delegated by the Internet Architecture Board (IAB) to the Internet Assigned Numbers Authority (IANA). These protocol parameters include op-codes, type fields, terminal types, system names, object identifiers, and so on. The "Assigned Numbers" Request for Comments (RFC) [1] documents the currently assigned values from several series of numbers used in network protocol implementations. Internet addresses and Autonomous System numbers are assigned by the Registration Services portion of the InterNIC. The IANA is located at USC/Information Sciences Institute.

Current types of assignments listed in Assigned Numbers and maintained by the IANA are:

Address Resolution Protocol Parameters  
BOOTP Parameters and BOOTP Extension Codes  
Character Sets  
Domain System Parameters  
Encoding Header Field Keywords  
ESMTP Mail Keywords  
Ethernet Multicast Addresses  
Ethernet Numbers of Interest  
Ethernet Vendor Address Components  
IANA Ethernet Address Block  
ICMP Type Numbers  
IEEE 802 Numbers of Interest  
Internet Protocol Numbers  
Internet Version Numbers  
IP Option Numbers  
IP Time to Live Parameter  
IP TOS Parameters  
Internet Multicast Addresses  
Inverse Address Resolution Protocol  
Machine Names  
Mail Encryption Types  
Mail System Names  
Mail Transmission Types  
MILNET X.25 Address Mappings  
MILNET Logical Addresses  
MILNET Link Numbers  
MIME Types  
MIME/X.400 Mapping Tables  
Network Management Parameters  
Novell Numbers  
Operating System Names  
OSPF Authentication Codes  
Point-to-Point Protocol Field Assignments  
Protocol Numbers  
Protocol and Service Names  
Protocol/Type Field Assignments  
Public Data Network Numbers  
Reverse Address Resolution Protocol Operation Codes  
SUN RPC Numbers  
TCP Option Numbers  
TCP Alternate Checksum Numbers  
TELNET Options  
Terminal Type Names  
Version Numbers  
Well Known and Registered Port Numbers  
X.25 Type Numbers  
XNS Protocol Types



For more information on number assignments, contact: IANA@ISI.EDU.

#### 7.6 What is a NIC? What is a NOC?

"NIC" stands for Network Information Center. It is an organization which provides network users with information about services provided by the network.

"NOC" stands for Network Operations Center. It is an organization that is responsible for maintaining a network.

For many networks, especially smaller, local networks, the functions of the NIC and NOC are combined. For larger networks, such as mid-level and backbone networks, the NIC and NOC organizations are separate, yet they do need to interact to fully perform their functions.

#### 7.7 What is the InterNIC?

The InterNIC is a five year project partially supported by the National Science Foundation to provide network information services to the networking community. The InterNIC began operations in April of 1993 and is a collaborative project of three organizations: General Atomics provides Information Services from their location in San Diego, CA; AT&T provides Directory and Database Services from South Plainsfield, NJ; and Network Solutions, Inc. provides Registration Services from their headquarters in Herndon, VA. Services are provided via the network electronically, and by telephone, FAX, and hardcopy documentation.

General Atomics offers Information Services acting as the "NIC of first and last resort" by providing a Reference Desk for new and experienced users, and midlevel and campus NICs. The InterNIC Reference Desk offers introductory materials and pointers to network resources and tools.

AT&T services include the Directory of Directories, Directory Services, and Database Services to store data available to all Internet users.

Network Solutions, Inc. (NSI) provides Internet registration services including IP address allocation, domain registration, and Autonomous System Number assignment. NSI also tracks points of contact for networks and domain servers and provides online and telephone support for questions related to IP address or domain name registration.

All three portions of the InterNIC can be reached by calling (800) 444-4345 or by sending a message to info@internic.net. Callers from outside the U.S. can telephone +1 (619) 445-4600. Extensive online information is available at host is.internic.net, accessible via gopher or TELNET.

#### 7.8 What is the DDN NIC (nic.ddn.mil)?

The DDN NIC is the Defense Data Network NIC. Until the formation of the InterNIC, the DDN NIC had been responsible for many services to the whole Internet, especially for registration services. Now the DDN NIC focuses on serving its primary constituency of MILNET users. Its host is nic.ddn.mil; the address hostmaster@nic.ddn.mil may still be in older Internet registration documentation. The DDN NIC maintains close ties to the newer InterNIC.

#### 7.9 What is the IR?

The Internet Registry (IR) is the organization that is responsible for assigning identifiers, such as IP network numbers and autonomous system numbers, to networks. The IR also gathers and registers such assigned information. The IR delegates some number assignment authority to regional registries (such as NCC@RIPE.NET and APNIC-STAFF@APNIC.NET). However, it will continue to gather data regarding such assignments. At present, the Registration Services portion of the InterNIC at Network Solutions, Inc., serves as the IR.

### 8. Questions About Services

#### 8.1 How do I find someone's electronic mail address?

There are a number of directories on the Internet; however, all of them are far from complete. Many people can be found, however, via the InterNIC WHOIS services, or KNOWBOT. Generally, it is still necessary to ask the person for his or her email address.

#### 8.2 How do I use the WHOIS program at the InterNIC Registration Services?

There are several ways to search the WHOIS database. You can TELNET to the InterNIC registration host, rs.internic.net. There is no need to login. Type "whois" to call up the information retrieval program, or choose one of the other options presented to you. Help is available for each option. You can also run a client of the WHOIS server and point it at any whois database you'd like to search. Pointing a client at the whois server

ds.internic.net will enable you to query the databases at three hosts: ds.internic.net, rs.internic.net, and nic.ddn.mil.

For more information, contact the InterNIC at (800) 444-4345 or the registration services group at (703) 742-4777.

### 8.3 How do I use the Knowbot Information Service?

The Knowbot Information Service is a white pages "meta-service" that provides a uniform interface to heterogeneous white pages services in the Internet. Using the Knowbot Information Service, you can form a single query that can search for white pages information from the NIC WHOIS service, the PSI White Pages Pilot Project, and MCI Mail, among others, and have the responses displayed in a single, uniform format.

Currently, the Knowbot Information Service can be accessed through TELNET to port 185 on hosts cnri.reston.va.us and sol.bucknell.edu. From a UNIX host, use "telnet cnri.reston.va.us 185". There is also an electronic mail interface available by sending mail to netaddress at either cnri.reston.va.us or sol.bucknell.edu.

The commands "help" and "man" summarize the command interface. Simply entering a user name at the prompt searches a default list of Internet directory services for the requested information. Organization and country information can be included through the syntax: "userid@organization.country". For example, the queries "droms@bucknell" and "kille@ucl.gb" are both valid. Note that these are not Domain Names, but rather a syntax to specify an organization and a country for the search.

### 8.4 What is the White Pages at PSI?

Performance Systems International, Inc. (PSI), sponsors a White Pages Project that collects personnel information from member organizations into a database and provides online access to that data. This effort is based on the OSI X.500 Directory standard.

To access the data, TELNET to WP.PSI.COM and login as "fred" (no password is necessary). You may now look up information on participating organizations. The program provides help on usage. For example, typing "help" will show you a list of commands, "manual" will give detailed documentation, and "whois" will provide information regarding how to find references to people. For a list of the organizations that are participating in the pilot project by providing information regarding their members, type "whois -org \*".

Access to the White Pages data is also possible via programs that act as X.500 Directory User Agent (DUA) clients.

For more information, send a message to WP-INFO@PSI.COM.

#### 8.5 What is USENET? What is Netnews?

USENET is the formal name, and Netnews a common informal name, for a distributed computer information service that some hosts on the Internet use. USENET handles only news and not mail. USENET uses a variety of underlying networks for transport, including parts of the Internet, BITNET, and others. Netnews can be a valuable tool to economically transport traffic that would otherwise be sent via mail. USENET has no central administration.

#### 8.6 How do I get a Netnews feed?

To get a Netnews feed, you must acquire the server software, which is available for some computers at no cost from some anonymous FTP sites across the Internet, and you must find an existing USENET site that is willing to support a connection to your computer. In many cases, this "connection" merely represents additional traffic over existing Internet access channels.

One well-known anonymous FTP archive site for software and information regarding USENET is ftp.uu.net. There is a "news" directory which contains many software distribution and information sub-directories.

It is recommended that new users subscribe to and read news.announce.newusers since it will help to become oriented to USENET and the Internet.

#### 8.7 What is a newsgroup?

A newsgroup is a bulletin board which readers interested in that newsgroup's particular topic can read and respond to messages posted by other readers. Generally, there will be a few "threads" of discussion going on at the same time, but they all share some common theme. There are approximately 900 newsgroups, and there are more being added all the time.

There are two types of newsgroups: moderated and unmoderated. A moderated newsgroup does not allow individuals to post directly to the newsgroup. Rather, the postings go to the newsgroup's moderator who determines whether or not to pass the posting to the entire group. An unmoderated newsgroup allows a reader to post directly to the other readers.

#### 8.8 How do I subscribe to a newsgroup?

You don't subscribe to a newsgroup. Either you get it on your machine or you don't. If there's one you want, all you can do is ask the systems administrator to try to get it for you.

#### 8.9 What is anonymous FTP?

Anonymous FTP is a conventional way of allowing you to sign on to a computer on the Internet and copy specified public files from it [3]. Some sites offer anonymous FTP to distribute software and various kinds of information. You use it like any FTP, but the username is "anonymous". Many systems will request that the password you choose is your email address. If this fails, the generic password is usually "guest".

#### 8.10 What is "archie"?

The archie system was created to automatically track anonymous FTP archive sites, and this is still its primary function. The system currently makes available the names and locations of some 2,100,000 files at some 1,000 archive sites.

Archie's User Access component allows you to search the "files" database for these filenames. When matches are found, you are presented with the appropriate archive site name, IP address, the location within the archive, and other useful information.

You can also use archie to "browse" through a site's complete listing in search of information of interest, or obtain a complete list of the archive sites known to that server.

The archie server also offers a "package descriptions" (or "whatis") database. This is a collection of names and descriptions gathered from a variety of sources and can be used to identify files located throughout the Internet, as well as other useful information. Files identified in the whatis database can then be found by searching the files database as described above.

#### 8.11 How do I connect to archie?

You can connect to archie in a variety of ways. There is a conventional TELNET interface, an electronic mail interface, and a variety of client programs available. The use of a client is strongly encouraged. There are currently 22 archie servers located throughout the world.

To try the TELNET interface to archie you can TELNET to one of the 22 archie servers (preferably the one nearest you, and during non-peak hours). Log in as "archie" (no password is required). Type "help" to get you started.

Here is a list of archie servers as of the date this was written:

archie.au*	139.130.4.6	Australia
archie.edvz.uni-linz.ac.at*	140.78.3.8	Austria
archie.univie.ac.at*	131.130.1.23	Austria
archie.uqam.ca*	132.208.250.10	Canada
archie.funet.fi	128.214.6.100	Finland
archie.th-darmstadt.de*	130.83.22.60	Germany
archie.ac.il*	132.65.6.15	Israel
archie.unipi.it*	131.114.21.10	Italy
archie.wide.ad.jp	133.4.3.6	Japan
archie.hana.nm.kr*	128.134.1.1	Korea
archie.sogang.ac.kr*	163.239.1.11	Korea
archie.uninett.no*	128.39.2.20	Norway
archie.rediris.es*	130.206.1.2	Spain
archie.luth.se*	130.240.18.4	Sweden
archie.switch.ch*	130.59.1.40	Switzerland
archie.ncu.edu.tw*	140.115.19.24	Taiwan
archie.doc.ic.ac.uk*	146.169.11.3	United Kingdom
archie.unl.edu	129.93.1.14	USA (NE)
archie.internic.net*	198.48.45.10	USA (NJ)
archie.rutgers.edu*	128.6.18.15	USA (NJ)
archie.ans.net	147.225.1.10	USA (NY)
archie.sura.net*	128.167.254.179	USA (MD)

Note: Sites marked with an asterisk "\*" run archie version 3.0.

You can obtain details on using the electronic mail interface by sending mail to "archie" at any of the above server hosts. Put the word "help" as the text of your message for directions.

Questions, comments, and suggestions can be sent to the archie development group by sending mail to [info@bunyip.com](mailto:info@bunyip.com).

#### 8.12 What is "gopher"?

The Internet Gopher presents an extremely wide variety of diverse types of information in an easy to use menu-driven interface. Gopher servers link information from all around the Internet in a manner that can be transparent to the user. (Users can easily discover the source of any piece of information, however, if they wish.) For example, gopher links databases of every type, applications, white pages directories, sounds, and pictures.

Some gophers are available via TELNET. Since most gophers are linked to other gophers, if you can get to one, you can get to many. You can, for example, telnet to naic.nasa.gov and use their public gopher.

The best way to use the gopher service, as with all client/server type services, is by running your own gopher client. The Internet Gopher was developed at the University of Minnesota. More information is available for anonymous FTP on the host boombox.micro.umn.edu.

#### 8.13 What is the World Wide Web? What is Mosaic?

The World Wide Web is a distributed, hypermedia-based Internet information browser. It presents users with a friendly point and click interface to a wide variety of types of information (text, graphics, sounds, movies, etc.) and Internet services. It is possible to use the Web to access FTP archives, databases, and even gopher servers.

The most familiar implementations of the World Wide Web are the Mosaic clients developed by the National Center for Supercomputing Applications (NCSA). Mosaic software is available online at ftp.ncsa.uiuc.edu.

#### 8.14 How do I find out about other Internet resource discovery tools?

The field of Internet resource discovery tools is one of the most dynamic on the Internet today. There are several tools in addition to those discussed here that are useful for discovering or searching Internet resources. The EARN (European Academic and Research Network) Association has compiled an excellent document that introduces many of these services and provides information about how to find out more about them. To obtain the document, send a message to listserv@earncc.bitnet or listserve%earncc.bitnet@cunyvm.cuny.edu. As the text of your message, type "GET filename" where the filename is either "nettools ps" or "nettools memo". The former is in PostScript format. This document is also available for anonymous FTP on some hosts, including naic.nasa.gov, where it is available in the files/general\_info directory as earn-resource-tool-guide.ps and earn-resource-tool-guide.txt.

### 8.15 What is "TELNET"?

The term "TELNET" refers to the remote login that's possible on the Internet because of the TELNET Protocol [9]. The use of this term as a verb, as in "telnet to a host" means to establish a connection across the Internet from one host to another. Usually, you must have an account on the remote host to be able to login to it once you've made a connection. However, some hosts, such as those offering white pages directories, provide public services that do not require a personal account.

If your host supports TELNET, your command to connect to a remote host would probably be "telnet <hostname>" or "telnet <host IP address>". For example, "telnet rs.internic.net" or "telnet 198.41.0.5".

## 9. Mailing Lists and Sending Mail

### 9.1 What is a mailing list?

A mailing list is an email address that stands for a group of people rather than for an individual. Mailing lists are usually created to discuss specific topics. Anybody interested in that topic, may (usually) join that list. Some mailing lists have membership restrictions, others have message content restrictions, and still others are moderated. Most "public" mailing lists have a second email address to handle administrative matters, such as requests to be added to or deleted from the list. All subscription requests should be sent to the administrative address rather than to the list itself!

### 9.2 How do I contact the administrator of a mailing list rather than posting to the entire list?

Today there are two main methods used by mailing list administrators to handle requests to subscribe or unsubscribe from their lists. The administrative address for many lists has the same name as the list itself, but with "-request" appended to the list name. So, to join the ietf-announce@cnri.reston.va.us list, you would send a message to ietf-announce-request@cnri.reston.va.us. Most often, requests to a "-request" mailbox are handled by a human and you can phrase your request as a normal message.

More often today, especially for lists with many readers, administrators prefer to have a program handle routine list administration. Many lists are accessible via LISTSERVE programs or other mailing list manager programs. If this is the case, the



administrative address will usually be something like "listserv@host.domain", where the address for the mailing list itself will be "list@host.domain". The same listserve address can handle requests for all mailing lists at that host. When talking with a program, your subscription request will often be in the form, "subscribe ListName YourFirstName YourLastName" where you substitute the name of the list for ListName and add your real name at the end.

The important thing to remember is that all administrative messages regarding using, joining, or quitting a list should be sent to the administrative mailbox instead of to the whole list so that the readers of the list don't have to read them.

### 9.3 How do I send mail to other networks?

Mail to the Internet is addressed in the form user@host.domain. Remember that a domain name can have several components and the name of each host is a node on the domain tree. So, an example of an Internet mail address is june@nisc.sri.com.

There are several networks accessible via email from the Internet, but many of these networks do not use the same addressing conventions the Internet does. Often you must route mail to these networks through specific gateways as well, thus further complicating the address.

Here are a few conventions you can use for sending mail from the Internet to three networks with which Internet users often correspond.

Internet user to Internet user:

username@hostname.subdomain.toplevel domain  
e.g. gsmith@nisc.sri.COM

Internet user to BITNET user:

user%site.BITNET@BITNET-GATEWAY  
e.g. gsmith%emoryul.BITNET@cunyvm.cuny.edu.  
gsmith%emoryul@CORNELL.CIT.CORNELL.EDU

Internet user to UUCP user:

user%host.UUCP@uunet.uu.net  
user%domain@uunet.uu.net

Internet user to SprintMail user:

```
/G=Mary/S=Anderson/O=co.abc/ADMD=SprintMail/C=US/@SPRINT.COM
-or-
/PN=Mary.Anderson/O=co.abc/ADMD=SprintMail/C=US/@SPRINT.COM
(Case is significant.)
```

Internet user to CompuServe user:

Replace the comma in the CompuServe userid (represented here with x's) with a period, and add the compuserve.com domain name.

```
xxxx.xxxx@compuserve.com
```

CompuServe user to Internet user:

```
>Internet:user@host
Insert >internet: before an Internet address.
```

Internet user to MCIMail user:

```
accountname@mcimail.com
mci_id@mcimail.com
full_user_name@mcimail.com.
```

## 10. Miscellaneous "Internet lore" questions

### 10.1 What does :-) mean?

In many electronic mail messages, it is sometimes useful to indicate that part of a message is meant in jest. It is also sometimes useful to communicate emotion which simple words do not readily convey. To provide these nuances, a collection of "smiley faces" has evolved. If you turn your head sideways to the left, :-) appears as a smiling face. Some of the more common faces are:

:-) smile	:-( frown
:) also a smile	;-) wink
:-D laughing	8-) wide-eyed
:-} grin	:-X close mouthed
:-] smirk	:-o oh, no!

### 10.2 What do "btw", "fyi", "imho", "wrt", and "rtfm" mean?

Often common expressions are abbreviated in informal network postings. These abbreviations stand for "by the way", "for your information", "in my humble [or honest] opinion", "with respect to", and "read the f\*ing manual" (with the "f" word varying according to the vehemence of the reader :-).

### 10.3 What is the "FAQ" list?

This list provides answers to "Frequently Asked Questions" that often appear on various USENET newsgroups. The list is posted every four to six weeks to the news.announce.newusers group. It is intended to provide a background for new users learning how to use the news. As the FAQ list provide new users with the answers to such questions, it helps keep the newsgroups themselves comparatively free of repetition. Often specific newsgroups will have and frequently post versions of a FAQ list that are specific to their topics. The term FAQ has become generalized so that any topic may have its FAQ even if it is not a newsgroup.

Here is information about obtaining the USENET FAQs, courtesy of Gene Spafford:

Many questions can be answered by consulting the most recent postings in the news.announce.newusers and news.lists groups. If those postings have expired from your site, or you do not get news, you can get archived postings from the FTP server on the host rtfm.mit.edu.

These archived postings include all the Frequently Asked Questions posted to the news.answers newsgroups, as well as the most recent lists of Usenet newsgroups, Usenet-accessible mailing lists, group moderators, and other Usenet-related information posted to the news.announce.newusers and news.lists groups.

To get the material by FTP, log in using anonymous FTP (userid of anonymous and your email address as password).

The archived files, and FAQ files from other newsgroups, are all in the directory:

/pub/usenet/news.answers

Archived files from news.announce.newusers and news.lists are in:

/pub/usenet/news.announce.newusers  
/pub/usenet/news.lists

respectively.

To get the information by mail, send an email message to: mail-server@pit-manager.mit.edu containing:

send usenet/news.answers/TITLE/PART

where TITLE is the archive title, and PART is the portion of the posting you want.

Send a message containing "help" to get general information about the mail server, including information on how to get a list of archive titles to use in further send commands.

## 11. Suggested Reading

For further information about the Internet and its protocols in general, you may choose to obtain copies of the following works as well as some of the works listed as References:

Krol, Ed. (1992) The Whole Internet User's Guide and Catalog, 400 p. O'Reilly and Assoc., Inc. Sebastopol, CA.

Dern, Daniel P. (1993) The Internet Guide for New Users, 570 p. McGraw-Hill, Inc. New York, NY.

Fisher, Sharon. (1993) Riding the Internet Highway, 266 p. New Riders Publishing, Carmel, IN.

Frey, Donnalyn and Rick Adams. (1993) !%@: A Directory of Electronic Mail Addressing and Networks, (third edition) 443 p. O'Reilly & Assoc., Inc. Sebastopol, CA.

Hoffman, Ellen and Lenore Jackson. (1993) "FYI on Introducing the Internet: A Short Bibliography of Introductory Internetworking Readings for the Network Novice," 4 p. (FYI 19/RFC 1463).

Kehoe, Brendan P. (1993) Zen and the Art of the Internet: A Beginner's Guide, (second edition) 112 p. Prentice Hall, Englewood Cliffs, NJ.

LaQuey, Tracy with Jeanne C. Ryer. (1992) The Internet Companion: A Beginner's Guide to Global Networking, 208 p. Addison-Wesley, Reading, MA.

Malkin, Gary, S. and Tracy LaQuey Parker. (1993) "Internet Users' Glossary," 53 p. (FYI 18/RFC 1392).

Marine, April, et al. (1993) Internet: Getting Started, 360 p. Prentice Hall, Englewood Cliffs, NJ.

Martin, Jerry. (1993) "There's Gold in them thar Networks! or Searching for Treasure in all the Wrong Places," 39 p. (FYI 10/RFC 1402).

Quarterman, John. (1993) "Recent Internet Books," 15 p. (RFC 1432).

## 12. References

- [1] Reynolds, J., and J. Postel, "Assigned Numbers", STD 2, RFC 1340, USC/Information Sciences Institute, July 1992.
- [2] Postel, J., Editor, "Internet Official Protocol Standards", STD 1, RFC 1540, Internet Architecture Board, October 1993.
- [3] Postel, J., and J. Reynolds, "File Transfer Protocol (FTP)", STD 9, RFC 959, USC/Information Sciences Institute, October 1985.
- [4] Postel, J., "Internet Protocol - DARPA Internet Program Protocol Specification", STD 5, RFC 791, DARPA, September 1981.
- [5] Postel, J., "Transmission Control Protocol - DARPA Internet Program Protocol Specification", STD 7, RFC 793, DARPA, September 1981.
- [6] Leiner, B., Cole, R., Postel, J., and D. Mills, "The DARPA Internet Protocol Suite", IEEE INFOCOM85, Washington D.C., March 1985. Also in IEEE Communications Magazine, March 1985. Also as ISI/RS-85-153.
- [7] Cerf, V., "The Internet Activities Board" RFC 1160, CNRI, May 1990.
- [8] Postel, J., "Simple Mail Transfer Protocol", STD 10, RFC 821, USC/Information Sciences Institute, August 1982.

- [9] Postel, J., and J. Reynolds, "TELNET Protocol Specification", STD 8, RFC 854, USC/Information Sciences Institute, May 1983.
- [10] Postel, J., "Instructions to RFC Authors", RFC 1543, USC/Information Sciences Institute, October 1993.
- [11] Malkin, G., Marine, A., and J. Reynolds, "FYI on Questions and Answers: Answers to Commonly Asked 'Experienced Internet User' Questions", FYI 7, RFC 1207, FTP Software, SRI, USC/Information Sciences Institute, February 1991.
- [12] Postel, J., "Introduction to the STD Notes", RFC 1311, USC/Information Sciences Institute, March 1992.
- [13] Krol, E., and E. Hoffman, "FYI on 'What is the Internet?'", FYI 20, RFC 1462, University of Illinois, Merit Network, Inc., May 1993.

## 13. Condensed Glossary

As with any profession, computers have a particular terminology all their own. Below is a condensed glossary to assist in making some sense of the Internet world.

- ACM      Association for Computing Machinery  
A group established in 1947 to promote professional development and research on computers.
- address    There are three types of addresses in common use within the Internet. They are email address; IP, internet or Internet address; and hardware or MAC address. An electronic mail address is the string of characters that you must give an electronic mail program to direct a message to a particular person. A MAC address is the hardware address of a device connected to a shared media. See "internet address" for its definition.
- AI        Artificial Intelligence  
The branch of computer science which deals with the simulation of human intelligence by computer systems.
- AIX       Advanced Interactive Executive  
IBM's version of Unix.
- ANSI      American National Standards Institute  
This organization is responsible for approving U.S. standards in many areas, including computers and communications. Standards approved by this organization are often called ANSI standards (e.g., ANSI C is the version of the C language approved by ANSI). ANSI is a member of ISO. See also: International Organization for Standardization.
- ARP       Address Resolution Protocol  
Used to dynamically discover the low level physical network hardware address that corresponds to the high level IP address for a given host. ARP is limited to physical network systems that support broadcast packets that can be heard by all hosts on the network. It is defined in STD 37, RFC 826.
- ARPA      Advanced Research Projects Agency  
An agency of the U.S. Department of Defense responsible for the development of new technology for use by the military. ARPA was responsible for funding much of the development of the Internet we know today, including the Berkeley version of Unix and TCP/IP.

- ARPANET Advanced Research Projects Agency Network  
A pioneering longhaul network funded by ARPA. It served as the basis for early networking research as well as a central backbone during the development of the Internet. The ARPANET consisted of individual packet switching computers interconnected by leased lines.
- AS Autonomous System  
A collection of routers under a single administrative authority using a common Interior Gateway Protocol for routing packets.
- ASCII American (National) Standard Code for Information Interchange  
A standard character-to-number encoding widely used in the computer industry.
- B Byte  
One character of information, usually eight bits wide.
- b bit - binary digit  
The smallest amount of information which may be stored in a computer.
- BBN Bolt Beranek and Newman, Inc.  
The Cambridge, MA company responsible for development, operation and monitoring of the ARPANET, and later, the Internet core gateway system, the CSNET Coordination and Information Center (CIC), and NSFNET Network Service Center (NNSC).
- BITNET An academic computer network that provides interactive electronic mail and file transfer services, using a store-and-forward protocol, based on IBM Network Job Entry protocols. BITNET-II encapsulates the BITNET protocol within IP packets and depends on the Internet to route them. There are three main constituents of the network: BITNET in the United States and Mexico, NETNORTH in Canada, and EARN in Europe. There are also AsiaNet, in Japan, and connections in South America. See CREM.
- bps bits per second  
A measure of data transmission speed.



- BSD Berkeley Software Distribution  
Implementation of the UNIX operating system and its utilities developed and distributed by the University of California at Berkeley. "BSD" is usually preceded by the version number of the distribution, e.g., "4.3 BSD" is version 4.3 of the Berkeley UNIX distribution. Many Internet hosts run BSD software, and it is the ancestor of many commercial UNIX implementations.
- catenet A network in which hosts are connected to networks with varying characteristics, and the networks are interconnected by gateways (routers). The Internet is an example of a catenet.
- CCITT International Telegraph and Telephone Consultative Committee  
This organization is part of the United National International Telecommunications Union (ITU) and is responsible for making technical recommendations about telephone and data communications systems.
- core gateway  
Historically, one of a set of gateways (routers) operated by the Internet Network Operations Center at BBN. The core gateway system forms a central part of Internet routing in that all groups had to advertise paths to their networks from a core gateway.
- CREN The Corporation for Research and Educational Networking  
This organization was formed in October 1989, when BITNET and CSNET (Computer + Science NETwork) were combined under one administrative authority. CSNET is no longer operational, but CREN still runs BITNET. See also: BITNET.
- DARPA See ARPA.
- Datagram  
A self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between this source and destination computer and the transporting network.
- DCA Defense Communications Agency  
Former name of the Defense Information Systems Agency (DISA). See DISA.

- DDN Defense Data Network  
A global communications network serving the US Department of Defense composed of MILNET, other portions of the Internet, and classified networks which are not part of the Internet. The DDN is used to connect military installations and is managed by the Defense Information Systems Agency (DISA). See also: DISA.
- DDN NIC The Defense Data Network Network Information Center  
The network information center at Network Solutions, Inc., funded by DISA, that provides information services to the DDN community. It is also a primary repository for RFCs, and a delegated registration authority for military networks.
- DEC Digital Equipment Corporation
- DECnet Digital Equipment Corporation network  
A proprietary network protocol designed by Digital Equipment Corporation. The functionality of each Phase of the implementation, such as Phase IV and Phase V, is different.
- default route  
A routing table entry which is used to direct packets addressed to networks not explicitly listed in the routing table.
- DISA Defense Information Systems Agency  
Formerly called DCA, this is the government agency responsible for installing the Defense Data Network (DDN) portion of the Internet, including the MILNET lines and nodes. Currently, DISA administers the DDN, and supports the user assistance services of the DDN NIC.
- DNS The Domain Name System is a general purpose distributed, replicated, data query service. The principal use is the lookup of host IP addresses based on host names. The style of host names now used in the Internet is called "domain name", because they are the style of names used to look up anything in the DNS. Some important domains are: .COM (commercial), .EDU (educational), .NET (network operations), .GOV (U.S. government), and .MIL (U.S. military). Most countries also have a domain. For example, .US (United States), .UK (United Kingdom), .AU (Australia). It is defined in STD 13, RFCs 1034 and 1035.
- DOD U.S. Department of Defense
- DOE U.S. Department of Energy

dot address (dotted address notation)

Dot address refers to the common notation for IP addresses of the form A.B.C.D; where each letter represents, in decimal, one byte of a four byte IP address.

Dynamic Adaptive Routing

Automatic rerouting of traffic based on a sensing and analysis of current actual network conditions. NOTE: this does not include cases of routing decisions taken on predefined information.

EARN European Academic Research Network

EBCDIC Extended Binary-coded Decimal Interchange Code

A standard character-to-number encoding used primarily by IBM computer systems. See also: ASCII.

EGP Exterior Gateway Protocol

A protocol which distributes routing information to the routers which connect autonomous systems. The term "gateway" is historical, as "router" is currently the preferred term. There is also a routing protocol called EGP defined in STD 18, RFC 904.

Ethernet

A 10-Mb/s standard for LANs, initially developed by Xerox, and later refined by Digital, Intel and Xerox (DIX). All hosts are connected to a coaxial cable where they contend for network access using a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) paradigm.

FDDI Fiber Distributed Data Interface

A high-speed (100Mb/s) LAN standard. The underlying medium is fiber optics, and the topology is a dual-attached, counter-rotating token ring.

FIPS Federal Information Processing Standard

FTP File Transfer Protocol

A protocol which allows a user on one host to access, and transfer files to and from, another host over a network. Also, FTP is usually the name of the program the user invokes to execute the protocol. It is defined in STD 9, RFC 959.

gateway See router.

- GB Gigabyte  
A unit of data storage size which represents  $10^9$  (one billion) characters of information.
- Gb Gigabit  
 $10^9$  bits of information (usually used to express a data transfer rate; as in, 1 gigabit/second = 1Gbps).
- GNU Gnu's Not UNIX  
A UNIX-compatible operating system developed by the Free Software Foundation.
- header The portion of a packet, preceding the actual data, containing source and destination addresses, and error checking and other fields. A header is also the part of an electronic mail message that precedes the body of a message and contains, among other things, the message originator, date and time.
- host number  
The part of an internet address that designates which node on the (sub)network is being addressed.
- HP Hewlett-Packard
- I/O Input/Output
- IAB Internet Architecture Board  
The technical body that oversees the development of the Internet suite of protocols. It has two task forces: the IETF and the IRTF.
- IBM International Business Machines Corporation
- ICMP Internet Control Message Protocol  
ICMP is an extension to the Internet Protocol. It allows for the generation of error messages, test packets and informational messages related to IP. It is defined in STD 5, RFC 792.
- IEEE Institute for Electrical and Electronics Engineers
- IETF Internet Engineering Task Force  
The IETF is a large open community of network designers, operators, vendors, and researchers whose purpose is to coordinate the operation, management and evolution of the Internet, and to resolve short- and mid-range protocol and architectural issues. It is a major source of proposed protocol standards which are submitted to the

Internet Engineering Steering Group for final approval. The IETF meets three times a year and extensive minutes of the plenary proceedings are issued.

#### internet

#### internetwork

While an internet is a network, the term "internet" is usually used to refer to a collection of networks interconnected with routers.

#### Internet

The Internet (note the capital "I") is the largest internet in the world. Is a three level hierarchy composed of backbone networks (e.g., NSFNET, MILNET), mid-level networks, and stub networks. The Internet is a multiprotocol internet.

#### internet address

The 32-bit address defined by the Internet Protocol in STD 5, RFC 791. It is usually represented in dotted decimal notation. An internet, or IP, address uniquely identifies a node on an internet.

#### IP

Internet Protocol  
The Internet Protocol, defined in STD 5, RFC 791, is the network layer for the TCP/IP Protocol Suite. It is a connectionless, best-effort packet switching protocol.

#### IRTF

Internet Research Task Force  
The IRTF is chartered by the IAB to consider long-term Internet issues from a theoretical point of view. It has Research Groups, similar to IETF Working Groups, which are each tasked to discuss different research topics. Multi-cast audio/video conferencing and privacy enhanced mail are samples of IRTF output.

#### ISO

International Organization for Standardization  
A voluntary, nontreaty organization founded in 1946 which is responsible for creating international standards in many areas, including computers and communications. Its members are the national standards organizations of the 89 member countries, including ANSI for the U.S.

#### KB

Kilobyte  
A unit of data storage size which represents  $10^3$  (one thousand) characters of information.

- Kb** Kilobit  
10<sup>3</sup> bits of information (usually used to express a data transfer rate; as in, 1 kilobit/second = 1Kbps = 1Kb).
- LAN** Local Area Network  
A data network intended to serve an area of only a few square kilometers or less. Because the network is known to cover only a small area, optimizations can be made in the network signal protocols that permit data rates up to 100Mb/s.
- LISP** List Processing Language  
A high-level computer language invented by Professor John McCarthy in 1961 to support research into computer based logic, logical reasoning, and artificial intelligence. It was the first symbolic (as opposed to numeric) computer processing language.
- MAC** Medium Access Control  
The lower portion of the datalink layer. The MAC differs for various physical media.
- Mac** Apple Macintosh computer.
- MAN** Metropolitan Area Network  
A data network intended to serve an area approximating that of a large city. Such networks are being implemented by innovative techniques, such as running fiber cables through subway tunnels. A popular example of a MAN is SMDS.
- MB** Megabyte  
A unit of data storage size which represents 10<sup>6</sup> (one million) characters of information.
- Mb** Megabit  
10<sup>6</sup> bits of information (usually used to express a data transfer rate; as in, 1 megabit/second = 1Mbps).
- MILNET** Military Network  
A network used for unclassified military production applications. It is part of the DDN and the Internet.
- MIT** Massachusetts Institute of Technology
- MTTF** Mean Time to Failure  
The average time between hardware breakdown or loss of service. This may be an empirical measurement or a calculation based on the MTTF of component parts.

MTTR Mean Time to Recovery (or Repair)  
The average time it takes to restore service after a breakdown or loss. This is usually an empirical measurement.

MVS Multiple Virtual Storage  
An IBM operating system based on OS/1.

NASA National Aeronautics and Space Administration

NBS National Bureau of Standards  
Now called NIST.

network number  
The network portion of an IP address. For a class A network, the network address is the first byte of the IP address. For a class B network, the network address is the first two bytes of the IP address. For a class C network, the network address is the first three bytes of the IP address. In each case, the remainder is the host address. In the Internet, assigned network addresses are globally unique.

NFS Network File System  
A protocol developed by Sun Microsystems, and defined in RFC 1094, which allows a computer system to access files over a network as if they were on its local disks. This protocol has been incorporated in products by more than two hundred companies, and is now a de facto Internet standard.

NIC Network Information Center  
A organization that provides information, assistance and services to network users.

NOC Network Operations Center  
A location from which the operation of a network or internet is monitored. Additionally, this center usually serves as a clearinghouse for connectivity problems and efforts to resolve those problems.

NIST National Institute of Standards and Technology  
United States governmental body that provides assistance in developing standards. Formerly the National Bureau of Standards (NBS).

- NSF National Science Foundation  
A U.S. government agency whose purpose is to promote the advancement of science. NSF funds science researchers, scientific projects, and infrastructure to improve the quality of scientific research. The NSFNET, funded by NSF, is an essential part of academic and research communications.
- NSFNET National Science Foundation Network  
The NSFNET is a highspeed "network of networks" which is hierarchical in nature. At the highest level is a backbone network which spans the continental United States. Attached to that are mid-level networks and attached to the mid-levels are campus and local networks. NSFNET also has connections out of the U.S. to Canada, Mexico, Europe, and the Pacific Rim. The NSFNET is part of the Internet.
- NSFNET Mid-level Level Network  
A network connected to the highest level of the NSFNET that covers a region of the United States. It is to mid-level networks that local sites connect. The mid-level networks were once called "regionals".
- OSI Open Systems Interconnection  
A suite of protocols, designed by ISO committees, to be the international standard computer network architecture.
- OSI Reference Model  
A seven-layer structure designed to describe computer network architectures and the way that data passes through them. This model was developed by the ISO in 1978 to clearly define the interfaces in multivendor networks, and to provide users of those networks with conceptual guidelines in the construction of such networks.
- OSPF Open Shortest-Path First Interior Gateway Protocol  
A link state, as opposed to distance vector, routing protocol. It is an Internet standard IGP defined in RFC 1247.
- packet The unit of data sent across a network. "Packet" a generic term used to describe unit of data at all levels of the protocol stack, but it is most correctly used to describe application data units.
- PC Personal Computer
- PCNFS Personal Computer Network File System



- PPP Point-to-Point Protocol  
The Point-to-Point Protocol, defined in RFC 1548, provides a method for transmitting packets over serial point-to-point links.
- protocol  
A formal description of message formats and the rules two computers must follow to exchange those messages. Protocols can describe low-level details of machine-to-machine interfaces (e.g., the order in which bits and bytes are sent across a wire) or high-level exchanges between allocation programs (e.g., the way in which two programs transfer a file across the Internet).
- RFC The document series, begun in 1969, which describes the Internet suite of protocols and related experiments. Not all (in fact very few) RFCs describe Internet standards, but all Internet standards are written up as RFCs.
- RIP Routing Information Protocol  
A distance vector, as opposed to link state, routing protocol. It is an Internet standard IGP defined in STD 34, RFC 1058 (updated by RFC 1388).
- RJE Remote Job Entry  
The general protocol for submitting batch jobs and retrieving the results.
- router A device which forwards traffic between networks. The forwarding decision is based on network layer information and routing tables, often constructed by routing protocols.
- RPC Remote Procedure Call  
An easy and popular paradigm for implementing the client-server model of distributed computing. In general, a request is sent to a remote system to execute a designated procedure, using arguments supplied, and the result returned to the caller. There are many variations and subtleties in various implementations, resulting in a variety of different (incompatible) RPC protocols.
- server A provider of resources (e.g., file servers and name servers).
- SLIP Serial Line Internet Protocol  
A protocol used to run IP over serial lines, such as telephone circuits or RS-232 cables, interconnecting two systems. SLIP is defined in STD 47, RFC 1055.

- SMTP** Simple Mail Transfer Protocol  
A protocol, defined in STD 10, RFC 821, used to transfer electronic mail between computers. It is a server to server protocol, so other protocols are used to access the messages.
- SNA** Systems Network Architecture  
A proprietary networking architecture used by IBM and IBM-compatible mainframe computers.
- SNMP** Simple Network Management Protocol  
The Internet standard protocol, defined in STD 15, RFC 1157, developed to manage nodes on an IP network. It is currently possible to manage wiring hubs, toasters, jukeboxes, etc.
- subnet** A portion of a network, which may be a physically independent network, which shares a network address with other portions of the network and is distinguished by a subnet number. A subnet is to a network what a network is to an internet.
- subnet number**  
A part of the internet address which designates a subnet. It is ignored for the purposes internet routing, but is used for intranet routing.
- T1** An AT&T term for a digital carrier facility used to transmit a DS-1 formatted digital signal at 1.544 megabits per second.
- T3** A term for a digital carrier facility used to transmit a DS-3 formatted digital signal at 44.746 megabits per second.
- TCP** Transmission Control Protocol  
An Internet Standard transport layer protocol defined in STD 7, RFC 793. It is connection-oriented and stream-oriented, as opposed to UDP.
- TCP/IP** Transmission Control Protocol/Internet Protocol  
This is a common shorthand which refers to the suite of application and transport protocols which run over IP. These include FTP, TELNET, SMTP, and UDP (a transport layer protocol).
- Telenet** A public packet switched network using the CCITT X.25 protocols. It should not be confused with Telnet.
- TELNET** Telnet is the Internet standard protocol for remote terminal connection service. It is defined in STD 8, RFC 854 and extended with options by many other RFCs.

## Token Ring

A token ring is a type of LAN with nodes wired into a ring. Each node constantly passes a control message (token) on to the next; whichever node has the token can send a message. Often, "Token Ring" is used to refer to the IEEE 802.5 token ring standard, which is the most common type of token ring.

**Tymnet** A public character-switching/packet-switching network operated by British Telecom.

**UDP** User Datagram Protocol  
An Internet Standard transport layer protocol defined in STD 6, RFC 768. It is a connectionless protocol which adds a level of multiplexing to IP.

**ULTRIX** UNIX-based operating system for Digital Equipment Corporation computers.

**UNIX** An operating system developed by Bell Laboratories that supports multiuser and multitasking operations.

**UUCP** UNIX-to-UNIX Copy Program  
This was initially a program run under the UNIX operating system that allowed one UNIX system to send files to another UNIX system via dial-up phone lines. Today, the term is more commonly used to describe the large international network which uses the UUCP protocol to pass news and electronic mail.

**VMS** Virtual Memory System  
A Digital Equipment Corporation operating system.

**WAN** Wide Area Network  
A network, usually constructed with serial lines, which covers a large geographic area.

**WHOIS** An Internet program which allows users to query databases of people and other Internet entities, such as domains, networks, and hosts. The information for people generally shows a person's company name, address, phone number and email address.

**XNS** Xerox Network System  
A network developed by Xerox corporation. Implementations exist for both 4.3BSD derived systems, as well as the Xerox Star computers.

X.25 A data communications interface specification developed to describe how data passes into and out of public data communications networks. The CCITT and ISO approved protocol suite defines protocol layers 1 through 3.

#### 14. Security Considerations

Security issues are not discussed in this memo.

#### 15. Authors' Addresses

April N. Marine  
Network Applications and Information Center  
NASA Ames Research Center  
M/S 204-14  
Moffett Field, CA 94035-1000

Phone: (415) 604-0762  
EMail: amarine@atlas.arc.nasa.gov

Joyce K. Reynolds  
USC/Information Sciences Institute  
4676 Admiralty Way, Suite 1001  
Marina del Rey, CA 90292-6695

Phone: (310) 822-1511  
EMail: jkrey@isi.edu

Gary Scott Malkin  
Xylogics, Inc.  
53 Third Avenue  
Burlington, MA 01803

Phone: (617) 272-8140  
EMail: gmalkin@Xylogics.COM