```
Network Working Group                   Internet Architecture Board
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1280, 1250, 1200, 1140, 1130, 1100, 1083
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
   15-Oct-97.

   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. Requirements for IP Version 4 Routers

This document reviews the specifications that apply to gateways and
supplies guidance and clarification for any ambiguities.
Requirements for IP Version 4 Routers is RFC-1812.

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 DoD MIL-STD Internet specifications are out of date and have been
discontinued. The DoD's Joint Technical Architecture (JTA) lists the
current set of IETF STDs and RFCs that the DoD intends to use in all
new and upgraded Command, Control, Communications, Computers, and
Intelligence (C4I) acquisitions. A copy of the JTA can be obtained
from http://www-jta.itsi.disa.mil.

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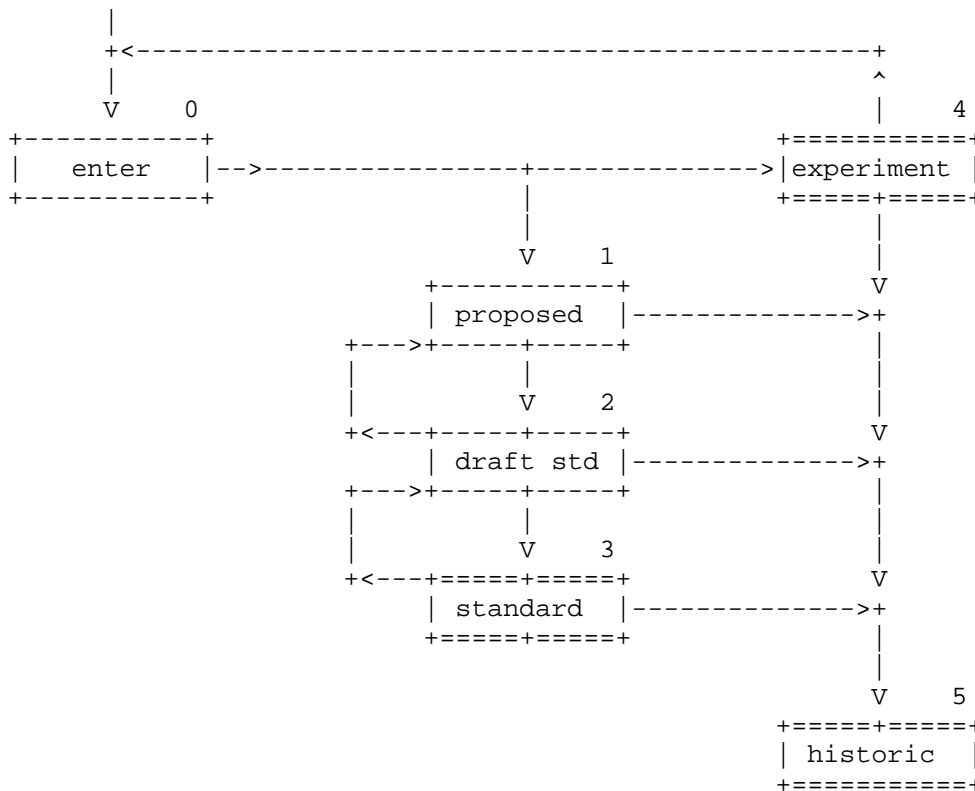
   The transition from proposed standard (1) to draft standard (2) can
   only be by action of the IESG and only after the protocol has been
   proposed standard (1) for at least six months.

   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:

     2153 - PPP Vendor Extensions

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

     2152 - UTF-7

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

     2151 - Not yet issued.

     2150 - Not yet issued.

     2149 - Multicast Server Architectures for MARS-based ATM
            multicasting

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

     2148 - Not yet issued.

     2147 - TCP and UDP over IPv6 Jumbograms

          A Proposed Standard protocol.

     2146 - U.S. Government Internet Domain Names

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

     2145 - Use and Interpretation of HTTP Version Numbers

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

2144 - The CAST-128 Encryption Algorithm

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

2143 - Encapsulating IP with the Small Computer System Interface

     An Experimental protocol.

2142 - Mailbox Names for Common Services, Roles and Functions

     A Proposed Standard protocol.

2141 - URN Syntax

     A Proposed Standard protocol.

2140 - TCP Control Block Interdependence

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

2139 - RADIUS Accounting

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

2138 - Remote Authentication Dial In User Service (RADIUS)

     A Proposed Standard protocol.

2137 - Secure Domain Name System Dynamic Update

     A Proposed Standard protocol.

2136 - Dynamic Updates in the Domain Name System (DNS UPDATE)

     A Proposed Standard protocol.

2135 - Internet Society By-Laws

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

2134 - Articles of Incorporation of Internet Society

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

2133 - Basic Socket Interface Extensions for IPv6

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

2132 - DHCP Options and BOOTP Vendor Extensions

        A Draft Standard protocol.

2131 - Dynamic Host Configuration Protocol

        A Draft Standard protocol.

2130 - The Report of the IAB Character Set Workshop held 29
        February - 1 March, 1996

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

2129 - Toshiba's Flow Attribute Notification Protocol (FANP)
        Specification

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

2128 - Dial Control Management Information Base using SMIv2

        A Proposed Standard protocol.

2127 - ISDN Management Information Base using SMIv2

        A Proposed Standard protocol.

2126 - ISO Transport Service on top of TCP (ITOT)

        A Proposed Standard protocol.

2125 - The PPP Bandwidth Allocation Protocol (BAP), The PPP
        Bandwidth Allocation Control Protocol (BACP)

        A Proposed Standard protocol.

2124 - Cabletron's Light-weight Flow Admission Protocol
        Specification

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

      2123 - Traffic Flow Measurement: Experiences with NeTraMet

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

      2122 - VEMMI URL Specification

            A Proposed Standard protocol.

      2121 - Issues affecting MARS Cluster Size

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

      2120 - Managing the X.500 Root Naming Context

            An Experimental protocol.

      2119 - Key words for use in RFCs to Indicate Requirement Level

            This is a Best Current Practices document and does not
            specify any level of standard.

      2118 - Microsoft Point-To-Point Compression (MPPC) Protocol

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

      2117 - Not yet issued.

      2116 - X.500 Implementations Catalog-96

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

      2115 - Not yet issued.

      2114 - Data Link Switching Client Access Protocol

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

      2113 - IP Router Alert Option

            A Proposed Standard protocol.

2112 - The MIME Multipart/Related Content-type

     A Proposed Standard protocol.

2111 - Content-ID and Message-ID Uniform Resource Locators

     A Proposed Standard protocol.

2110 - MIME E-mail Encapsulation of Aggregate Documents, such as
HTML (MHTML)

     A Proposed Standard protocol.

2100 - The Naming of Hosts

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

2099 - Request for Comments Summary - RFC Numbers 2000-2099

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

2094 - Not yet issued.

2093 - Not yet issued.

2076 - Common Internet Message Headers

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

6.1.2. Other Changes:

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

1542 - Clarifications and Extensions for the Bootstrap Protocol

     Elevated to Draft Standard.

1534 - Interoperation Between DHCP and BOOTP

     Elevated to Draft Standard.

6.2. Standard Protocols

Protocol	Name	Status	RFC	STD	*
--------	Internet Official Protocol Standards	Req	2200	1	
--------	Assigned Numbers	Req	1700	2	
--------	Host Requirements - Communications	Req	1122	3	
--------	Host Requirements - Applications	Req	1123	3	
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	
SMTP-SIZE	SMTP Service Ext for Message Size	Rec	1870	10	
SMTP-EXT	SMTP Service Extensions	Rec	1869	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	
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	
IP-SMDS	IP Datagrams over the SMDS Service	Ele	1209	52	
POP3	Post Office Protocol, Version 3	Ele	1939	53	

[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 devpeloping 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-X.25	X.25 and ISDN in the Packet Mode	Draft	1356		
ARP	Address Resolution Protocol	Std	826	37	
RARP	A Reverse Address Resolution Protocol	Std	903	38	
IP-ARPA	Internet Protocol on ARPANET	Std	BBN1822	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	
IP-HIPPI	IP over HIPPI	Draft	2067		

[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
========    ====================================     ==============      =====
BOOTP       DHCP Options and BOOTP Extensions        Recommended         2132*
DHCP        Dynamic Host Configuration Protocol      Elective            2131*
-------     Clarifications and Extensions BOOTP      Elective            1542*
DHCP-BOOTP  Interoperation Between DHCP and BOOTP     Elective            1534*
MIME-CONF   MIME Conformance Criteria                Elective            2049
MIME-MSG    MIME Msg Header Ext for Non-ASCII        Elective            2047
MIME-MEDIA  MIME Media Types                         Elective            2046
MIME        Multipurpose Internet Mail Extensions    Elective            2045
PPP-CHAP    PPP Challenge Handshake Authentication   Elective            1994
PPP-MP      PPP Multilink Protocol                   Elective            1990
PPP-LINK    PPP Link Quality Monitoring              Elective            1989
COEX-MIB    Coexistence between SNMPV1 & SNMPV2      Elective            1908
SNMPv2-MIB  MIB for SNMPv2                           Elective            1907
TRANS-MIB   Transport Mappings for SNMPv2            Elective            1906
OPS-MIB     Protocol Operations for SNMPv2           Elective            1905
CONF-MIB    Conformance Statements for SNMPv2        Elective            1904
CONV-MIB    Textual Conventions for SNMPv2           Elective            1903
SMIV2       SMI for SNMPv2                           Elective            1902
CON-MD5     Content-MD5 Header Field                 Elective            1864
OSPF-MIB    OSPF Version 2 MIB                       Elective            1850
STR-REP     String Representation ...                Elective            1779
X.500syn    X.500 String Representation ...          Elective            1778
X.500lite   X.500 Lightweight ...                    Elective            1777
BGP-4-APP   Application of BGP-4                      Elective            1772
BGP-4       Border Gateway Protocol 4                Elective            1771
PPP-DNCP    PPP DECnet Phase IV Control Protocol     Elective            1762
RMON-MIB    Remote Network Monitoring MIB            Elective            1757
802.5-MIB   IEEE 802.5 Token Ring MIB                Elective            1748
BGP-4-MIB   BGP-4 MIB                                Elective            1657
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-8BIT   SMTP Service Ext or 8bit-MIMEtransport    Elective            1652
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
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
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
========   ===================================   ============== =====
IPv6-Jumbo TCP and UDP over IPv6 Jumbograms      Elective       2147*
MAIL-SERV  Mailbox Names for Common Services     Elective       2142*
URN-SYNTAX URN Syntax                            Elective       2141*
RADIUS     Remote Authentication Dial In Service Elective       2138*
SDNSDU     Secure Domain Name System Dynamic Update Elective    2137*
DNS-UPDATE Dynamic Updates in the DNS            Elective       2136*
DC-MIB     Dial Control MIB using SMIv2          Elective       2128*
ISDN-MIB   ISDN MIB using SMIv2                  Elective       2127*
ITOT       ISO Transport Service on top of TCP   Elective       2126*
BAP-BACP   PPP-BAP, PPP-BACP                     Elective       2125*
VEMMI-URL  VEMMI URL Specification               Elective       2122*
ROUT-ALERT IP Router Alert Option                Elective       2113*
MIME-RELAT MIME Multipart/Related Content-type   Elective       2112*
CIDMID-URL Content-ID and Message-ID URLs        Elective       2111*
MHTML      MIME E-mail Encapsulation             Elective       2110*
HTTP-STATE HTTP State Management Mechanism       Elective       2109
802.3-MIB  802.3 Repeater MIB using SMIv2        Elective       2108
PPP-NBFCP  PPP NetBIOS Frames Control Protocol   Elective       2097
TABLE-MIB  IP Forwarding Table MIB               Elective       2096
IMAPPOPAU  IMAP/POP AUTHorize Extension          Elective       2095
RIP-TRIG   Trigger RIP                           Elective       2091
IMAP4-LIT  IMAP4 non-synchronizing literals      Elective       2088
IMAP4-QUO  IMAP4 QUOTA extension                 Elective       2087
IMAP4-ACL  IMAP4 ACL Extension                   Elective       2086
HMAC-MD5   HMAC-MD5 IP Auth. with Replay Prevention Elective    2085
RIP2-MD5   RIP-2 MD5 Authentication              Elective       2082
RIPNG-IPV6 RIPng for IPv6                        Elective       2080
URI-ATT    URI Attribute Type and Object Class   Elective       2079
GSSAP      Generic Security Service Application  Elective       2078
MIME-MODEL Model Primary MIME Types              Elective       2077
RMON-MIB   Remote Network Monitoring MIB         Elective       2074
```

```
IPV6-UNI    IPv6 Provider-Based Unicast Address    Elective    2073
HTML-INT    HTML Internationalization              Elective    2070
DAA         Digest Access Authentication           Elective    2069
HTTP-1.1    Hypertext Transfer Protocol -- HTTP/1.1 Elective   2068
DNS-SEC     Domain Name System Security Extensions Elective    2065
IMAPV4      Internet Message Access Protocol v4rev1 Elective   2060
URLZ39.50   Uniform Resource Locators for Z39.50   Elective    2056
SNANAU-APP  SNANAU APPC MIB using SMIv2            Elective    2051
PPP-SNACP   PPP SNA Control Protocol               Elective    2043
RTP-MPEG    RTP Payload Format for MPEG1/MPEG2     Elective    2038
ENTITY-MIB  Entity MIB using SMIv2                 Elective    2037
RTP-JPEG    RTP Payload Format for JPEG-compressed Elective    2035
SMTP-ENH    SMTP Enhanced Error Codes              Elective    2034
RTP-H.261   RTP Payload Format for H.261           Elective    2032
RTP-CELLB   RTP Payload Format of Sun's CellB      Elective    2029
SPKM        Simple Public-Key GSS-API Mechanism    Elective    2025
DLSW-MIB    DLSw MIB using SMIv2                   Elective    2024
IPV6-PPP    IP Version 6 over PPP                  Elective    2023
MULTI-UNI   Multicast over UNI 3.0/3.1 based ATM   Elective    2022
RMON-MIB    RMON MIB using SMIv2                   Elective    2021
802.12-MIB  IEEE 802.12 Interface MIB              Elective    2020
IPV6-FDDI   Transmission of IPv6 Packets Over FDDI Elective    2019
TCP-ACK     TCP Selective Acknowledgement Options  Elective    2018
URL-ACC     URL Access-Type                        Elective    2017
MIME-PGP    MIME Security with PGP                 Elective    2015
MIB-UDP     SNMPv2 MIB for UDP                     Elective    2013
MIB-TCP     SNMPv2 MIB for TCP                     Elective    2012
MIB-IP      SNMPv2 MIB for IP                      Elective    2011
MOBILEIPMIB Mobile IP MIB Definition using SMIv2   Elective    2006
MOBILEIPAPP Applicability Statement for IP Mobility Elective   2005
MINI-IP     Minimal Encapsulation within IP        Elective    2004
IPENCAPIP   IP Encapsulation within IP             Elective    2003
MOBILEIPSUP IP Mobility Support                    Elective    2002
TCPSLOWSRT  TCP Slow Start, Congestion Avoidance... Elective   2001
BGP-COMM    BGP Communities Attribute              Elective    1997
DNS-NOTIFY  Mech. for Notification of Zone Changes Elective    1996
DNS-IZT     Incremental Zone Transfer in DNS       Elective    1995
SMTP-ETRN   SMTP Service Extension ETRN            Elective    1985
SNA         Serial Number Arithmetic               Elective    1982
MTU-IPV6    Path MTU Discovery for IP version 6    Elective    1981
PPP-FRAME   PPP in Frame Relay                     Elective    1973
IPV6-ETHER  Transmission IPv6 Packets Over Ethernet Elective   1972
IPV6-AUTO   IPv6 Stateless Address Autoconfiguration Elective  1971
IPV6-ND     Neighbor Discovery for IP Version 6    Elective    1970
PPP-ECP     PPP Encryption Control Protocol        Elective    1968
GSSAPI-KER  Kerberos Version 5 GSS-API Mechanism   Elective    1964
PPP-CCP     PPP Compression Control Protocol       Elective    1962
GSSAPI-SOC  GSS-API Auth for SOCKS Version 5       Elective    1961
```

```
LDAP-STR    String Rep. of LDAP Search Filters    Elective     1960
LDAP-URL    LDAP URL Format                       Elective     1959
ONE-PASS    One-Time Password System              Elective     1938
TRANS-IPV6  Transition Mechanisms IPv6 Hosts/Routers Elective   1933
AUTH-SOCKS  Username Authentication for SOCKS V5   Elective     1929
SOCKSV5     SOCKS Protocol Version 5              Elective     1928
WHOIS++M    How to Interact with a Whois++ Mesh   Elective     1914
WHOIS++A    Architecture of Whois++ Index Service Elective     1913
DSN         Delivery Status Notifications         Elective     1894
EMS-CODE    Enhanced Mail System Status Codes     Elective     1893
MIME-RPT    Multipart/Report                      Elective     1892
SMTP-DSN    SMTP Delivery Status Notifications    Elective     1891
RTP-AV      RTP Audio/Video Profile               Elective     1890
RTP         Transport Protocol for Real-Time Apps Elective     1889
DNS-IPV6    DNS Extensions to support IPv6        Elective     1886
ICMPv6      ICMPv6 for IPv6                       Elective     1885
IPV6-Addr   IPv6 Addressing Architecture          Elective     1884
IPV6        IPv6 Specification                    Elective     1883
HTML        Hypertext Markup Language - 2.0       Elective     1866
SMTP-Pipe   SMTP Serv. Ext. for Command Pipelining Elective    1854
MIME-Sec    MIME Object Security Services         Elective     1848
MIME-Encyp  MIME: Signed and Encrypted            Elective     1847
WHOIS++     Architecture of the WHOIS++ service   Elective     1835
--------    Binding Protocols for ONC RPC Version 2 Elective   1833
XDR         External Data Representation Standard  Elective     1832
RPC         Remote Procedure Call Protocol V. 2   Elective     1831
--------    ESP DES-CBC Transform                 Ele/Req      1829
--------    IP Authentication using Keyed MD5     Ele/Req      1828
ESP         IP Encapsulating Security Payload     Ele/Req      1827
IPV6-AH     IP Authentication Header              Ele/Req      1826
--------    Security Architecture for IP          Ele/Req      1825
RREQ        Requirements for IP Version 4 Routers Elective     1812
URL         Relative Uniform Resource Locators    Elective     1808
CLDAP       Connection-less LDAP                  Elective     1798
OSPF-DC     Ext. OSPF to Support Demand Circuits  Elective     1793
TMUX        Transport Multiplexing Protocol       Elective     1692
TFTP-Opt    TFTP Options                          Elective     1784
TFTP-Blk    TFTP Blocksize Option                 Elective     1783
TFTP-Ext    TFTP Option Extension                 Elective     1782
OSI-Dir     OSI User Friendly Naming ...          Elective     1781
MIME-EDI    MIME Encapsulation of EDI Objects     Elective     1767
Lang-Tag    Tags for Identification of Languages  Elective     1766
XNSCP       PPP XNS IDP Control Protocol          Elective     1764
BVCP        PPP Banyan Vines Control Protocol     Elective     1763
Print-MIB   Printer MIB                           Elective     1759
ATM-SIG     ATM Signaling Support for IP over ATM Elective     1755
IPNG        Recommendation for IP Next Generation Elective     1752
802.5-SSR   802.5 SSR MIB using SMIv2             Elective     1749
```

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SDLCSMIv2  SNADLC SDLC MIB using SMIv2            Elective     1747
BGP4/IDRP  BGP4/IDRP for IP/OSPF Interaction      Elective     1745
AT-MIB     Appletalk MIB                          Elective     1742
MacMIME    MIME Encapsulation of Macintosh files  Elective     1740
URL        Uniform Resource Locators              Elective     1738
POP3-AUTH  POP3 AUTHentication command            Elective     1734
IMAP4-AUTH IMAP4 Authentication Mechanisms         Elective     1731
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     1666
PPP-TRANS  PPP Reliable Transmission              Elective     1663
--------   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
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
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
```

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Equiv       X.400/MIME Body Equivalences          Elective     1494
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      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
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-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
BGP-MIB     Border Gateway Protocol MIB (Version 3) Elective    1269
ICMP-ROUT   ICMP Router Discovery Messages         Elective     1256
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
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.]

[Note: Ele/Req indicates elective for use with IPv4 and required for use
with IPv6.]

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-TN3270E TN3270 Enhancements                 40    Prop  Ele    1647
TOPT-AUTH   Telnet XAUTH                          41    Exp
```

```
TOPT-CHARSET Telnet CHARSET                    42  Exp          2066
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
========   ===================================            =====
IP-SCSI    Encapsulating IP with the SCSI                 2143*
X.500-NAME Managing the X.500 Root Naming Context          2120*
TFTP-MULTI TFTP Multicast Option                          2090
IP-Echo    IP Echo Host Service                           2075
METER-MIB  Traffic Flow Measurement Meter MIB             2064
TFM-ARCH   Traffic Flow Measurement Architecture          2063
DNS-SRV    Location of Services in the DNS                2052
URAS       Uniform Resource Agents                        2016
GPS-AR     GPS-Based Addressing and Routing               2009
ETFTP      Enhanced Trivial File Transfer Protocol        1986
BGP-RR     BGP Route Reflection                           1966
BGP-ASC    Autonomous System Confederations for BGP       1965
SMKD       Scalable Multicast Key Distribution            1949
HTML-TBL   HTML Tables                                    1942
MIME-VP    Voice Profile for Internet Mail                1911
SNMPV2SM   User-based Security Model for SNMPv2           1910
SNMPV2AI   SNMPv2 Administrative Infrastructure           1909
SNMPV2CB   Introduction to Community-based SNMPv2         1901
-------    IPv6 Testing Address Allocation                1897
DNS-LOC    Location Information in the DNS                1876
SGML-MT    SGML Media Types                               1874
CONT-MT    Access Type Content-ID                         1873
UNARP      ARP Extension - UNARP                          1868
-------    Form-based File Upload in HTML                 1867
-------    BGP/IDRP Route Server Alternative              1863
-------    IP Authentication using Keyed SHA              1852
ESP3DES    ESP Triple DES Transform                       1851
-------    SMTP 521 Reply Code                            1846
-------    SMTP Serv. Ext. for Checkpoint/Restart         1845
-------    X.500 Mapping X.400 and RFC 822 Addresses      1838
-------    Tables and Subtrees in the X.500 Directory     1837
-------    O/R Address hierarchy in X.500                 1836
-------    SMTP Serv. Ext. Large and Binary MIME Msgs.    1830
ST2        Stream Protocol Version 2                      1819
-------    Content-Disposition Header                     1806
-------    Schema Publishing in X.500 Directory           1804
```

```
-------     X.400-MHS use X.500 to support X.400-MHS Routing    1801
-------     Class A Subnet Experiment                           1797
TCP/IPXMIB TCP/IPX Connection Mib Specification                 1792
-------     TCP And UDP Over IPX Networks With Fixed Path MTU    1791
ICMP-DM     ICMP Domain Name Messages                           1788
CLNP-MULT   Host Group Extensions for CLNP Multicasting         1768
OSPF-OVFL   OSPF Database Overflow                              1765
RWP         Remote Write ProtocolL - Version 1.0                1756
NARP        NBMA Address Resolution Protocol                    1735
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
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
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
IP-AX.25    IP Encapsulation of AX.25 Frames                    1226
ALERTS      Managing Asynchronously Generated Alerts            1224
MPP         Message Posting Protocol                            1204
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
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
=======     ==================================places=====   =====
PPP-EXT     PPP Vendor Extensions                           2153*
UTF-7       UTF-7                                           2152*
CAST-128    CAST-128 Encryption Algorithm                   2144*
DLSCAP      Data Link Switching Client Access Protocol      2114*
PNG         Portable Network Graphics Version 1.0           2083
RC5         RC5, RC5-CBC, RC5-CBC-Pad, and RC5-CTS Algorithms  2040
SNTP        Simple Network Time Protocol v4 for IPv4, IPv6 and OSI  2030
PGP-MEF     PGP Message Exchange Formats                    1991
PPP-DEFL    PPP Deflate Protocol                            1979
PPP-PRED    PPP Predictor Compression Protocol              1978
PPP-BSD     PPP BSD Compression Protocol                    1977
PPP-DCE     PPP for Data Compression in DCE                 1976
PPP-MAG     PPP Magnalink Variable Resource Compression     1975
PPP-STAC    PPP Stac LZS Compression Protocol               1974
GZIP        GZIP File Format Specification Version 4.3      1952
DEFLATE     DEFLATE Compressed Data Format Specification V. 1.3  1951
ZLIB        ZLIB Compressed Data Format Specification V. 3.3  1950
HTTP-1.0    Hypertext Transfer Protocol -- HTTP/1.0         1945
--------    text/enriched MIME Content-type                 1896
--------    Application/CALS-1840 Content-type              1895
--------    PPP IPCP Extensions for Name Server Addresses   1877
SNPP        Simple Network Paging Protocol - Version 2      1861
--------    ISO Transport Class 2 Non-use Explicit Flow Control  1859
            over TCP RFC1006 extension
--------    IP in IP Tunneling                              1853
--------    PPP Network Control Protocol for LAN Extension  1841
TESS        The Exponential Security System                 1824
NFSV3       NFS Version 3 Protocol Specification            1813
--------    A Format for Bibliographic Records              1807
-------     Data Link Switching: Switch-to-Switch Protocol  1795
BGP-4       Experience with the BGP-4 Protocol              1773
SDMD        IPv4 Option for Sender Directed MD Delivery     1770
SNOOP       Snoop Version 2 Packet Capture File Format      1761
BINHEX      MIME Content Type for BinHex Encoded Files      1741
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
ADSNA-IP    Advanced SNA/IP: A Simple SNA Transport Protocol  1538
TACACS      Terminal Access Control Protocol                1492
MD4         MD4 Message Digest Algorithm                    1320
```

```
SUN-NFS     Network File System Protocol                         1094
SUN-RPC     Remote Procedure Call Protocol Version 2             1057
GOPHER      The Internet Gopher Protocol                         1436
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
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
========    ===================================    =====  ===
IPSO        DoD Security Options for IP         Elective  1108
SNMPv2      Manager-to-Manager MIB              Elective  1451
SNMPv2      Party MIB for SNMPv2                Elective  1447
SNMPv2      Security Protocols for SNMPv2       Elective  1446
SNMPv2      Administrative Model for SNMPv2     Elective  1445
RIP         Routing Information Protocol        Ele       1058  34
--------    Mapping full 822 to Restricted 822            1137
BGP3        Border Gateway Protocol 3 (BGP-3)        1267,1268
--------    Gateway Requirements                Req       1009   4
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.

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 Stan/Rec    Network Time Protocol version 2
```

Thanks to Lynn Wheeler 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
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   7.2. Internet Assigned Numbers Authority Contact

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

         1-310-822-1511

         IANA@IANA.ORG

   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 "Requirements for IP Version 4 Routers" (RFC-1812).

      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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