Network Working Group   Internet Architecture Board
Request for Comments: 1720   J. Postel, Editor
Obsoletes: RFCs 1610, 1600, 1540, 1500,   November 1994
1410, 1360, 1280, 1250, 1100, 1083,
1130, 1140, 1200
STD: 1
Category: Standards Track

                  INTERNET OFFICIAL PROTOCOL STANDARDS

Status of this Memo

   This memo describes the state of standardization of protocols used in
   the Internet as determined by the Internet Architecture Board (IAB).
   This memo is an Internet Standard. Distribution of this memo is
   unlimited.

Table of Contents

Introduction

   A discussion of the standardization process and the RFC document
   series is presented first, followed by an explanation of the terms.
   Sections 6.2 - 6.10 contain the lists of protocols in each stage of
   standardization. Finally are pointers to references and contacts for
   further information.

   This memo is intended to be issued approximately quarterly; please be
   sure the copy you are reading is current. Current copies may be
   obtained from the Network Information Center (INTERNIC) or from the
   Internet Assigned Numbers Authority (IANA) (see the contact
   information at the end of this memo). Do not use this edition after
   1-Mar-95.

   See Section 6.1 for a description of recent changes. In the official
   lists in sections 6.2 - 6.10, an asterisk (*) next to a protocol
   denotes that it is new to this document or has been moved from one
   protocol level to another, or differs from the previous edition of
   this document.

1. The Standardization Process

   The Internet Architecture Board maintains this list of documents that
   define standards for the Internet protocol suite. See RFC-1601 for
   the charter of the IAB and RFC-1160 for an explanation of the role
   and organization of the IAB and its subsidiary groups, the Internet
   Engineering Task Force (IETF) and the Internet Research Task Force
   (IRTF). Each of these groups has a steering group called the IESG
   and IRSG, respectively. The IETF develops these standards with the
   goal of co-ordinating the evolution of the Internet protocols; this
   co-ordination has become quite important as the Internet protocols
   are increasingly in general commercial use. The definitive
   description of the Internet standards process is found in RFC-1602.

   The majority of Internet protocol development and standardization
   activity takes place in the working groups of the IETF.

   Protocols which are to become standards in the Internet go through a
   series of states or maturity levels (proposed standard, draft
   standard, and standard) involving increasing amounts of scrutiny and
   testing. When a protocol completes this process it is assigned a STD
   number (see RFC-1311). At each step, the Internet Engineering
   Steering Group (IESG) of the IETF must make a recommendation for
   advancement of the protocol.

   To allow time for the Internet community to consider and react to
   standardization proposals, a minimum delay of 6 months before a
   proposed standard can be advanced to a draft standard and 4 months
   before a draft standard can be promoted to standard.

   It is general practice that no proposed standard can be promoted to
   draft standard without at least two independent implementations (and
   the recommendation of the IESG). Promotion from draft standard to
   standard generally requires operational experience and demonstrated
   interoperability of two or more implementations (and the
   recommendation of the IESG).

   In cases where there is uncertainty as to the proper decision
   concerning a protocol a special review committee may be appointed
   consisting of experts from the IETF, IRTF and the IAB with the
   purpose of recommending an explicit action.

   Advancement of a protocol to proposed standard is an important step
   since it marks a protocol as a candidate for eventual standardization
   (it puts the protocol "on the standards track"). Advancement to
   draft standard is a major step which warns the community that, unless
   major objections are raised or flaws are discovered, the protocol is
   likely to be advanced to standard in six months.

Some protocols have been superseded by better ones or are otherwise
unused. Such protocols are still documented in this memorandum with
the designation "historic".

Because it is useful to document the results of early protocol
research and development work, some of the RFCs document protocols
which are still in an experimental condition. The protocols are
designated "experimental" in this memorandum. They appear in this
report as a convenience to the community and not as evidence of their
standardization.

Other protocols, such as those developed by other standards
organizations, or by particular vendors, may be of interest or may be
recommended for use in the Internet. The specifications of such
protocols may be published as RFCs for the convenience of the
Internet community. These protocols are labeled "informational" in
this memorandum.

In addition to the working groups of the IETF, protocol development
and experimentation may take place as a result of the work of the
research groups of the Internet Research Task Force, or the work of
other individuals interested in Internet protocol development. The
the documentation of such experimental work in the RFC series is
encouraged, but none of this work is considered to be on the track
for standardization until the IESG has made a recommendation to
advance the protocol to the proposed standard state.

A few protocols have achieved widespread implementation without the
approval of the IESG. For example, some vendor protocols have become
very important to the Internet community even though they have not
been recommended by the IESG. However, the IAB strongly recommends
that the standards process be used in the evolution of the protocol
suite to maximize interoperability (and to prevent incompatible
protocol requirements from arising). The use of the terms
"standard", "draft standard", and "proposed standard" are reserved in
any RFC or other publication of Internet protocols to only those
protocols which the IESG has approved.

In addition to a state (like "Proposed Standard"), a protocol is also
assigned a status, or requirement level, in this document. The
possible requirement levels ("Required", "Recommended", "Elective",
"Limited Use", and "Not Recommended") are defined in Section 4.2.
When a protocol is on the standards track, that is in the proposed
standard, draft standard, or standard state (see Section 5), the
status shown in Section 6 is the current status.

Few protocols are required to be implemented in all systems; this is
because there is such a variety of possible systems, for example,

gateways, routers, terminal servers, workstations, and multi-user
hosts. The requirement level shown in this document is only a one
word label, which may not be sufficient to characterize the
implementation requirements for a protocol in all situations. For
some protocols, this document contains an additional status paragraph
(an applicability statement). In addition, more detailed status
information may be contained in separate requirements documents (see
Section 3).

2. The Request for Comments Documents

The documents called Request for Comments (or RFCs) are the working
notes of the "Network Working Group", that is 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.

Notice:

    All 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 (see the contact
information at the end of this memo, and see RFC 1543).

While RFCs are not refereed publications, they do receive technical
review from the task forces, individual technical experts, or the RFC
Editor, as appropriate.

The RFC series comprises a wide range of documents, ranging from
informational documents of general interests to specifications of
standard Internet protocols. In cases where submission is intended
to document a proposed standard, draft standard, or standard
protocol, the RFC Editor will publish the document only with the
approval of the IESG. For documents describing experimental work,
the RFC Editor will notify the IESG before publication, allowing for
the possibility of review by the relevant IETF working group or IRTF
research group and provide those comments to the author. See Section
5.1 for more detail.

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. This "Internet Official Protocol Standards"

memo is the reference for determining the correct RFC for the current
specification of each protocol.

The RFCs are available from the INTERNIC, and a number of other
sites. For more information about obtaining RFCs, see Sections 7.4
and 7.5.

3. Other Reference Documents

There are three other reference documents of interest in checking the
current status of protocol specifications and standardization. These
are the Assigned Numbers, the Gateway Requirements, and the Host
Requirements. Note that these documents are revised and updated at
different times; in case of differences between these documents, the
most recent must prevail.

Also, one should be aware of the MIL-STD publications on IP, TCP,
Telnet, FTP, and SMTP. These are described in Section 3.4.

3.1. Assigned Numbers

The "Assigned Numbers" document lists the assigned values of the
parameters used in the various protocols. For example, IP protocol
codes, TCP port numbers, Telnet Option Codes, ARP hardware types, and
Terminal Type names. Assigned Numbers was most recently issued as
RFC-1700.

3.2. Gateway Requirements

This document reviews the specifications that apply to gateways and
supplies guidance and clarification for any ambiguities. Gateway
Requirements is RFC-1009. A working group of the IETF is actively
preparing a revision.

3.3. Host Requirements

This pair of documents reviews and updates the specifications that
apply to hosts, and it supplies guidance and clarification for any
ambiguities. Host Requirements was issued as RFC-1122 and RFC-1123.

3.4. The MIL-STD Documents

The Internet community specifications for IP (RFC-791) and TCP (RFC-
793) and the DoD MIL-STD specifications are intended to describe
exactly the same protocols. Any difference in the protocols
specified by these sets of documents should be reported to DISA and
to the IESG. The RFCs and the MIL-STDs for IP and TCP differ in
style and level of detail. It is strongly advised that the two sets

of documents be used together, along with RFC-1122 and RFC-1123.

The Internet and the DoD MIL-STD specifications for the FTP, SMTP,
and Telnet protocols are essentially the same documents (RFCs 765,
821, 854). The MIL-STD versions have been edited slightly. Note
that the current Internet specification for FTP is RFC-959 (as
modified by RFC-1123).

Note that these MIL-STD are now somewhat out of date. The Gateway
Requirements (RFC-1009) and Host Requirements (RFC-1122, RFC-1123)
take precedence over both earlier RFCs and the MIL-STDs.

```
        Internet Protocol (IP)                    MIL-STD-1777
        Transmission Control Protocol (TCP)       MIL-STD-1778
        File Transfer Protocol (FTP)              MIL-STD-1780
        Simple Mail Transfer Protocol (SMTP)      MIL-STD-1781
        Telnet Protocol and Options (TELNET)      MIL-STD-1782
```

These documents are available from the Naval Publications and Forms
Center. Requests can be initiated by telephone, telegraph, or mail;
however, it is preferred that private industry use form DD1425, if
possible.

```
        Naval Publications and Forms Center, Code 3015
        5801 Tabor Ave
        Philadelphia, PA 19120
        Phone: 1-215-697-3321 (order tape)
               1-215-697-4834 (conversation)
```

4. Explanation of Terms

   There are two independent categorization of protocols. The first is
   the "maturity level" or STATE of standardization, one of "standard",
   "draft standard", "proposed standard", "experimental",
   "informational" or "historic". The second is the "requirement level"
   or STATUS of this protocol, one of "required", "recommended",
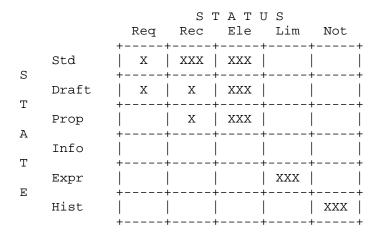   "elective", "limited use", or "not recommended".

   The status or requirement level is difficult to portray in a one word
   label. These status labels should be considered only as an
   indication, and a further description, or applicability statement,
   should be consulted.

   When a protocol is advanced to proposed standard or draft standard,
   it is labeled with a current status.

At any given time a protocol occupies a cell of the following matrix.
Protocols are likely to be in cells in about the following
proportions (indicated by the relative number of Xs). A new protocol
is most likely to start in the (proposed standard, elective) cell, or
the (experimental, not recommended) cell.

```
                            S T A T U S
                      Req   Rec   Ele   Lim   Not
                    +-----+-----+-----+-----+-----+
        Std         |  X  | XXX | XXX |     |     |
    S               +-----+-----+-----+-----+-----+
        Draft       |  X  |  X  | XXX |     |     |
    T               +-----+-----+-----+-----+-----+
        Prop        |     |  X  | XXX |     |     |
    A               +-----+-----+-----+-----+-----+
        Info        |     |     |     |     |     |
    T               +-----+-----+-----+-----+-----+
        Expr        |     |     |     | XXX |     |
    E               +-----+-----+-----+-----+-----+
        Hist        |     |     |     |     | XXX |
                    +-----+-----+-----+-----+-----+
```

What is a "system"?

Some protocols are particular to hosts and some to gateways; a few
protocols are used in both. The definitions of the terms below
will refer to a "system" which is either a host or a gateway (or
both). It should be clear from the context of the particular
protocol which types of systems are intended.

4.1. Definitions of Protocol State

Every protocol listed in this document is assigned to a "maturity
level" or STATE of standardization: "standard", "draft standard",
"proposed standard", "experimental", or "historic".

4.1.1. Standard Protocol

The IESG has established this as an official standard protocol for
the Internet. These protocols are assigned STD numbers (see RFC-
1311). These are separated into two groups: (1) IP protocol and
above, protocols that apply to the whole Internet; and (2)
network-specific protocols, generally specifications of how to do
IP on particular types of networks.

4.1.2. Draft Standard Protocol

   The IESG is actively considering this protocol as a possible
   Standard Protocol. Substantial and widespread testing and comment
   are desired. Comments and test results should be submitted to the
   IESG. There is a possibility that changes will be made in a Draft
   Standard Protocol before it becomes a Standard Protocol.

4.1.3. Proposed Standard Protocol

   These are protocol proposals that may be considered by the IESG
   for standardization in the future. Implementation and testing by
   several groups is desirable. Revision of the protocol
   specification is likely.

4.1.4. Experimental Protocol

   A system should not implement an experimental protocol unless it
   is participating in the experiment and has coordinated its use of
   the protocol with the developer of the protocol.

   Typically, experimental protocols are those that are developed as
   part of an ongoing research project not related to an operational
   service offering. While they may be proposed as a service
   protocol at a later stage, and thus become proposed standard,
   draft standard, and then standard protocols, the designation of a
   protocol as experimental may sometimes be meant to suggest that
   the protocol, although perhaps mature, is not intended for
   operational use.

4.1.5. Informational Protocol

   Protocols developed by other standard organizations, or vendors,
   or that are for other reasons outside the purview of the IESG, may
   be published as RFCs for the convenience of the Internet community
   as informational protocols.

4.1.6. Historic Protocol

   These are protocols that are unlikely to ever become standards in
   the Internet either because they have been superseded by later
   developments or due to lack of interest.

4.2. Definitions of Protocol Status

   This document lists a "requirement level" or STATUS for each
   protocol. The status is one of "required", "recommended",
   "elective", "limited use", or "not recommended".

4.2.1. Required Protocol

   A system must implement the required protocols.

4.2.2. Recommended Protocol

   A system should implement the recommended protocols.

4.2.3. Elective Protocol

   A system may or may not implement an elective protocol. The
   general notion is that if you are going to do something like this,
   you must do exactly this. There may be several elective protocols
   in a general area, for example, there are several electronic mail
   protocols, and several routing protocols.

4.2.4. Limited Use Protocol

   These protocols are for use in limited circumstances. This may be
   because of their experimental state, specialized nature, limited
   functionality, or historic state.

4.2.5. Not Recommended Protocol

   These protocols are not recommended for general use. This may be
   because of their limited functionality, specialized nature, or
   experimental or historic state.

5. The Standards Track

   This section discusses in more detail the procedures used by the RFC
   Editor and the IESG in making decisions about the labeling and
   publishing of protocols as standards.

5.1. The RFC Processing Decision Table

   Here is the current decision table for processing submissions by the
   RFC Editor. The processing depends on who submitted it, and the
   status they want it to have.

```
+===========================================================+
|**************|                  S O U R C E               |
+===========================================================+
| Desired      |   IAB   |  IESG   |  IRSG   |   Other   |
| Status       |         |         |         |           |
+===========================================================+
|              |         |         |         |           |
| Standard     |  Bogus  | Publish |  Bogus  |  Bogus    |
| or           |   (2)   |   (1)   |   (2)   |   (2)     |
| Draft        |         |         |         |           |
| Standard     |         |         |         |           |
+--------------+---------+---------+---------+-----------+
|              |         |         |         |           |
|              |  Refer  | Publish |  Refer  |  Refer    |
| Proposed     |   (3)   |   (1)   |   (3)   |   (3)     |
| Standard     |         |         |         |           |
|              |         |         |         |           |
+--------------+---------+---------+---------+-----------+
|              |         |         |         |           |
|              |  Notify | Publish |  Notify |  Notify   |
| Experimental |   (4)   |   (1)   |   (4)   |   (4)     |
| Protocol     |         |         |         |           |
|              |         |         |         |           |
+--------------+---------+---------+---------+-----------+
|              |         |         |         |           |
| Information  | Publish | Publish |Discretion|Discretion|
| or Opinion   |   (1)   |   (1)   |   (5)   |   (5)     |
| Paper        |         |         |         |           |
|              |         |         |         |           |
+===========================================================+
```

(1) Publish.

(2) Bogus. Inform the source of the rules. RFCs specifying
    Standard, or Draft Standard must come from the IESG, only.

(3) Refer to an Area Director for review by a WG. Expect to see
    the document again only after approval by the IESG.

(4) Notify both the IESG and IRSG. If no concerns are raised in
    two weeks then do Discretion (5), else RFC Editor to resolve
    the concerns or do Refer (3).

(5) RFC Editor's discretion. The RFC Editor decides if a review
    is needed and if so by whom. RFC Editor decides to publish or
    not.

Of course, in all cases the RFC Editor can request or make minor
changes for style, format, and presentation purposes.

The IESG has designated the IESG Secretary as its agent for
forwarding documents with IESG approval and for registering concerns
in response to notifications (4) to the RFC Editor. Documents from
Area Directors or Working Group Chairs may be considered in the same
way as documents from "other".

5.2. The Standards Track Diagram

There is a part of the STATUS and STATE categorization that is called
the standards track. Actually, only the changes of state are
significant to the progression along the standards track, though the
status assignments may change as well.

The states illustrated by single line boxes are temporary states,
those illustrated by double line boxes are long term states. A
protocol will normally be expected to remain in a temporary state for
several months (minimum six months for proposed standard, minimum
four months for draft standard). A protocol may be in a long term
state for many years.

A protocol may enter the standards track only on the recommendation
of the IESG; and may move from one state to another along the track
only on the recommendation of the IESG. That is, it takes action by
the IESG to either start a protocol on the track or to move it along.

Generally, as the protocol enters the standards track a decision is
made as to the eventual STATUS, requirement level or applicability
(elective, recommended, or required) the protocol will have, although
a somewhat less stringent current status may be assigned, and it then
is placed in the the proposed standard STATE with that status. So
the initial placement of a protocol is into state 1. At any time the
STATUS decision may be revisited.

```
            |
       +<-------------------------------------------+
       |                                            ^
       V    0                                       |    4
  +-----------+                          +===========+
  |   enter   |-->---------------+------------->|experiment |
  +-----------+                  |          +=====+=====+
                                 |                   |
                            V    1                   |
                       +-----------+                 V
                       | proposed  |-------------->+
                  +--->+-----+-----+                 |
                  |         |                        |
                  |         V    2                   |
                  +<---+-----+-----+                 V
                       | draft std |-------------->+
                  +--->+-----+-----+                 |
                  |         |                        |
                  |         V    3                   |
                  +<---+=====+=====+                 V
                       | standard  |-------------->+
                       +=====+=====+                 |
                                                     |
                                                V    5
                                           +=====+=====+
                                           | historic  |
                                           +===========+
```

   The transition from proposed standard (1) to draft standard (2) can
   only be by action of the IESG and only after the protocol has been
   proposed standard (1) for at least six months.

   The transition from draft standard (2) to standard (3) can only be by
   action of the IESG and only after the protocol has been draft
   standard (2) for at least four months.

   Occasionally, the decision may be that the protocol is not ready for
   standardization and will be assigned to the experimental state (4).
   This is off the standards track, and the protocol may be resubmitted
   to enter the standards track after further work. There are other
   paths into the experimental and historic states that do not involve
   IESG action.

   Sometimes one protocol is replaced by another and thus becomes
   historic, or it may happen that a protocol on the standards track is
   in a sense overtaken by another protocol (or other events) and
   becomes historic (state 5).

6. The Protocols

   Subsection 6.1 lists recent RFCs and other changes. Subsections 6.2
   - 6.10 list the standards in groups by protocol state.

6.1. Recent Changes

6.1.1. New RFCs:

     1725 - Post Office Protocol - Version 3

          A Draft Standard protocol.

     1724 - RIP Version 2 MIB Extension

          A Draft Standard protocol.

     1723 - RIP Version 2 - Carrying Additional Information

          A Draft Standard protocol.

     1722 - RIP Version 2 Protocol Applicability Statement

          A Draft Standard protocol.

     1721 - RIP Version 2 Protocol Analysis

          This is an information document and does not specify any
          level of standard.

     1720 - Internet Official Protocol Standards

          This memo.

     1719 - Not yet issued.

     1718 - The Tao of IETF - A Guide for New Attendees of the Internet
            Engineering Task Force

          This is an information document and does not specify any
          level of standard.

     1717 - The PPP Multilink Protocol (MP)

          A Proposed Standard protocol.

1716 - Towards Requirements for IP Routers

       This is an information document and does not specify any
       level of standard.

1715 - The H Ratio for Address Assignment Efficiency

       This is an information document and does not specify any
       level of standard.

1714 - Referral Whois Protocol (RWhois)

       This is an information document and does not specify any
       level of standard.

1713 - Tools for DNS debugging

       This is an information document and does not specify any
       level of standard.

1712 - DNS Encoding of Geographical Location

       An Experimental protocol.

1711 - Classifications in E-mail Routing

       This is an information document and does not specify any
       level of standard.

1710 - Simple Internet Protocol Plus White Paper

       This is an information document and does not specify any
       level of standard.

1709 - K-12 Internetworking Guidelines

       This is an information document and does not specify any
       level of standard.

1708 - NTP PICS PROFORMA - For the Network Time Protocol Version 3

       This is an information document and does not specify any
       level of standard.

1707 - CATNIP: Common Architecture for the Internet

       This is an information document and does not specify any
       level of standard.

      1706 - DNS NSAP Resource Records

            This is an information document and does not specify any
            level of standard.

      1705 - Six Virtual Inches to the Left: The Problem with IPng

            This is an information document and does not specify any
            level of standard.

      1704 - On Internet Authentication

            This is an information document and does not specify any
            level of standard.

      1703 - Principles of Operation for the TPC.INT Subdomain: Radio
             Paging -- Technical Procedures

            This is an information document and does not specify any
            level of standard.

      1702 - Generic Routing Encapsulation over IPv4 networks

            This is an information document and does not specify any
            level of standard.

      1701 - Generic Routing Encapsulation (GRE)

            This is an information document and does not specify any
            level of standard.

      1700 - Assigned Numbers

            A status report on the parameters (i.e., numbers and
            keywords) used in protocols in the Internet community.

      1699 - Not yet issued.

      1698 - Octet Sequences for Upper-Layer OSI to Support Basic
             Communications Applications

            This is an information document and does not specify any
            level of standard.

      1697 - Relational Database Management System (RDBMS) Management
             Information Base (MIB) using SMIv2

            A Proposed Standard protocol.

    1696 - Modem Management Information Base (MIB) using SMIv2

           A Proposed Standard protocol.

    1695 - Definitions of Managed Objects for ATM Management Version
           8.0 using SMIv2

           A Proposed Standard protocol.

    1694 - Definitions of Managed Objects for SMDS Interfaces using
           SMIv2

           A Draft Standard protocol.

    1693 - An Extension to TCP : Partial Order Service

           An Experimental protocol.

    1692 - Transport Multiplexing Protocol (TMux)

           This is an information document and does not specify any
           level of standard.

    1691 - The Document Architecture for the Cornell Digital Library

           This is an information document and does not specify any
           level of standard.

    1690 - Introducing the Internet Engineering and Planning Group
           (IEPG)

           This is an information document and does not specify any
           level of standard.

    1689 - A Status Report on Networked Information Retrieval: Tools
           and Groups

           This is an information document and does not specify any
           level of standard.

    1688 - IPng Mobility Considerations

           This is an information document and does not specify any
           level of standard.

1687 -   A Large Corporate User's View of IPng

         This is an information document and does not specify any
         level of standard.

1686 - IPng Requirements: A Cable Television Industry Viewpoint

         This is an information document and does not specify any
         level of standard.

1685 - Writing X.400 O/R Names

         This is an information document and does not specify any
         level of standard.

1684 - Introduction to White Pages Services based on X.500

         This is an information document and does not specify any
         level of standard.

1683 - Multiprotocol Interoperability In IPng

         This is an information document and does not specify any
         level of standard.

1682 - IPng BSD Host Implementation Analysis

         This is an information document and does not specify any
         level of standard.

1681 - On Many Addresses per Host

         This is an information document and does not specify any
         level of standard.

1680 - IPng Support for ATM Services

         This is an information document and does not specify any
         level of standard.

1679 - HPN Working Group Input to the IPng Requirements
       Solicitation

         This is an information document and does not specify any
         level of standard.

    1678 - IPng Requirements of Large Corporate Networks

        This is an information document and does not specify any
        level of standard.

    1677 - Tactical Radio Frequency Communication Requirments for IPng

        This is an information document and does not specify any
        level of standard.

    1676 - INFN Requirements for an IPng

        This is an information document and does not specify any
        level of standard.

    1675 - Security Concerns for IPng

        This is an information document and does not specify any
        level of standard.

    1674 - Electric Power Research Institute Comments on IPng

        This is an information document and does not specify any
        level of standard.

    1673 - Electric Power Research Institute Comments on IPng

        This is an information document and does not specify any
        level of standard.

    1672 - Accounting Requirements for IPng

        This is an information document and does not specify any
        level of standard.

    1671 - IPng White Paper on Transition and Other Considerations

        This is an information document and does not specify any
        level of standard.

    1670 - Input to IPng Engineering Considerations

        This is an information document and does not specify any
        level of standard.

   1669 - Market Viability as a IPng Criteria

        This is an information document and does not specify any
        level of standard.

   1668 - Unified Routing Requirements for IPng

        This is an information document and does not specify any
        level of standard.

   1667 - Modeling and Simulation Requirements for IPng

        This is an information document and does not specify any
        level of standard.

   1666 - Definitions of Managed Objects for SNA NAUs using SMIv2

        A Proposed Standard protocol.

   1665 - Definitions of Managed Objects for SNA NAUs using SMIv2

        A Proposed Standard protocol.

   1664 - Using the Internet DNS to Distribute RFC1327 Mail Address
          Mapping Tables

        An Experimental protocol.

   1663 - PPP Reliable Transmission

        A Proposed Standard protocol.

   1662 - The Point-to-Point Protocol (PPP)

        A Standard protocol.

   1661 - The Point-to-Point Protocol (PPP)

        A Standard protocol.

   1660 - Definitions of Managed Objects for Parallel-printer-like
          Hardware Devices using SMIv2

        A Draft Standard protocol.

1659 - Definitions of Managed Objects for RS-232-like Hardware
       Devices using SMIv2

       A Draft Standard protocol.

1658 - Definitions of Managed Objects for Character Stream Devices
       using SMIv2

       A Draft Standard protocol.

1657 - Definitions of Managed Objects for the Fourth Version of
       the Border Gateway Protocol (BGP-4) using SMIv2

       A Proposed Standard protocol.

1656 - BGP-4 Protocol Document Roadmap and Implementation
       Experience

       This is an information document and does not specify any
       level of standard.

1655 - Application of the Border Gateway Protocol in the Internet

       A Proposed Standard protocol.

1654 - A Border Gateway Protocol 4 (BGP-4)

       A Proposed Standard protocol.

1653 - SMTP Service Extension for Message Size Declaration

       A Draft Standard protocol.

1652 - SMTP Service Extension for 8bit-MIMEtransport

       A Draft Standard protocol.

1651 - SMTP Service Extensions

       A Draft Standard protocol.

1650 - Definitions of Managed Objects for the Ethernet-like
       Interface Types using SMIv2

       A Proposed Standard protocol.

        1649 - Operational Requirements for X.400 Management Domains in
               the GO-MHS Community

               This is an information document and does not specify any
               level of standard.

        1648 - Postmaster Convention for X.400 Operations

               A Proposed Standard protocol.

        1647 - TN3270 Enhancements

               A Proposed Standard protocol.

        1646 - TN3270 Extensions for LUname and Printer Selection

               This is an information document and does not specify any
               level of standard.

        1645 - Simple Network Paging Protocol - Version 2

               This is an information document and does not specify any
               level of standard.

        1644 - T/TCP -- TCP Extensions for Transactions Functional
               Specification

               An Experimental protocol.

        1643 - Definitions of Managed Objects for the Ethernet-like
               Interface Type

               A Standard protocol.

        1642 - UTF-7 - A Mail-Safe Transformation Format of Unicode

               An Experimental protocol.

        1641 - Using Unicode with MIME

               An Experimental protocol.

6.1.2. Other Changes:

   The following are changes to protocols listed in the previous
   edition.

      904 - Exterior Gateway Protocol

            Moved to Historic.

6.2. Standard Protocols

```
Protocol   Name                                   Status   RFC STD *
========   ===================================    ======= ==== === =
--------   Internet Official Protocol Standards    Req      1720  1
--------   Assigned Numbers                        Req      1700  2
--------   Host Requirements - Communications      Req      1122  3
--------   Host Requirements - Applications        Req      1123  3
--------   Gateway Requirements                    Req      1009  4
IP         Internet Protocol                       Req       791  5
             as amended by:--------
--------      IP Subnet Extension                  Req       950  5
--------      IP Broadcast Datagrams               Req       919  5
--------      IP Broadcast Datagrams with Subnets  Req       922  5
ICMP       Internet Control Message Protocol       Req       792  5
IGMP       Internet Group Multicast Protocol       Rec      1112  5
UDP        User Datagram Protocol                  Rec       768  6
TCP        Transmission Control Protocol           Rec       793  7
TELNET     Telnet Protocol                         Rec   854,855  8
FTP        File Transfer Protocol                  Rec       959  9
SMTP       Simple Mail Transfer Protocol           Rec       821 10
MAIL       Format of Electronic Mail Messages      Rec       822 11
CONTENT    Content Type Header Field               Rec      1049 11
NTPV2      Network Time Protocol (Version 2)       Rec      1119 12
DOMAIN     Domain Name System                      Rec 1034,1035 13
DNS-MX     Mail Routing and the Domain System      Rec       974 14
SNMP       Simple Network Management Protocol      Rec      1157 15
SMI        Structure of Management Information     Rec      1155 16
Concise-MIB Concise MIB Definitions                Rec      1212 16
MIB-II     Management Information Base-II           Rec      1213 17
NETBIOS    NetBIOS Service Protocols               Ele 1001,1002 19
ECHO       Echo Protocol                           Rec       862 20
DISCARD    Discard Protocol                        Ele       863 21
CHARGEN    Character Generator Protocol            Ele       864 22
QUOTE      Quote of the Day Protocol               Ele       865 23
USERS      Active Users Protocol                   Ele       866 24
DAYTIME    Daytime Protocol                        Ele       867 25
TIME       Time Server Protocol                    Ele       868 26
TFTP       Trivial File Transfer Protocol          Ele      1350 33
RIP        Routing Information Protocol            Ele      1058 34
TP-TCP     ISO Transport Service on top of the TCP Ele      1006 35
ETHER-MIB  Ethernet MIB                            Ele      1643 50*
PPP        Point-to-Point Protocol (PPP)           Ele      1661 51*
PPP-HDLC   PPP in HDLC Framing                     Ele      1662 51*
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

Applicability Statements:

   IGMP -- The Internet Architecture Board intends to move towards
   general adoption of IP multicasting, as a more efficient solution
   than broadcasting for many applications. The host interface has been
   standardized in RFC-1112; however, multicast-routing gateways are in
   the experimental stage and are not widely available. An Internet
   host should support all of RFC-1112, except for the IGMP protocol
   itself which is optional; see RFC-1122 for more details. Even
   without IGMP, implementation of RFC-1112 will provide an important
   advance: IP-layer access to local network multicast addressing. It
   is expected that IGMP will become recommended for all hosts and
   gateways at some future date.

   SMI, MIB-II SNMP -- The Internet Architecture Board recommends that
   all IP and TCP implementations be network manageable. At the current
   time, this implies implementation of the Internet MIB-II (RFC-1213),
   and at least the recommended management protocol SNMP (RFC-1157).

   RIP -- The Routing Information Protocol (RIP) is widely implemented
   and used in the Internet. However, both implementors and users
   should be aware that RIP has some serious technical limitations as a
   routing protocol. The IETF is currently developing several
   candidates for a new standard "open" routing protocol with better
   properties than RIP. The IAB urges the Internet community to track
   these developments, and to implement the new protocol when it is
   standardized; improved Internet service will result for many users.

   TP-TCP -- As OSI protocols become more widely implemented and used,
   there will be an increasing need to support interoperation with the
   TCP/IP protocols. The Internet Engineering Task Force is formulating
   strategies for interoperation. RFC-1006 provides one interoperation
   mode, in which TCP/IP is used to emulate TP0 in order to support OSI
   applications. Hosts that wish to run OSI connection-oriented
   applications in this mode should use the procedure described in RFC-
   1006. In the future, the IAB expects that a major portion of the
   Internet will support both TCP/IP and OSI (inter-)network protocols
   in parallel, and it will then be possible to run OSI applications
   across the Internet using full OSI protocol "stacks".

6.3. Network-Specific Standard Protocols

All Network-Specific Standards have Elective status.

Protocol	Name	State	RFC	STD	*
========	=====================================	=====	=====	===	=
IP-ATM	Classical IP and ARP over ATM	Prop	1577		
IP-FR	Multiprotocol over Frame Relay	Draft	1490		
ATM-ENCAP	Multiprotocol Encapsulation over ATM	Prop	1483		
IP-TR-MC	IP Multicast over Token-Ring LANs	Prop	1469		
IP-FDDI	Transmission of IP and ARP over FDDI Net	Std	1390	36	
IP-HIPPI	IP and ARP on HIPPI	Prop	1374		
IP-X.25	X.25 and ISDN in the Packet Mode	Draft	1356		
IP-SMDS	IP Datagrams over the SMDS Service	Prop	1209		
IP-FDDI	Internet Protocol on FDDI Networks	Draft	1188		
ARP	Address Resolution Protocol	Std	826	37	
RARP	A Reverse Address Resolution Protocol	Std	903	38	
IP-ARPA	Internet Protocol on ARPANET	Std BBN	1822	39	
IP-WB	Internet Protocol on Wideband Network	Std	907	40	
IP-E	Internet Protocol on Ethernet Networks	Std	894	41	
IP-EE	Internet Protocol on Exp. Ethernet Nets	Std	895	42	
IP-IEEE	Internet Protocol on IEEE 802	Std	1042	43	
IP-DC	Internet Protocol on DC Networks	Std	891	44	
IP-HC	Internet Protocol on Hyperchannel	Std	1044	45	
IP-ARC	Transmitting IP Traffic over ARCNET Nets	Std	1201	46	
IP-SLIP	Transmission of IP over Serial Lines	Std	1055	47	
IP-NETBIOS	Transmission of IP over NETBIOS	Std	1088	48	
IP-IPX	Transmission of 802.2 over IPX Networks	Std	1132	49	

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

Applicability Statements:

   It is expected that a system will support one or more physical
   networks and for each physical network supported the appropriate
   protocols from the above list must be supported. That is, it is
   elective to support any particular type of physical network, and for
   the physical networks actually supported it is required that they be
   supported exactly according to the protocols in the above list. See
   also the Host and Gateway Requirements RFCs for more specific
   information on network-specific ("link layer") protocols.

6.4. Draft Standard Protocols

Protocol	Name	Status	RFC
==========	======================================	================	=====
POP3	Post Office Protocol, Version 3	Elective	1725*
RIP2-MIB	RIP Version 2 MIB Extension	Elective	1724*
RIP2	RIP Version 2-Carrying Additional Info.	Elective	1723*
RIP2-APP	RIP Version 2 Protocol App. Statement	Elective	1722*
SIP-MIB	SIP Interface Type MIB	Elective	1694*
-------	Def Man Objs Parallel-printer-like	Elective	1660*
-------	Def Man Objs RS-232-like	Elective	1659*
-------	Def Man Objs Character Stream	Elective	1658*
SMTP-SIZE	SMTP Service Ext for Message Size	Elective	1653*
SMTP-8BIT	SMTP Service Ext or 8bit-MIMEtransport	Elective	1652*
SMTP-EXT	SMTP Service Extensions	Elective	1651*
OSI-NSAP	Guidelines for OSI NSAP Allocation	Elective	1629
OSPF2	Open Shortest Path First Routing V2	Elective	1583
ISO-TS-ECHO	Echo for ISO-8473	Elective	1575
DECNET-MIB	DECNET MIB	Elective	1559
-------	Message Header Ext. of Non-ASCII Text	Elective	1522
MIME	Multipurpose Internet Mail Extensions	Elective	1521
802.3-MIB	IEEE 802.3 Repeater MIB	Elective	1516
BRIDGE-MIB	BRIDGE-MIB	Elective	1493
NTPV3	Network Time Protocol (Version 3)	Elective	1305
IP-MTU	Path MTU Discovery	Elective	1191
FINGER	Finger Protocol	Elective	1288
BGP3	Border Gateway Protocol 3 (BGP-3)	Elective	1267,1268
BOOTP	Bootstrap Protocol	Recommended	951,1497
NICNAME	WhoIs Protocol	Elective	954

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

Applicability Statements:

    PPP -- Point to Point Protocol is a method of sending IP over serial
    lines, which are a type of physical network. It is anticipated that
    PPP will be advanced to the network-specifics standard protocol state
    in the future.

6.5. Proposed Standard Protocols

```
Protocol    Name                                    Status          RFC
========    ===================================     ============== =====
PPP-MP      PPP Multilink Protocol                  Elective        1717*
RDBMS-MIB   RDMS MIB - using SMIv2                   Elective        1697*
MODEM-MIB   Modem MIB - using SMIv2                  Elective        1696*
ATM-MIB     ATM Management Version 8.0 using SMIv2   Elective        1695*
SNANAU-MIB  SNA NAUs MIB using SMIv2                 Elective        1665*
PPP-TRANS   PPP Reliable Transmission               Elective        1663*
BGP-4-MIB   BGP-4 MIB                               Elective        1657*
BGP-4-IMP   BGP-4 Roadmap and Implementation        Elective        1656*
BGP-4-APP   Application of BGP-4                     Elective        1655*
BGP-4       Border Gateway Protocol 4               Elective        1654*
--------    Postmaster Convention X.400 Operations  Elective        1648*
TN3270-En   TN3270 Enhancements                     Elective        1647*
PPP-BCP     PPP Bridging Control Protocol           Elective        1638
UPS-MIB     UPS Management Information Base          Elective        1628
AAL5-MTU    Default IP MTU for use over ATM AAL5     Elective        1626
PPP-SONET   PPP over SONET/SDH                       Elective        1619
PPP-ISDN    PPP over ISDN                           Elective        1618
DNS-R-MIB   DNS Resolver MIB Extensions             Elective        1612
DNS-S-MIB   DNS Server MIB Extensions               Elective        1611
FR-MIB      Frame Relay Service MIB                  Elective        1604
PPP-X25     PPP in X.25                             Elective        1598
OSPF-NSSA   The OSPF NSSA Option                    Elective        1587
OSPF-Multi  Multicast Extensions to OSPF            Elective        1584
SONET-MIB   MIB SONET/SDH Interface Type            Elective        1595
RIP-DC      Extensions to RIP to Support Demand Cir. Elective       1582
--------    Evolution of the Interfaces Group of MIB-II Elective    1573
PPP-LCP     PPP LCP Extensions                      Elective        1570
X500-MIB    X.500 Directory Monitoring MIB          Elective        1567
MAIL-MIB    Mail Monitoring MIB                     Elective        1566
NSM-MIB     Network Services Monitoring MIB         Elective        1565
CIPX        Compressing IPX Headers Over WAM Media   Elective        1553
IPXCP       PPP Internetworking Packet Exchange Control Elective     1552
CON-MD5     Content-MD5 Header Field                Elective        1544
DHCP-BOOTP  Interoperation Between DHCP and BOOTP    Elective        1534
DHCP-BOOTP  DHCP Options and BOOTP Vendor Extensions Elective        1533
BOOTP       Clarifications and Extensions BOOTP      Elective        1532
DHCP        Dynamic Host Configuration Protocol      Elective        1531
SRB-MIB     Source Routing Bridge MIB               Elective        1525
CIDR-STRA   CIDR Address Assignment...              Elective        1519
CIDR-ARCH   CIDR Architecture...                    Elective        1518
CIDR-APP    CIDR Applicability Statement            Elective        1517
--------    802.3 MAU MIB                           Elective        1515
HOST-MIB    Host Resources MIB                      Elective        1514
--------    Token Ring Extensions to RMON MIB       Elective        1513
```

```
FDDI-MIB    FDDI Management Information Base        Elective     1512
KERBEROS    Kerberos Network Authentication Ser (V5) Elective    1510
GSSAPI      Generic Security Service API: C-bindings Elective    1509
GSSAPI      Generic Security Service Application... Elective     1508
DASS        Distributed Authentication Security...  Elective     1507
--------    X.400 Use of Extended Character Sets    Elective     1502
HARPOON     Rules for Downgrading Messages...       Elective     1496
Mapping     MHS/RFC-822 Message Body Mapping        Elective     1495
Equiv       X.400/MIME Body Equivalences            Elective     1494
X.500syn    X.500 String Representation ...         Elective     1488
X.500lite   X.500 Lightweight ...                   Elective     1487
STR-REP     String Representation ...               Elective     1485
OSI-Dir     OSI User Friendly Naming ...            Elective     1484
IDPR        Inter-Domain Policy Routing Protocol    Elective     1479
IDPR-ARCH   Architecture for IDPR                   Elective     1478
PPP/Bridge MIB Bridge PPP MIB                       Elective     1474
PPP/IP MIB  IP Network Control Protocol of PPP MIB  Elective     1473
PPP/SEC MIB Security Protocols of PPP MIB           Elective     1472
PPP/LCP MIB Link Control Protocol of PPP MIB        Elective     1471
X25-MIB     Multiprotocol Interconnect on X.25 MIB  Elective     1461
SNMPv2      Coexistence between SNMPv1 and SNMPv2   Elective     1452
SNMPv2      Manager-to-Manager MIB                  Elective     1451
SNMPv2      Management Information Base for SNMPv2   Elective     1450
SNMPv2      Transport Mappings for SNMPv2           Elective     1449
SNMPv2      Protocol Operations for SNMPv2          Elective     1448
SNMPv2      Party MIB for SNMPv2                    Elective     1447
SNMPv2      Security Protocols for SNMPv2           Elective     1446
SNMPv2      Administrative Model for SNMPv2         Elective     1445
SNMPv2      Conformance Statements for SNMPv2       Elective     1444
SNMPv2      Textual Conventions for SNMPv2          Elective     1443
SNMPv2      SMI for SNMPv2                          Elective     1442
SNMPv2      Introduction to SNMPv2                  Elective     1441
PEM-KEY     PEM - Key Certification                 Elective     1424
PEM-ALG     PEM - Algorithms, Modes, and Identifiers Elective    1423
PEM-CKM     PEM - Certificate-Based Key Management  Elective     1422
PEM-ENC     PEM - Message Encryption and Auth       Elective     1421
SNMP-IPX    SNMP over IPX                           Elective     1420
SNMP-AT     SNMP over AppleTalk                     Elective     1419
SNMP-OSI    SNMP over OSI                           Elective     1418
FTP-FTAM    FTP-FTAM Gateway Specification          Elective     1415
IDENT-MIB   Identification MIB                      Elective     1414
IDENT       Identification Protocol                 Elective     1413
DS3/E3-MIB DS3/E3 Interface Type                    Elective     1407
DS1/E1-MIB DS1/E1 Interface Type                    Elective     1406
BGP-OSPF    BGP OSPF Interaction                    Elective     1403
--------    Route Advertisement In BGP2 And BGP3    Elective     1397
SNMP-X.25   SNMP MIB Extension for X.25 Packet Layer Elective    1382
SNMP-LAPB   SNMP MIB Extension for X.25 LAPB        Elective     1381
```

```
PPP-ATCP    PPP AppleTalk Control Protocol        Elective       1378
PPP-OSINLCP PPP OSI Network Layer Control Protocol Elective      1377
PPP-DNCP    PPP DECnet Phase IV Control Protocol   Elective       1376
TABLE-MIB   IP Forwarding Table MIB                Elective       1354
SNMP-PARTY-MIB Administration of SNMP              Elective       1353
SNMP-SEC    SNMP Security Protocols                Elective       1352
SNMP-ADMIN  SNMP Administrative Model              Elective       1351
TOS         Type of Service in the Internet        Elective       1349
PPP-AUTH    PPP Authentication                     Elective       1334
PPP-LINK    PPP Link Quality Monitoring            Elective       1333
PPP-IPCP    PPP Control Protocol                   Elective       1332
-------     X.400 1988 to 1984 downgrading         Elective       1328
-------     Mapping between X.400(1988)            Elective       1327
TCP-EXT     TCP Extensions for High Performance    Elective       1323
FRAME-MIB   Management Information Base for Frame   Elective       1315
NETFAX      File Format for the Exchange of Images Elective       1314
IARP        Inverse Address Resolution Protocol    Elective       1293
FDDI-MIB    FDDI-MIB                               Elective       1285
-------     Encoding Network Addresses             Elective       1277
-------     Replication and Distributed Operations Elective       1276
-------     COSINE and Internet X.500 Schema       Elective       1274
RMON-MIB    Remote Network Monitoring MIB          Elective       1271
BGP-MIB     Border Gateway Protocol MIB (Version 3) Elective      1269
ICMP-ROUT   ICMP Router Discovery Messages         Elective       1256
OSPF-MIB    OSPF Version 2 MIB                     Elective       1253
IPSO        DoD Security Options for IP            Elective       1108
AT-MIB      Appletalk MIB                          Elective       1243
OSI-UDP     OSI TS on UDP                          Elective       1240
STD-MIBs    Reassignment of Exp MIBs to Std MIBs   Elective       1239
IPX-IP      Tunneling IPX Traffic through IP Nets  Elective       1234
802.5-MIB   IEEE 802.5 Token Ring MIB              Elective       1231
GINT-MIB    Extensions to the Generic-Interface MIB Elective      1229
PPP-EXT     PPP Extensions for Bridging            Elective       1220
IS-IS       OSI IS-IS for TCP/IP Dual Environments Elective       1195
IP-CMPRS    Compressing TCP/IP Headers             Elective       1144
NNTP        Network News Transfer Protocol         Elective        977
```

[Note: an asterisk at the end of a line indicates a change from the previous edition of this document.]

Applicability Statements:

   OSPF - RFC 1370 is an applicability statement for OSPF.

6.6. Telnet Options

For convenience, all the Telnet Options are collected here with both
their state and status.

```
Protocol   Name                              Number  State Status  RFC STD
========   ==================================  ====== ===== ======  ==== ===
TOPT-BIN   Binary Transmission                    0  Std   Rec      856  27
TOPT-ECHO  Echo                                   1  Std   Rec      857  28
TOPT-RECN  Reconnection                           2  Prop  Ele      ...
TOPT-SUPP  Suppress Go Ahead                      3  Std   Rec      858  29
TOPT-APRX  Approx Message Size Negotiation        4  Prop  Ele      ...
TOPT-STAT  Status                                 5  Std   Rec      859  30
TOPT-TIM   Timing Mark                            6  Std   Rec      860  31
TOPT-REM   Remote Controlled Trans and Echo       7  Prop  Ele      726
TOPT-OLW   Output Line Width                      8  Prop  Ele      ...
TOPT-OPS   Output Page Size                       9  Prop  Ele      ...
TOPT-OCRD  Output Carriage-Return Disposition 10  Prop  Ele      652
TOPT-OHT   Output Horizontal Tabstops            11  Prop  Ele      653
TOPT-OHTD  Output Horizontal Tab Disposition     12  Prop  Ele      654
TOPT-OFD   Output Formfeed Disposition           13  Prop  Ele      655
TOPT-OVT   Output Vertical Tabstops              14  Prop  Ele      656
TOPT-OVTD  Output Vertical Tab Disposition       15  Prop  Ele      657
TOPT-OLD   Output Linefeed Disposition           16  Prop  Ele      658
TOPT-EXT   Extended ASCII                        17  Prop  Ele      698
TOPT-LOGO  Logout                                18  Prop  Ele      727
TOPT-BYTE  Byte Macro                            19  Prop  Ele      735
TOPT-DATA  Data Entry Terminal                   20  Prop  Ele     1043
TOPT-SUP   SUPDUP                                21  Prop  Ele      736
TOPT-SUPO  SUPDUP Output                         22  Prop  Ele      749
TOPT-SNDL  Send Location                         23  Prop  Ele      779
TOPT-TERM  Terminal Type                         24  Prop  Ele     1091
TOPT-EOR   End of Record                         25  Prop  Ele      885
TOPT-TACACS  TACACS User Identification          26  Prop  Ele      927
TOPT-OM    Output Marking                        27  Prop  Ele      933
TOPT-TLN   Terminal Location Number              28  Prop  Ele      946
TOPT-3270  Telnet 3270 Regime                    29  Prop  Ele     1041
TOPT-X.3   X.3 PAD                               30  Prop  Ele     1053
TOPT-NAWS  Negotiate About Window Size           31  Prop  Ele     1073
TOPT-TS    Terminal Speed                        32  Prop  Ele     1079
TOPT-RFC   Remote Flow Control                   33  Prop  Ele     1372
TOPT-LINE  Linemode                              34  Draft Ele     1184
TOPT-XDL   X Display Location                    35  Prop  Ele     1096
TOPT-ENVIR Telnet Environment Option             36  Hist  Not     1408
TOPT-AUTH  Telnet Authentication Option          37  Exp   Ele     1416
TOPT-ENVIR Telnet Environment Option             39  Prop  Ele     1572
TOPT-EXTOP Extended-Options-List                255  Std   Rec      861  32
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

6.7. Experimental Protocols

All Experimental protocols have the Limited Use status.

```
Protocol    Name                                             RFC
=======     =================================                =====
DNS-DEBUG   Tools for DNS debugging                          1713*
DNS-ENCODE  DNS Encoding of Geographical Location            1712*
TCP-POS     An Extension to TCP: Partial Order Service       1693*
-------     DNS to Distribute RFC1327 Mail Address Mapping Tables  1664*
T/TCP       TCP Extensions for Transactions                  1644*
UTF-7       A Mail-Safe Transformation Format of Unicode     1642*
MIME-UNI    Using Unicode with MIME                          1641*
FOOBAR      FTP Operation Over Big Address Records           1639
X500-CHART  Charting Networks in the X.500 Directory         1609
X500-DIR    Representing IP Information in the X.500 Directory  1608
SNMP-DPI    SNMP Distributed Protocol Interface              1592
CLNP-TUBA   Use of ISO CLNP in TUBA Environments             1561
REM-PRINT   TPC.INT Subdomain Remote Printing - Technical    1528
EHF-MAIL    Encoding Header Field for Internet Messages      1505
REM-PRT     An Experiment in Remote Printing                 1486
RAP         Internet Route Access Protocol                   1476
TP/IX       TP/IX: The Next Internet                         1475
X400        Routing Coordination for X.400 Services          1465
DNS         Storing Arbitrary Attributes in DNS              1464
IRCP        Internet Relay Chat Protocol                     1459
TOS-LS      Link Security TOS                                1455
SIFT/UFT    Sender-Initiated/Unsolicited File Transfer       1440
DIR-ARP     Directed ARP                                     1433
TEL-SPX     Telnet Authentication: SPX                       1412
TEL-KER     Telnet Authentication: Kerberos V4               1411
MAP-MAIL    X.400 Mapping and Mail-11                        1405
TRACE-IP    Traceroute Using an IP Option                    1393
DNS-IP      Experiment in DNS Based IP Routing               1383
RMCP        Remote Mail Checking Protocol                    1339
TCP-HIPER   TCP Extensions for High Performance              1323
MSP2        Message Send Protocol 2                          1312
DSLCP       Dynamically Switched Link Control                1307
--------    X.500 and Domains                                1279
IN-ENCAP    Internet Encapsulation Protocol                  1241
CLNS-MIB    CLNS-MIB                                         1238
CFDP        Coherent File Distribution Protocol              1235
SNMP-DPI    SNMP Distributed Program Interface               1228
IP-AX.25    IP Encapsulation of AX.25 Frames                 1226
ALERTS      Managing Asynchronously Generated Alerts         1224
```

```
MPP         Message Posting Protocol                         1204
ST-II       Stream Protocol                                  1190
SNMP-BULK   Bulk Table Retrieval with the SNMP               1187
DNS-RR      New DNS RR Definitions                           1183
IMAP2       Interactive Mail Access Protocol                 1176
NTP-OSI     NTP over OSI Remote Operations                   1165
DMF-MAIL    Digest Message Format for Mail                   1153
RDP         Reliable Data Protocol                       908,1151
TCP-ACO     TCP Alternate Checksum Option                    1146
--------    Mapping full 822 to Restricted 822               1137
IP-DVMRP    IP Distance Vector Multicast Routing             1075
VMTP        Versatile Message Transaction Protocol           1045
COOKIE-JAR  Authentication Scheme                            1004
NETBLT      Bulk Data Transfer Protocol                       998
IRTP        Internet Reliable Transaction Protocol            938
LDP         Loader Debugger Protocol                          909
RLP         Resource Location Protocol                        887
NVP-II      Network Voice Protocol                       ISI-memo
PVP         Packet Video Protocol                        ISI-memo
```

[Note: an asterisk at the end of a line indicates a change from the previous edition of this document.]

6.8. Informational Protocols

Information protocols have no status.

```
Protocol    Name                                             RFC
=======     ==================================               =====
RWHOIS      Referral Whois Protocol                          1714*
DNS-NSAP    DNS NSAP Resource Records                        1706*
RADIO-PAGE  TPC.INT Subdomain: Radio Paging -- Technical Procedures 1703*
GRE-IPv4    Generic Routing Encapsulation over IPv4          1702*
GRE         Generic Routing Encapsulatio                     1701*
TMUX        Transport Multiplexing Protocol                  1692*
SNPP        Simple Network Paging Protocol - Version 2       1645*
IPXWAN      Novell IPX Over Various WAN Media                1634
ADSNA-IP    Advanced SNA/IP: A Simple SNA Transport Protocol 1538
AUBR        Appletalk Update-Based Routing Protocol...       1504
TACACS      Terminal Access Control Protocol                 1492
SUN-NFS     Network File System Protocol                     1094
SUN-RPC     Remote Procedure Call Protocol Version 2         1057
GOPHER      The Internet Gopher Protocol                     1436
-------     Data Link Switching: Switch-to-Switch Protocol   1434
LISTSERV    Listserv Distribute Protocol                     1429
-------     Replication Requirements                         1275
PCMAIL      Pcmail Transport Protocol                        1056
MTP         Multicast Transport Protocol                     1301
```

```
BSD Login  BSD Login                                         1282
DIXIE      DIXIE Protocol Specification                      1249
IP-X.121   IP to X.121 Address Mapping for DDN               1236
OSI-HYPER  OSI and LLC1 on HYPERchannel                      1223
HAP2       Host Access Protocol                              1221
SUBNETASGN On the Assignment of Subnet Numbers               1219
SNMP-TRAPS Defining Traps for use with SNMP                  1215
DAS        Directory Assistance Service                      1202
MD4        MD4 Message Digest Algorithm                      1186
LPDP       Line Printer Daemon Protocol                      1179
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

6.9. Historic Protocols

All Historic protocols have Not Recommended status.

```
Protocol   Name                                        RFC  STD
=======    ==================================          ===== ===
EGP        Exterior Gateway Protocol        Rec         904  18*
SNMP-MUX   SNMP MUX Protocol and MIB                   1227
OIM-MIB-II OSI Internet Management: MIB-II              1214
IMAP3      Interactive Mail Access Protocol Version 3  1203
SUN-RPC    Remote Procedure Call Protocol Version 1    1050
802.4-MIP  IEEE 802.4 Token Bus MIB                    1230
CMOT       Common Management Information Services      1189
--------   Mail Privacy: Procedures                    1113
--------   Mail Privacy: Key Management                1114
--------   Mail Privacy: Algorithms                    1115
NFILE      A File Access Protocol                      1037
HOSTNAME   HOSTNAME Protocol                            953
SFTP       Simple File Transfer Protocol                913
SUPDUP     SUPDUP Protocol                              734
BGP        Border Gateway Protocol             1163,1164
MIB-I      MIB-I                                       1156
SGMP       Simple Gateway Monitoring Protocol          1028
HEMS       High Level Entity Management Protocol       1021
STATSRV    Statistics Server                            996
POP2       Post Office Protocol, Version 2              937
RATP       Reliable Asynchronous Transfer Protocol      916
HFEP       Host - Front End Protocol                    929
THINWIRE   Thinwire Protocol                            914
HMP        Host Monitoring Protocol                     869
GGP        Gateway Gateway Protocol                     823
RTELNET    Remote Telnet Service                        818
CLOCK      DCNET Time Server Protocol                   778
MPM        Internet Message Protocol                    759
```

```
NETRJS     Remote Job Service                              740
NETED      Network Standard Text Editor                    569
RJE        Remote Job Entry                                407
XNET       Cross Net Debugger                          IEN-158
NAMESERVER Host Name Server Protocol                    IEN-116
MUX        Multiplexing Protocol                         IEN-90
GRAPHICS   Graphics Protocol                          NIC-24308
```

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

6.10. Obsolete Protocols

Some of the protocols listed in this memo are described in RFCs that are
obsoleted by newer RFCs. "Obsolete" or "obsoleted" is not an official
state or status of protocols. This subsection is for information only.

While it may seem to be obviously wrong to have an obsoleted RFC in the
list of standards, there may be cases when an older standard is in the
process of being replaced. This process may take a year or two.

For example, the Network Time Protocol (NTP) [RFC 1119] is in its
version 2 a full Standard, and in its version 3 is a Draft Standard [RFC
1305]. Once version 3 is a full Standard, version 2 will be made
Historic.

Many obsoleted protocols are of little interest and are dropped from
this memo altogether. Some obsoleted protocols have received enough
recognition that it seems appropriate to list them under their current
status and with the following reference to their current replacement.

```
RFC             RFC     Status      Title                                 *
====            ====    =========   ================================= =
1305 obsoletes 1119  Std  /Rec  Network Time Protocol (Version 2)
1533 obsoletes 1497  Draft/Rec  Bootstrap Protocol
1331 obsoletes 1171  Draft/Ele  Point to Point Protocol
1574 obsoletes 1139  Prop /Ele  Echo for ISO-8473
1573 obsoletes 1229  Prop /Ele  Extensions to the Generic-IF MIB
1559 obsoletes 1289  Prop /Ele  DECNET MIB
1548 obsoletes 1331  Prop /Ele  Point-to-Point Protocol (PPP)
1541 obsoletes 1531  Prop /Ele  Dynamic Host Configuration Protocol
1592 obsoletes 1228  Exper/Lim  SNMP Distributed Program Interface
1528 obsoletes 1486  Exper/Lim  An Experiment in Remote Printing
1320 obsoletes 1186  Info /      MD4 Message Digest Algorithm
1057 obsoletes 1050  Hist /Not  Remote Procedure Call Version 1
1421 obsoletes 1113  Hist /Not  Mail Privacy: Procedures
1422 obsoletes 1114  Hist /Not  Mail Privacy: Key Management
1423 obsoletes 1115  Hist /Not  Mail Privacy: Algorithms
1267 obsoletes 1163  Hist /Not  Border Gateway Protocol
1268 obsoletes 1164  Hist /Not  Border Gateway Protocol
```

Thanks to Lynn Wheeler of Britton Lee for compiling the information in
this subsection.

[Note: an asterisk at the end of a line indicates a change from the
previous edition of this document.]

7. Contacts

7.1. IAB, IETF, and IRTF Contacts

   7.1.1. Internet Architecture Board (IAB) Contact

   Please send your comments about this list of protocols and especially
   about the Draft Standard Protocols to the Internet Architecture Board
   care of Abel Winerib, IAB Executive Director.

      Contacts:

         Abel Winerib
         Executive Director of the IAB
         Intel, JF2-64
         2111 NE 25th Avenue
         Hillsboro, OR 97124

         1-503-696-8972

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         Chair of the IAB
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         F-06561 Valbonne Cedex
         France

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         Christian.Huitema@MIRSA.INRIA.FR

   7.1.2. Internet Engineering Task Force (IETF) Contact

      Contacts:

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Reston, VA 22091

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7.1.3. Internet Research Task Force (IRTF) Contact

   Contact:

      Jon Postel
      Chair of the IRTF
      USC/Information Sciences Institute
      4676 Admiralty Way
      Marina del Rey, CA 90292-6695

      1-310-822-1511

      Postel@ISI.EDU

7.2. Internet Assigned Numbers Authority Contact

     Contact:

          Joyce K. Reynolds
          Internet Assigned Numbers Authority
          USC/Information Sciences Institute
          4676 Admiralty Way
          Marina del Rey, CA 90292-6695

          1-310-822-1511

          IANA@ISI.EDU

   The protocol standards are managed by the Internet Assigned Numbers
   Authority.

   Please refer to the document "Assigned Numbers" (RFC-1700) for
   further information about the status of protocol documents. There
   are two documents that summarize the requirements for host and
   gateways in the Internet, "Host Requirements" (RFC-1122 and RFC-1123)
   and "Gateway Requirements" (RFC-1009).

     How to obtain the most recent edition of this "Internet Official
     Protocol Standards" memo:

        The file "in-notes/std/std1.txt" may be copied via FTP from the
        FTP.ISI.EDU computer using the FTP username "anonymous" and FTP
        password "guest".

7.3. Request for Comments Editor Contact

     Contact:

        Jon Postel
        RFC Editor
        USC/Information Sciences Institute
        4676 Admiralty Way
        Marina del Rey, CA 90292-6695

        1-310-822-1511

        RFC-Editor@ISI.EDU

   Documents may be submitted via electronic mail to the RFC Editor for
   consideration for publication as RFC. If you are not familiar with
   the format or style requirements please request the "Instructions for
   RFC Authors". In general, the style of any recent RFC may be used as
   a guide.

7.4. The Network Information Center and
      Requests for Comments Distribution Contact

     RFC's may be obtained from DS.INTERNIC.NET via FTP, WAIS, and
     electronic mail. Through FTP, RFC's are stored as rfc/rfcnnnn.txt
     or rfc/rfcnnnn.ps where 'nnnn' is the RFC number. Login as
     "anonymous" and provide your e-mail address as the password.
     Through WAIS, you may use either your local WAIS client or telnet
     to DS.INTERNIC.NET and login as "wais" (no password required) to
     access a WAIS client. Help information and a tutorial for using
     WAIS are available online. The WAIS database to search is "rfcs".

     Directory and Database Services also provides a mail server
     interface. 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.

     The InterNIC directory and database services collection of
     resource listings, internet documents such as RFCs, FYIs, STDs,
     and Internet Drafts, and publicly accessible databases are also

now available via Gopher. All our collections are WAIS indexed
and can be searched from the Gopher menu.

To access the InterNIC Gopher Servers, please connect to
"internic.net" port 70.

Contact: admin@ds.internic.net

7.5. Sources for Requests for Comments

Details on many sources of RFCs via FTP or EMAIL may be obtained by
sending an EMAIL message to "rfc-info@ISI.EDU" with the message body
"help: ways_to_get_rfcs". For example:

        To: rfc-info@ISI.EDU
        Subject: getting rfcs

        help: ways_to_get_rfcs

8. Security Considerations

Security issues are not addressed in this memo.

9. Author's Address

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