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Internet Architecture Board
J. Postel, Editor
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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.

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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 16-Jun-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 |
| S | Std | X | XXX | XXX | | |
| | Draft | X | X | XXX | | |
| | Prop | | X | XXX | | |
| T | Info | | | | | |
| | 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 Status | IAB | IESG | IRSG | Other |
| Standard or Draft Standard | Bogus (2) | Publish (1) | Bogus (2) | Bogus (2) |
| Proposed Standard | Refer (3) | Publish (1) | Refer (3) | Refer (3) |
| Experimental Protocol | Notify (4) | Publish (1) | Notify (4) | Notify (4) |
| Information or Opinion Paper | Publish (1) | Publish (1) | Discretion (5) | Discretion (5) |

(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.



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:

2109 - HTTP State Management Mechanism

A Proposed Standard protocol.

2108 - Definitions of Managed Objects for IEEE 802.3 Repeater Devices using SMIV2

A Proposed Standard protocol.

2107 - Ascend Tunnel Management Protocol - ATMP

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

2106 - Data Link Switching Remote Access Protocol

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

2105 - Cisco Systems' Tag Switching Architecture Overview

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

2104 - HMAC: Keyed-Hashing for Message Authentication

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

2103 - Mobility Support for Nimrod : Challenges and Solution Approaches

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

2102 - Multicast Support for Nimrod : Requirements and Solution Approaches

This is an information document and does not specify any

level of standard.

2101 - IPv4 Address Behaviour Today

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

2100 - not yet issued.

2099 - not yet issued.

2098 - Toshiba's Router Architecture Extensions for ATM : Overview

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

2097 - The PPP NetBIOS Frames Control Protocol (NBFCP)

A Proposed Standard protocol.

2096 - IP Forwarding Table MIB

A Proposed Standard protocol.

2095 - IMAP/POP AUTHorize Extension for Simple Challenge/Response

A Proposed Standard protocol.

2094 - not yet issued.

2093 - not yet issued.

2092 - Protocol Analysis for Triggered RIP

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

2091 - Triggered Extensions to RIP to Support Demand Circuits

A Proposed Standard protocol.

2090 - TFTP Multicast Option

An Experimental protocol.

2089 - V2ToV1 Mapping SNMPv2 onto SNMPv1 within a bi-lingual SNMP agent

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

2088 - IMAP4 non-synchronizing literals

A Proposed Standard protocol.

2087 - IMAP4 QUOTA extension

A Proposed Standard protocol.

2086 - IMAP4 ACL extension

A Proposed Standard protocol.

2085 - HMAC-MD5 IP Authentication with Replay Prevention

A Proposed Standard protocol.

2084 - Considerations for Web Transaction Security

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

2083 - PNG (Portable Network Graphics) Specification Version 1.0

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

2082 - RIP-2 MD5 Authentication

A Proposed Standard protocol.

2081 - RIPng Protocol Applicability Statement

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

2080 - RIPng for IPv6

A Proposed Standard protocol.

2079 - Definition of an X.500 Attribute Type and an Object Class to Hold Uniform Resource Identifiers (URIs)

A Proposed Standard protocol.

- 2078 - Generic Security Service Application Program Interface,
Version 2

A Proposed Standard protocol.

- 2077 - The Model Primary Content Type for Multipurpose Internet
Mail Extension

A Proposed Standard protocol.

- 2076 - not yet issued.

- 2075 - IP Echo Host Service

An Experimental protocol.

- 2074 - Remote Network Monitoring MIB Protocol Identifiers

A Proposed Standard protocol.

- 2073 - An IPv6 Provider-Based Unicast Address Format

A Proposed Standard protocol.

- 2072 - Router Renumbering Guide

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

- 2071 - Network Renumbering Overview: Why would I want it and what
is it anyway?

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

- 2070 - Internationalization of the Hypertext Markup Language

A Proposed Standard protocol.

- 2069 - An Extension to HTTP : Digest Access Authentication

A Proposed Standard protocol.

- 2068 - Hypertext Transfer Protocol -- HTTP/1.1

A Proposed Standard protocol.

- 2067 - IP over HIPPI
A Draft Standard protocol.
- 2066 - TELNET CHARSET Option
An Experimental protocol.
- 2065 - Domain Name System Security Extensions
A Proposed Standard protocol.
- 2064 - Traffic Flow Measurement: Meter MIB
An Experimental protocol.
- 2063 - Traffic Flow Measurement: Architecture
An Experimental protocol.
- 2062 - Internet Message Access Protocol - Obsolete Syntax
This is an information document and does not specify any level of standard.
- 2061 - IMAP4 Compatibility with IMAP2BIS
This is an information document and does not specify any level of standard.
- 2060 - Internet Message Access Protocol - Version 4rev1
A Proposed Standard protocol.
- 2059 - RADIUS Accounting
This is an information document and does not specify any level of standard.
- 2058 - Remote Authentication Dial In User Service (RADIUS)
A Proposed Standard protocol.
- 2057 - Source Directed Access Control on the Internet
This is an information document and does not specify any level of standard.

2056 - Uniform Resource Locators for Z39.50

A Proposed Standard protocol.

2055 - WebNFS Server Specification

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

2054 - WebNFS Client Specification

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

2053 - The AM (Armenia) Domain

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

2052 - A DNS RR for specifying the location of services (DNS SRV)

An Experimental protocol.

2051 - Definitions of Managed Objects for APPC using SMIV2

A Proposed Standard protocol.

2050 - Internet Registry IP Allocation Guidelines

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

2049 - Multipurpose Internet Mail Extensions (MIME) Part Five: Conformance Criteria and Examples

A Draft Standard protocol.

2048 - Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures

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

2047 - MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text

A Draft Standard protocol.

- 2046 - Multipurpose Internet Mail Extensions (MIME) Part Two:
Media Types

A Draft Standard protocol.

- 2045 - Multipurpose Internet Mail Extensions (MIME) Part One:
Format of Internet Message Bodies

A Draft Standard protocol.

- 2044 - UTF-8, a transformation format of Unicode and ISO 10646

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

- 2043 - The PPP SNA Control Protocol (SNACP)

A Proposed Standard protocol.

- 2042 - Registering New BGP Attribute Types

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

- 2041 - Mobile Network Tracing

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

- 2040 - The RC5, RC5-CBC, RC5-CBC-Pad, and RC5-CTS Algorithms

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

- 2039 - Applicability of Standards Track MIBs to Management of World
Wide Web Servers

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

- 2038 - RTP Payload Format for MPEG1/MPEG2 Video

A Proposed Standard protocol.

- 2037 - Entity MIB using SMIV2

A Proposed Standard protocol.

- 2036 - Observations on the use of Components of the Class A Address Space within the Internet

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

- 2035 - RTP Payload Format for JPEG-compressed Video

A Proposed Standard protocol.

- 2034 - SMTP Service Extension for Returning Enhanced Error Codes

A Proposed Standard protocol.

- 2033 - Local Mail Transfer Protocol

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

- 2032 - RTP Payload Format for H.261 Video Streams

A Proposed Standard protocol.

- 2031 - IETF-ISOC relationship

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

- 2030 - Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI

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

- 2029 - RTP Payload Format of Sun's CellB Video Encoding

A Proposed Standard protocol.

- 2028 - The Organizations Involved in the IETF Standards Process

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

- 2027 - IAB and IESG Selection, Confirmation, and Recall Process: Operation of the Nominating and Recall Committees

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

2026 - The Internet Standards Process -- Revision 3

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

2025 - The Simple Public-Key GSS-API Mechanism (SPKM)

A Proposed Standard protocol.

2024 - Definitions of Managed Objects for Data Link Switching using SMIV2

A Proposed Standard protocol.

2023 - IP Version 6 over PPP

A Proposed Standard protocol.

2022 - Support for Multicast over UNI 3.0/3.1 based ATM Networks

A Proposed Standard protocol.

2021 - Remote Network Monitoring Management Information Base Version 2 using SMIV2

A Proposed Standard protocol.

2020 - IEEE 802.12 Interface MIB

A Proposed Standard protocol.

2019 - Transmission of IPv6 Packets Over FDDI

A Proposed Standard protocol.

2018 - TCP Selective Acknowledgement Options

A Proposed Standard protocol.

2017 - Definition of the URL MIME External-Body Access-Type

A Proposed Standard protocol.

2016 - Uniform Resource Agents (URAs)

An Experimental protocol.

- 2015 - MIME Security with Pretty Good Privacy (PGP)
A Proposed Standard protocol.
- 2014 - IRTF Research Group Guidelines and Procedures
This is a Best Current Practices document and does not specify any level of standard.
- 2013 - SNMPv2 Management Information Base for the User Datagram Protocol using SMIV2
A Proposed Standard protocol.
- 2012 - SNMPv2 Management Information Base for the Transmission Control Protocol using SMIV2
A Proposed Standard protocol.
- 2011 - SNMPv2 Management Information Base for the Internet Protocol using SMIV2
A Proposed Standard protocol.
- 2010 - Operational Criteria for Root Name Servers
This is an information document and does not specify any level of standard.
- 2009 - GPS-Based Addressing and Routing
An Experimental protocol.
- 2008 - Implications of Various Address Allocation Policies for Internet Routing
This is a Best Current Practices document and does not specify any level of standard.
- 2007 - Catalogue of Network Training Materials
This is an information document and does not specify any level of standard.
- 2006 - The Definitions of Managed Objects for IP Mobility Support using SMIV2
A Proposed Standard protocol.

- 2005 - Applicability Statement for IP Mobility Support
A Proposed Standard protocol.
- 2004 - Minimal Encapsulation within IP
A Proposed Standard protocol.
- 2003 - IP Encapsulation within IP
A Proposed Standard protocol.
- 2002 - IP Mobility Support
A Proposed Standard protocol.
- 2001 - TCP Slow Start, Congestion Avoidance, Fast Retransmit, and
Fast Recovery Algorithms
A Proposed Standard protocol.
- 2000 - Internet Official Protocol Standards
This memo.
- 1999 - Request for Comments Summary RFC Numbers 1900-1999
This is an information document and does not specify any
level of standard.
- 1998 - An Application of the BGP Community Attribute in Multi-home
Routing
This is an information document and does not specify any
level of standard.
- 1997 - BGP Communities Attribute
A Proposed Standard protocol.
- 1996 - A Mechanism for Prompt Notification of Zone Changes (DNS
NOTIFY)
A Proposed Standard protocol.
- 1995 - Incremental Zone Transfer in DNS
A Proposed Standard protocol.

- 1994 - PPP Challenge Handshake Authentication Protocol (CHAP)
A Draft Standard protocol.
- 1993 - PPP Gandalf FZA Compression Protocol
This is an information document and does not specify any level of standard.
- 1992 - The Nimrod Routing Architecture
This is an information document and does not specify any level of standard.
- 1991 - PGP Message Exchange Formats
This is an information document and does not specify any level of standard.
- 1990 - The PPP Multilink Protocol (MP)
A Draft Standard protocol.
- 1989 - PPP Link Quality Monitoring
A Draft Standard protocol.
- 1988 - Conditional Grant of Rights to Specific Hewlett-Packard Patents In Conjunction With the Internet Engineering Task Force's Internet-Standard Network Management Framework
This is an information document and does not specify any level of standard.
- 1987 - Ipsilon's General Switch Management Protocol Specification Version 1.1
This is an information document and does not specify any level of standard.
- 1986 - Experiments with a Simple File Transfer Protocol for Radio Links using Enhanced Trivial File Transfer Protocol (ETFTP)
An Experimental protocol.
- 1985 - SMTP Service Extension for Remote Message Queue Starting
A Proposed Standard protocol.

- 1984 - IAB and IESG Statement on Cryptographic Technology and the Internet

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

- 1983 - Internet Users' Glossary

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

- 1982 - Serial Number Arithmetic

A Proposed Standard protocol.

- 1981 - Path MTU Discovery for IP version 6

A Proposed Standard protocol.

- 1980 - A Proposed Extension to HTML : Client-Side Image Maps

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

- 1979 - PPP Deflate Protocol

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

- 1978 - PPP Predictor Compression Protocol

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

- 1977 - PPP BSD Compression Protocol

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

- 1976 - PPP for Data Compression in Data Circuit-Terminating Equipment (DCE)

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

- 1975 - PPP Magnalink Variable Resource Compression

This is an information document and does not specify any

level of standard.

1974 - PPP Stac LZS Compression Protocol

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

1973 - PPP in Frame Relay

A Proposed Standard protocol.

1972 - A Method for the Transmission of IPv6 Packets over Ethernet Networks

A Proposed Standard protocol.

1971 - IPv6 Stateless Address Autoconfiguration

A Proposed Standard protocol.

1970 - Neighbor Discovery for IP Version 6 (IPv6)

A Proposed Standard protocol.

1969 - The PPP DES Encryption Protocol (DESE)

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

1968 - The PPP Encryption Control Protocol (ECP)

A Proposed Standard protocol.

1967 - PPP LZS-DCP Compression Protocol (LZS-DCP)

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

1966 - BGP Route Reflection An alternative to full mesh IBGP

An Experimental protocol.

1965 - Autonomous System Confederations for BGP

An Experimental protocol.

- 1964 - The Kerberos Version 5 GSS-API Mechanism
A Proposed Standard protocol.
- 1963 - PPP Serial Data Transport Protocol (SDTP)
This is an information document and does not specify any level of standard.
- 1962 - The PPP Compression Control Protocol (CCP)
A Proposed Standard protocol.
- 1961 - GSS-API Authentication Method for SOCKS Version 5
A Proposed Standard protocol.
- 1960 - A String Representation of LDAP Search Filters
A Proposed Standard protocol.
- 1959 - An LDAP URL Format
A Proposed Standard protocol.
- 1958 - Architectural Principles of the Internet
This is an information document and does not specify any level of standard.
- 1957 - Some Observations on Implementations of the Post Office Protocol (POP3)
This is an information document and does not specify any level of standard.
- 1956 - Registration in the MIL Domain
This is an information document and does not specify any level of standard.
- 1955 - New Scheme for Internet Routing and Addressing (ENCAPS) for IPNG
This is an information document and does not specify any level of standard.

- 1954 - Transmission of Flow Labelled IPv4 on ATM Data Links
Ipsilon Version 1.0

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

- 1953 - Ipsilon Flow Management Protocol Specification for IPv4
Version 1.0

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

- 1952 - GZIP file format specification version 4.3

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

- 1951 - DEFLATE Compressed Data Format Specification version 1.3

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

- 1950 - ZLIB Compressed Data Format Specification version 3.3

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

- 1949 - Scalable Multicast Key Distribution

An Experimental protocol.

- 1948 - Defending Against Sequence Number Attacks

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

- 1947 - Greek Character Encoding for Electronic Mail Messages

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

- 1946 - Native ATM Support for ST2+

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

1945 - Hypertext Transfer Protocol -- HTTP/1.0

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

1944 - Benchmarking Methodology for Network Interconnect Devices

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

1943 - Building an X.500 Directory Service in the US

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

1942 - HTML Tables

An Experimental protocol.

1941 - Frequently Asked Questions for Schools

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

1940 - Source Demand Routing: Packet Format and Forwarding Specification

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

1939 - Post Office Protocol - Version 3

A Standard protocol.

1938 - A One-Time Password System

A Proposed Standard protocol.

1937 - "Local/Remote" Forwarding Decision in Switched Data Link Subnetworks

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

1936 - Implementing the Internet Checksum in Hardware

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

1935 - What is the Internet, Anyway?

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

1934 - Ascend's Multilink Protocol Plus (MP+)

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

1933 - Transition Mechanisms for IPv6 Hosts and Routers

A Proposed Standard protocol.

1932 - IP over ATM: A Framework Document

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

1931 - Dynamic RARP Extensions for Automatic Network Address Acquisition

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

1930 - Guidelines for creation, selection, and registration of an Autonomous System (AS)

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

1929 - Username/Password Authentication for SOCKS V5

A Proposed Standard protocol.

1928 - SOCKS Protocol Version 5

A Proposed Standard protocol.

1927 - Suggested Additional MIME Types for Associating Documents

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

1926 - An Experimental Encapsulation of IP Datagrams on Top of ATM

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

1925 - The Twelve Networking Truths

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

1924 - A Compact Representation of IPv6 Addresses

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

1923 - RIPv1 Applicability Statement for Historic Status

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

1922 - Chinese Character Encoding for Internet Messages

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

1921 - TNVIP Protocol

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

1919 - Classical versus Transparent IP Proxies

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

1899 - Request for Comments Summary RFC Numbers 1800-1899

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

1799 - Request for Comments Summary RFC Numbers 1700-1799

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

1699 - Request for Comments Summary RFC Numbers 1600-1699

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

1599 - Request for Comments Summary RFC Numbers 1500-1599

This is an information document and does not specify any

level of standard.

1499 - Request for Comments Summary RFC Numbers 1400-1499

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

1399 - Request for Comments Summary RFC Numbers 1300-1399

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

1299 - Request for Comments Summary RFC Numbers 1200-1299

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.

2067 - IP over HIPPI

Elevated to Draft Standard.

2049 - Multipurpose Internet Mail Extensions (MIME) Part Five: Conformance Criteria and Examples

Elevated to Draft Standard.

2047 - MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text

Elevated to Draft Standard.

2046 - Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types

Elevated to Draft Standard.

2045 - Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies

Elevated to Draft Standard.

1994 - PPP Challenge Handshake Authentication Protocol (CHAP)

Elevated to Draft Standard.

1990 - The PPP Multilink Protocol (MP)

Elevated to Draft Standard.

1989 - PPP Link Quality Monitoring

Elevated to Draft Standard.

1939 - Post Office Protocol - Version 3

Elevated to Standard.

1108 - U.S. Department of Defense Security Options for the
Internet Protocol

Moved to Historic.

6.2. Standard Protocols

| Protocol | Name | Status | RFC | STD | * |
|-------------|---|--------|-----------|-------|-------|
| ===== | ===== | ===== | ===== | ===== | ===== |
| ----- | Internet Official Protocol Standards | Req | 2000 | 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 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-X.25 | X.25 and ISDN in the Packet Mode | Draft | 1356 | | |
| 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 | 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 |
|-------------|---|-------------|----------|
| ===== | ===== | ===== | ===== |
| 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 |
| 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 |
| BOOTP | Bootstrap Protocol | Recommended | 951,1533 |
| 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 |
|------------|--|----------|-------|
| ===== | ===== | ===== | ===== |
| 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* |
| RADIUS | Remote Authentication Dial In User Serv | Elective | 2058* |
| 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* |
| TCP-SLOW-RTT | 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 |
| SDLC SMiv2 | 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 |
| IMAP4 | Internet Message Access Protocol V4 | Elective | 1730 |
| 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-IMP | BGP-4 Roadmap and Implementation | Elective | 1656 |
| ----- | 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 |
| 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 | 1542 |
| DHCP | Dynamic Host Configuration Protocol | Elective | 1541 |
| 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 |
| 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 | Management Information Base for SNMPv2 | Elective | 1450 |

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|----------------|--|----------|------|
| SNMPv2 | Transport Mappings for SNMPv2 | Elective | 1449 |
| SNMPv2 | Protocol Operations for SNMPv2 | Elective | 1448 |
| 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 |
| 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 |
| GINT-MIB | Extensions to the Generic-Interface MIB | Elective | 1229 |
| 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 |
|------------|--|-------|
| ===== | ===== | ===== |
| 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 |
| RELAT-MT | Multipart/Related | 1872 |
| 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 |

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|------------|---|------|
| ----- | 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 |
| 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 |

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|------------|--|----------|
| 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 |
|------------|--|-------|
| ===== | ===== | ===== |
| ATMP | Ascend Tunnel Management Protocol | 2107* |
| DLSRAP | Data Link Switching Remote Access Protocol | 2106* |
| PNG | Portable Network Graphics Version 1.0 | 2083* |
| RC5 | RC5, RC5-CBC, RC5-CBC-Pad, and RC5-CTS Algorithms | 2040* |
| SNTPv4 | Simple Network Time Protocol v4 for IPv4, IPv6 and OSI | 2030* |
| PGP-MEF | PGP Message Exchange Formats | 1991* |
| GSMP | Ipsilon's General Switch Management Protocol | 1987* |
| 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* |
| MP+ | Ascend's Multilink Protocol Plus (MP+) | 1934* |
| CYBERCASH | CyberCash Credit Card Protocol Version 0.8 | 1898 |
| ----- | 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 over TCP RFC1006 extension | 1859 |
| ----- | 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 |
| SDMD | IPv4 Option for Sender Directed MD Delivery | 1770 |
| SNTP | Simple Network Time Protocol | 1769 |
| 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 |
| 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 |

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|------------|--|------|
| 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 |
|------------|--|----------|------------|-------|
| ===== | ===== | | ===== | ===== |
| 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 | |

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|------------|---|-----------|
| 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 | |
| 1533 | obsoletes | 1497 | Draf/Rec | BOOTP Vendor Information Extensions | |
| 2045 | obsoletes | 1522 | Draf/Ele | MIME Part Two | * |
| 2045 | obsoletes | 1521 | Draf/Ele | MIME Part One | * |
| 1939 | obsoletes | 1725 | Draf/Ele | Post Office Protocol - Version 3 | * |
| 1390 | obsoletes | 1188 | Draf/Elec | Transmission of IP and ARP over FDDI | |
| 2096 | obsoletes | 1354 | Prop/Ele | IP Forwarding Table MIB | * |
| 2078 | obsoletes | 1508 | Prop/Ele | GSSAP Interface | * |
| 2067 | obsoletes | 1374 | Prop/Ele | IP and ARP on HIPPI | * |
| 2060 | obsoletes | 1730 | Prop/Ele | IMAP4rev1 | * |
| 1994 | obsoletes | 1334 | Prop/Ele | PPP Authentication Protocols | * |
| 1990 | obsoletes | 1717 | Prop/Ele | PPP Multilink Protocol (MP) | * |
| 1989 | obsoletes | 1333 | Prop/Ele | PPP Link Quality Monitoring | * |
| 1908 | obsoletes | 1452 | Prop/Elec | Coexistence between SNMPv1 & SNMPv2 | |
| 1907 | obsoletes | 1450 | Prop/Elec | MIB for SNMPv2 | |
| 1906 | obsoletes | 1449 | Prop/Elec | Transport Mappings for SNMPv2 | |
| 1905 | obsoletes | 1448 | Prop/Elec | Protocol Operations for SNMPv2 | |
| 1904 | obsoletes | 1444 | Prop/Elec | Conformance Statements for SNMPv2 | |
| 1903 | obsoletes | 1443 | Prop/Elec | Textual Conventions for SNMPv2 | |
| 1902 | obsoletes | 1442 | Prop/Elec | SMI for SNMPv2 | |
| 1773 | obsoletes | 1656 | Prop/Elec | BGP-4 Protocol Document | |
| 1666 | obsoletes | 1665 | Prop/Ele | SNANAU MIB | |
| 1573 | obsoletes | 1229 | Prop/Elec | Ext. to the Generic-Interface MIB | |
| 1542 | obsoletes | 1532 | Prop/Elec | Extensions for Bootstrap Protocol | |
| 2030 | obsoletes | 1769 | Info/ | Simple Network Time Protocol | * |
| 1795 | obsoletes | 1434 | Info/ | Data Link Switching | * |
| 1320 | obsoletes | 1186 | Info/ | The MD4 Message Digest Algorithm | |
| 1592 | obsoletes | 1228 | Expe/Limi | SNMP Distributed Protocol Interface | |
| 1528 | obsoletes | 1486 | Expe/Lim | An Experiment in Remote Printing | * |

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.

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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:

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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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