

Network Working Group  
Request for Comments: 2300

Internet Architecture Board  
J. Postel, Editor  
May 1998

Obsoletes: 2200, 2000, 1920, 1880, 1800,  
1780, 1720, 1610, 1600, 1540, 1500, 1410,  
1360, 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.

### Copyright Notice

Copyright (C) The Internet Society (1998). All Rights Reserved.

### Table of Contents

Introduction . . . . .	2
1. The Standardization Process . . . . .	3
2. The Request for Comments Documents . . . . .	5
3. Other Reference Documents . . . . .	6
3.1. Assigned Numbers . . . . .	6
3.2. Gateway Requirements . . . . .	6
3.3. Host Requirements . . . . .	6
3.4. The MIL-STD Documents . . . . .	6
4. Explanation of Terms . . . . .	7
4.1. Definitions of Protocol State (Maturity Level) . . . . .	8
4.1.1. Standard Protocol . . . . .	8
4.1.2. Draft Standard Protocol . . . . .	8
4.1.3. Proposed Standard Protocol . . . . .	8
4.1.4. Experimental Protocol . . . . .	8
4.1.5. Informational Protocol . . . . .	9
4.1.6. Historic Protocol . . . . .	9
4.2. Definitions of Protocol Status (Requirement Level) . . . . .	9
4.2.1. Required Protocol . . . . .	9
4.2.2. Recommended Protocol . . . . .	9
4.2.3. Elective Protocol . . . . .	9
4.2.4. Limited Use Protocol . . . . .	9
4.2.5. Not Recommended Protocol . . . . .	9
5. The Standards Track . . . . .	10

5.1.	The RFC Processing Decision Table . . . . .	10
5.2.	The Standards Track Diagram . . . . .	11
6.	The Protocols . . . . .	13
6.1.	Recent Changes . . . . .	13
6.1.1.	New RFCs . . . . .	13
6.1.2.	Other Changes . . . . .	33
6.2.	Standard Protocols . . . . .	34
6.3.	Network-Specific Standard Protocols . . . . .	36
6.4.	Draft Standard Protocols . . . . .	37
6.5.	Proposed Standard Protocols . . . . .	39
6.6.	Telnet Options . . . . .	46
6.7.	Experimental Protocols . . . . .	47
6.8.	Informational Protocols . . . . .	50
6.9.	Historic Protocols . . . . .	52
6.10.	Obsolete Protocols . . . . .	53
7.	Contacts . . . . .	54
7.1.	IAB, IETF, and IRTF Contacts . . . . .	54
7.1.1.	Internet Architecture Board (IAB) Contact . . . . .	54
7.1.2.	Internet Engineering Task Force (IETF) Contact . . . . .	54
7.1.3.	Internet Research Task Force (IRTF) Contact . . . . .	55
7.2.	Internet Assigned Numbers Authority (IANA) Contact . . . . .	56
7.3.	Request for Comments Editor Contact . . . . .	57
7.4.	Network Information Center Contact . . . . .	57
7.5.	Sources for Requests for Comments . . . . .	58
8.	Security Considerations . . . . .	58
9.	Author's Address . . . . .	58
10.	Full Copyright Statement . . . . .	59

## 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 every one hundred RFCs; please be sure the copy you are reading is current. Current copies may be obtained from the Requests for Comments Editor (RFC-EDITOR) or from the Internet Assigned Numbers Authority (IANA) (see the contact information at the end of this memo).

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.

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 2223).

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 RFC-EDITOR, 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		
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 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".

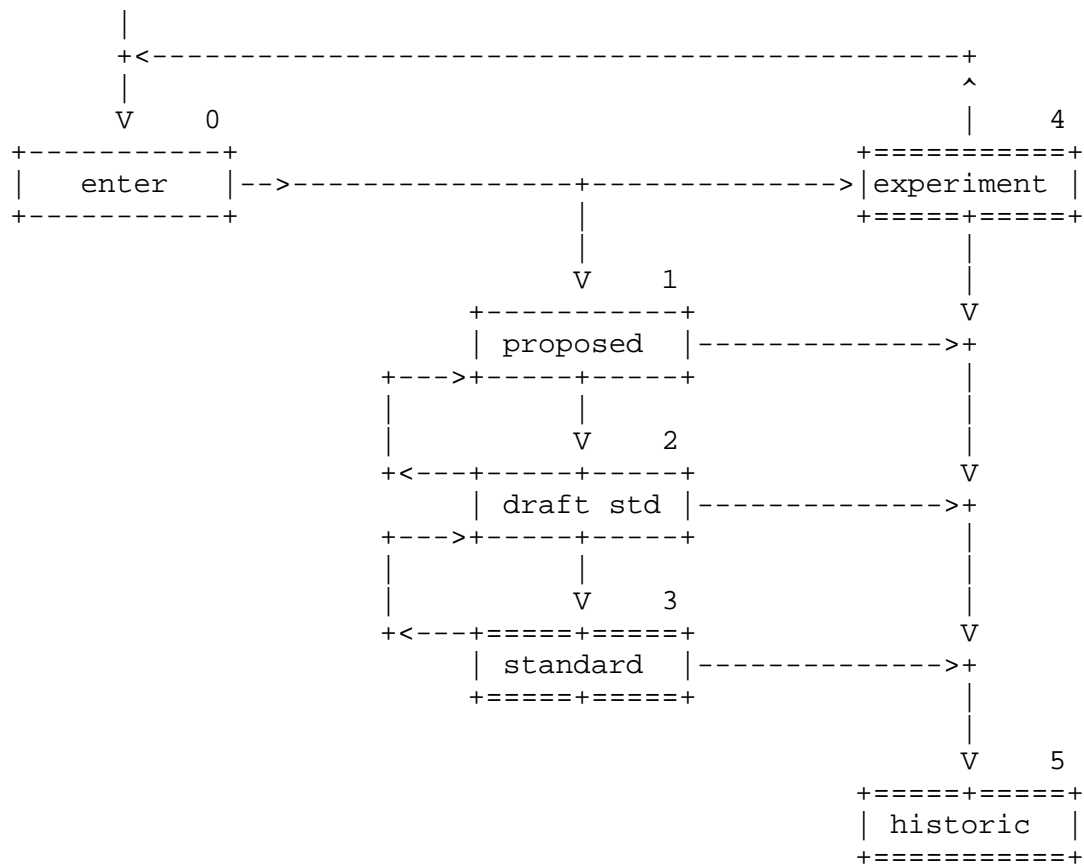
## 5.2. The Standards Track Diagram

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:

2352 - A Convention For Using Legal Names as Domain Names

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

2351 - Mapping of Airline Reservation, Ticketing, and Messaging Traffic over IP

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

2350 - Not yet issued.

2349 - TFTP Timeout Interval and Transfer Size Options

A Draft Standard protocol.

2348 - TFTP Blocksize Option

A Draft Standard protocol.

2347 - TFTP Option Extension

A Draft Standard protocol.

2346 - Making Postscript and PDF International

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

2345 - Domain Names and Company Name Retrieval

An Experimental protocol.

2344 - Reverse Tunneling for Mobile IP

A Proposed Standard protocol.

- 2343 - RTP Payload Format for Bundled MPEG  
An Experimental protocol.
- 2342 - IMAP4 Namespace  
A Proposed Standard protocol.
- 2341 - Cisco Layer Two Forwarding (Protocol) "L2F"  
A Historic protocol.
- 2340 - Not yet issued.
- 2339 - An Agreement Between the Internet Society, the IETF, and  
Sun Microsystems, Inc. in the matter of NFS V.4 Protocols  
  
This is an information document and does not specify any  
level of standard.
- 2338 - Virtual Router Redundancy Protocol  
A Proposed Standard protocol.
- 2337 - Intra-LIS IP multicast among routers over ATM using Sparse  
Mode PIM  
  
An Experimental protocol.
- 2336 - Not yet issued.
- 2335 - A Distributed NHRP Service Using SCSP  
A Proposed Standard protocol.
- 2334 - Server Cache Synchronization Protocol (SCSP)  
A Proposed Standard protocol.
- 2333 - NHRP Protocol Applicability Statement  
A Proposed Standard protocol.
- 2332 - NBMA Next Hop Resolution Protocol (NHRP)  
A Proposed Standard protocol.

- 2331 - ATM Signalling Support for IP over ATM - UNI Signalling 4.0 Update  
A Proposed Standard protocol.
- 2330 - Framework for IP Performance Metrics  
This is an information document and does not specify any level of standard.
- 2329 - OSPF Standardization Report  
This is an information document and does not specify any level of standard.
- 2328 - OSPF Version 2  
A Standard protocol.
- 2327 - SDP: Session Description Protocol  
A Proposed Standard protocol.
- 2326 - Real Time Streaming Protocol (RTSP)  
A Proposed Standard protocol.
- 2325 - Definitions of Managed Objects for Drip-Type Heated Beverage Hardware Devices using SMIV2  
This is an information document and does not specify any level of standard.
- 2324 - Hyper Text Coffee Pot Control Protocol (HTCPCP/1.0)  
This is an information document and does not specify any level of standard.
- 2323 - IETF Identification and Security Guidelines  
This is an information document and does not specify any level of standard.
- 2322 - Management of IP numbers by peg-dhcp  
This is an information document and does not specify any level of standard.

2321 - RITA -- The Reliable Internetwork Troubleshooting Agent

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

2320 - Definitions of Managed Objects for Classical IP and ARP Over ATM Using SMIV2 (IPOA-MIB)

A Proposed Standard protocol.

2319 - Ukrainian Character Set KOI8-U

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

2318 - The text/css Media Type

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

2317 - Classless IN-ADDR.ARPA delegation

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

2316 - Report of the IAB Security Architecture Workshop

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

2315 - PKCS #7: Cryptographic Message Syntax Version 1.5

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

2314 - PKCS #10: Certification Request Syntax Version 1.5

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

2313 - PKCS #1: RSA Encryption Version 1.5

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

2312 - S/MIME Version 2 Certificate Handling

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

2311 - S/MIME Version 2 Message Specification

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

2310 - The Safe Response Header Field

An Experimental protocol.

2309 - Recommendations on Queue Management and Congestion Avoidance in the Internet

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

2308 - Negative Caching of DNS Queries (DNS NCACHE)

A Proposed Standard protocol.

2307 - An Approach for Using LDAP as a Network Information Service

An Experimental protocol.

2306 - Tag Image File Format (TIFF) - F Profile for Facsimile

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

2305 - A Simple Mode of Facsimile Using Internet Mail

A Proposed Standard protocol.

2304 - Minimal FAX address format in Internet Mail

A Proposed Standard protocol.

2303 - Minimal PSTN address format in Internet Mail

A Proposed Standard protocol.

2302 - Tag Image File Format (TIFF) - image/tiff MIME Sub-type Registration

A Proposed Standard protocol.

2301 - File Format for Internet Fax

A Proposed Standard protocol.

2300 - This memo.

2299 - Not yet issued.

2298 - An Extensible Message Format for Message Disposition Notifications

A Proposed Standard protocol.

2297 - Ipsilon's General Switch Management Protocol Specification Version 2.0

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

2296 - HTTP Remote Variant Selection Algorithm -- RVSA/1.0

An Experimental protocol.

2295 - Transparent Content Negotiation in HTTP

An Experimental protocol.

2294 - Representing the O/R Address hierarchy in the X.500 Directory Information Tree

A Proposed Standard protocol.

2293 - Representing Tables and Subtrees in the X.500 Directory

A Proposed Standard protocol.

2292 - Advanced Sockets API for IPv6

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

- 2291 - Requirements for a Distributed Authoring and Versioning Protocol for the World Wide Web

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

- 2290 - Mobile-IPv4 Configuration Option for PPP IPCP

A Proposed Standard protocol.

- 2289 - A One-Time Password System

A Draft Standard protocol.

- 2288 - Using Existing Bibliographic Identifiers as Uniform Resource Names

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

- 2287 - Definitions of System-Level Managed Objects for Applications

A Proposed Standard protocol.

- 2286 - Test Cases for HMAC-RIPEMD160 and HMAC-RIPEMD128

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

- 2285 - Benchmarking Terminology for LAN Switching Devices

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

- 2284 - PPP Extensible Authentication Protocol (EAP)

A Proposed Standard protocol.

- 2283 - Multiprotocol Extensions for BGP-4

A Proposed Standard protocol.

- 2282 - 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.

2281 - Cisco Hot Standby Router Protocol (HSRP)

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

2280 - Routing Policy Specification Language (RPSL)

A Proposed Standard protocol.

2279 - UTF-8, a transformation format of ISO 10646

A Proposed Standard protocol.

2278 - IANA Charset Registration Procedures

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

2277 - IETF Policy on Character Sets and Languages

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

2276 - Architectural Principles of Uniform Resource Name Resolution

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

2275 - View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)

A Proposed Standard protocol.

2274 - User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)

A Proposed Standard protocol.

2273 - SNMPv3 Applications

A Proposed Standard protocol.

2272 - Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)

A Proposed Standard protocol.

- 2271 - An Architecture for Describing SNMP Management Frameworks  
A Proposed Standard protocol.
- 2270 - Using a Dedicated AS for Sites Homed to a Single Provider  
This is an information document and does not specify any level of standard.
- 2269 - Using the MARS Model in non-ATM NBMA Networks  
This is an information document and does not specify any level of standard.
- 2268 - A Description of the RC2(r) Encryption Algorithm  
This is an information document and does not specify any level of standard.
- 2267 - Network Ingress Filtering: Defeating Denial of Service Attacks which employ IP Source Address Spoofing  
This is an information document and does not specify any level of standard.
- 2266 - Definitions of Managed Objects for IEEE 802.12 Repeater Devices  
A Proposed Standard protocol.
- 2265 - View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)  
A Proposed Standard protocol.
- 2264 - User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)  
A Proposed Standard protocol.
- 2263 - SNMPv3 Applications  
A Proposed Standard protocol.
- 2262 - Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)  
A Proposed Standard protocol.

2261 - An Architecture for Describing SNMP Management Frameworks  
A Proposed Standard protocol.

2260 - Scalable Support for Multi-homed Multi-provider  
Connectivity

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

2259 - Simple Nomenclator Query Protocol (SNQP)

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

2258 - Internet Nomenclator Project

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

2257 - Agent Extensibility (AgentX) Protocol Version 1

A Proposed Standard protocol.

2256 - A Summary of the X.500(96) User Schema for use with LDAPv3

A Proposed Standard protocol.

2255 - The LDAP URL Format

A Proposed Standard protocol.

2254 - The String Representation of LDAP Search Filters

A Proposed Standard protocol.

2253 - Lightweight Directory Access Protocol (v3): UTF-8 String  
Representation of Distinguished Names

A Proposed Standard protocol.

2252 - Lightweight Directory Access Protocol (v3): Attribute  
Syntax Definitions

A Proposed Standard protocol.

- 2251 - Lightweight Directory Access Protocol (v3)  
A Proposed Standard protocol.
- 2250 - RTP Payload Format for MPEG1/MPEG2 Video  
A Proposed Standard protocol.
- 2249 - Mail Monitoring MIB  
A Proposed Standard protocol.
- 2248 - Network Services Monitoring MIB  
A Proposed Standard protocol.
- 2247 - Using Domains in LDAP/X.500 Distinguished Names  
A Proposed Standard protocol.
- 2246 - Not yet issued.
- 2245 - Anonymous SASL Mechanism  
A Proposed Standard protocol.
- 2244 - ACAP -- Application Configuration Access Protocol  
A Proposed Standard protocol.
- 2243 - OTP Extended Responses  
A Proposed Standard protocol.
- 2242 - NetWare/IP Domain Name and Information  
A Proposed Standard protocol.
- 2241 - DHCP Options for Novell Directory Services  
A Proposed Standard protocol.
- 2240 - A Legal Basis for Domain Name Allocation  
This is an information document and does not specify any  
level of standard.

- 2239 - Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs) using SMIV2  
A Proposed Standard protocol.
- 2238 - Definitions of Managed Objects for HPR using SMIV2  
A Proposed Standard protocol.
- 2237 - Japanese Character Encoding for Internet Messages  
This is an information document and does not specify any level of standard.
- 2236 - Internet Group Management Protocol, Version 2  
A Proposed Standard protocol.
- 2235 - Hobbes' Internet Timeline  
This is an information document and does not specify any level of standard.
- 2234 - Augmented BNF for Syntax Specifications: ABNF  
A Proposed Standard protocol.
- 2233 - The Interfaces Group MIB using SMIV2  
A Proposed Standard protocol.
- 2232 - Definitions of Managed Objects for DLUR using SMIV2  
A Proposed Standard protocol.
- 2231 - MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations  
A Proposed Standard protocol.
- 2230 - Key Exchange Delegation Record for the DNS  
This is an information document and does not specify any level of standard.

2229 - A Dictionary Server Protocol

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

2228 - FTP Security Extensions

A Proposed Standard protocol.

2227 - Simple Hit-Metering and Usage-Limiting for HTTP

A Proposed Standard protocol.

2226 - IP Broadcast over ATM Networks

A Proposed Standard protocol.

2225 - Classical IP and ARP over ATM

A Proposed Standard protocol.

2224 - NFS URL Scheme

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

2223 - Instructions to RFC Authors

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

2222 - Simple Authentication and Security Layer (SASL)

A Proposed Standard protocol.

2221 - IMAP4 Login Referrals

A Proposed Standard protocol.

2220 - The Application/MARC Content-type

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

2219 - Use of DNS Aliases for Network Services

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

- 2218 - A Common Schema for the Internet White Pages Service  
A Proposed Standard protocol.
- 2217 - Telnet Com Port Control Option  
An Experimental protocol.
- 2216 - Network Element Service Specification Template  
This is an information document and does not specify any level of standard.
- 2215 - General Characterization Parameters for Integrated Service Network Elements  
A Proposed Standard protocol.
- 2214 - Integrated Services Management Information Base Guaranteed Service Extensions using SMIPv2  
A Proposed Standard protocol.
- 2213 - Integrated Services Management Information Base using SMIPv2  
A Proposed Standard protocol.
- 2212 - Specification of Guaranteed Quality of Service  
A Proposed Standard protocol.
- 2211 - Specification of the Controlled-Load Network Element Service  
A Proposed Standard protocol.
- 2210 - The Use of RSVP with IETF Integrated Services  
A Proposed Standard protocol.
- 2209 - Resource ReSerVation Protocol (RSVP) -- Version 1 Message Processing Rules  
A Proposed Standard protocol.

- 2208 - Resource ReSerVation Protocol (RSVP) -- Version 1  
Applicability Statement Some Guidelines on Deployment  
  
A Proposed Standard protocol.
- 2207 - RSVP Extensions for IPSEC Data Flows  
  
A Proposed Standard protocol.
- 2206 - RSVP Management Information Base using SMIV2  
  
A Proposed Standard protocol.
- 2205 - Resource ReSerVation Protocol (RSVP) -- Version 1  
Functional Specification  
  
A Proposed Standard protocol.
- 2204 - ODETTE File Transfer Protocol  
  
This is an information document and does not specify any  
level of standard.
- 2203 - RPCSEC\_GSS Protocol Specification  
  
A Proposed Standard protocol.
- 2202 - Test Cases for HMAC-MD5 and HMAC-SHA-1  
  
This is an information document and does not specify any  
level of standard.
- 2201 - Core Based Trees (CBT) Multicast Routing Architecture  
  
An Experimental protocol.
- 2200 - Internet Official Protocol Standards  
  
A Standard protocol.
- 2199 - Request for Comments Summary - RFC Numbers 2100-2199  
  
This is an information document and does not specify any  
level of standard.
- 2198 - RTP Payload for Redundant Audio Data  
  
A Proposed Standard protocol.

- 2197 - SMTP Service Extension for Command Pipelining  
A Draft Standard protocol.
- 2196 - Site Security Handbook  
This is an information document and does not specify any level of standard.
- 2195 - IMAP/POP AUTHorize Extension for Simple Challenge/Response  
A Proposed Standard protocol.
- 2194 - Review of Roaming Implementations  
This is an information document and does not specify any level of standard.
- 2193 - IMAP4 Mailbox Referrals  
A Proposed Standard protocol.
- 2192 - IMAP URL Scheme  
A Proposed Standard protocol.
- 2191 - VENUS - Very Extensive Non-Unicast Service  
This is an information document and does not specify any level of standard.
- 2190 - RTP Payload Format for H.263 Video Streams  
A Proposed Standard protocol.
- 2189 - Core Based Trees (CBT version 2) Multicast Routing  
An Experimental protocol.
- 2188 - AT&T/Neda's Efficient Short Remote Operations (ESRO) Protocol Specification Version 1.  
This is an information document and does not specify any level of standard.

2187 - Application of Internet Cache Protocol (ICP), version 2

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

2186 - Internet Cache Protocol (ICP), version 2

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

2185 - Routing Aspects of IPv6 Transition

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

2184 - MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations

A Proposed Standard protocol.

2183 - Communicating Presentation Information in Internet Messages: The Content-Disposition Header Field

A Proposed Standard protocol.

2182 - Selection and Operation of Secondary DNS Servers

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

2181 - Clarifications to the DNS Specification

A Proposed Standard protocol.

2180 - IMAP4 Multi-Accessed Mailbox Practice

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

2179 - Network Security For Trade Shows

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

2178 - OSPF Version 2

A Draft Standard protocol.

2177 - IMAP4 IDLE command

A Proposed Standard protocol.

2176 - IPv4 over MAPOS Version 1

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

2175 - MAPOS 16 - Multiple Access Protocol over SONET/SDH with 16 Bit Addressing

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

2174 - A MAPOS version 1 Extension - Switch-Switch Protocol

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

2173 - A MAPOS version 1 Extension - Node Switch Protocol

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

2172 - MAPOS Version 1 Assigned Numbers

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

2171 - MAPOS - Multiple Access Protocol over SONET/SDH Version 1

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

2170 - Application REQuested IP over ATM (AREQUIPA)

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

2169 - A Trivial Convention for using HTTP in URN Resolution

An Experimental protocol.

2168 - Resolution of Uniform Resource Identifiers using the Domain Name System

An Experimental protocol.

## 2167 - Referral Whois (RWhois) Protocol V1.5

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

## 2166 - APPN Implementer's Workshop Closed Pages Document DLSw v2.0 Enhancements

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

## 2165 - Service Location Protocol

A Proposed Standard protocol.

## 2164 - Use of an X.500/LDAP directory to support MIXER address mapping

A Proposed Standard protocol.

## 2163 - Using the Internet DNS to Distribute MIXER Conformant Global Address Mapping (MCGAM)

A Proposed Standard protocol.

## 2162 - MaXIM-11 - Mapping between X.400 / Internet mail and Mail-11 mail

An Experimental protocol.

## 2161 - A MIME Body Part for ODA

An Experimental protocol.

## 2160 - Carrying PostScript in X.400 and MIME

A Proposed Standard protocol.

## 2159 - A MIME Body Part for FAX

A Proposed Standard protocol.

## 2158 - X.400 Image Body Parts

A Proposed Standard protocol.

- 2157 - Mapping between X.400 and RFC-822/MIME Message Bodies  
A Proposed Standard protocol.
- 2156 - MIXER (Mime Internet X.400 Enhanced Relay): Mapping between X.400 and RFC 822/MIME  
A Proposed Standard protocol.
- 2155 - Definitions of Managed Objects for APPN using SMIV2  
A Proposed Standard protocol.
- 2154 - OSPF with Digital Signature  
An Experimental protocol.
- 2151 - A Primer On Internet and TCP/IP Tools and Utilities  
This is an information document and does not specify any level of standard.
- 2150 - Humanities and Arts: Sharing Center Stage on the Internet  
This is an information document and does not specify any level of standard.
- 2148 - Deployment of the Internet White Pages Service  
This is a Best Current Practices document and does not specify any level of standard.
- 2115 - Management Information Base for Frame Relay DTEs Using SMIV2  
A Draft Standard protocol.
- 2094 - Group Key Management Protocol (GKMP) Architecture  
An Experimental protocol.
- 2093 - Group Key Management Protocol (GKMP) Specification  
An Experimental protocol.

### 6.1.2. Other Changes:

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

2349 - TFTP Timeout Interval and Transfer Size Options

Elevated to Draft Standard.

2348 - TFTP Blocksize Option

Elevated to Draft Standard.

2347 - TFTP Option Extension

Elevated to Draft Standard.

2328 - OSPF Version 2

Elevated to Standard.

2289 - A One-Time Password System

Elevated to Draft Standard.

2197 - SMTP Service Extension for Command Pipelining

Elevated to Draft Standard.

2115 - Management Information Base for Frame Relay DTEs Using  
SMIv2

Elevated to Draft Standard.

## 6.2. Standard Protocols

Protocol	Name	Status	RFC	STD	*
=====	=====	=====	=====	=====	=====
-----	Internet Official Protocol Standards	Req	2300	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	
OSPF2	Open Shortest Path First Routing V2	Ele	2328	54	*

[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".

OSPF -- RFC 1370 is an applicability statement for OSPF.

### 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	2225		*
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
=====	=====	=====	=====
TFTP-Opt	TFTP Options	Elective	2349*
TFTP-Blk	TFTP Blocksize Option	Elective	2348*
TFTP-Ext	TFTP Option Extension	Elective	2347*
ONE-PASS	One-Time Password System	Elective	2289*
SMTP-Pipe	SMTP Serv. Ext. for Command Pipelining	Elective	2197*
BOOTP	DHCP Options and BOOTP Extensions	Recommended	2132
DHCP	Dynamic Host Configuration Protocol	Elective	2131
FRAME-MIB	Management Information Base for Frame	Elective	2115*
-----	Clarifications and Extensions BOOTP	Elective	1542
DHCP-BOOTP	Interoperation Between DHCP and BOOTP	Elective	1534
BOOTP	Bootstrap Protocol	Recommended	951,1497
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
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
BGP-4-MIB	BGP-4 MIB	Elective	1657
SMTP-8BIT	SMTP Service Ext or 8bit-MIMEtransport	Elective	1652

OSI-NSAP	Guidelines for OSI NSAP Allocation	Elective	1629
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
=====	=====	=====	=====
MOBILIPREV	Reverse Tunneling for Mobile IP	Elective	2344*
IMAP4NAME	IMAP4 Namespace	Elective	2342*
VRRP	Virtual Router Redundancy Protocol	Elective	2338*
NHRP-SCSP	Distributed NHRP Service Using SCSP	Elective	2335*
SCSP	Server Cache Synchronization Protocol	Elective	2334*
NHRP-APP	NHRP Protocol Applicability Statement	Elective	2333*
NHRP	NBMA Next Hop Resolution Protocol	Elective	2332*
UNI-SIG	ATM Sig Support (IPOA) UNI Signalling	Elective	2331*
SDP	Session Description Protocol	Elective	2327*
RTSP	Real Time Streaming Protocol	Elective	2326*
IPOA-MIB	Classical IP and ARP Over ATM MIB	Elective	2320*
DNS-NCACHE	Negative Caching of DNS Queries	Elective	2308*
SMFAX-IM	Simple Mode of FAX Using Internet Mail	Elective	2305*
MINFAX-IM	Minimal FAX addr format in Internet Mail	Elective	2304*
MIN-PSTN	Min. PSTN addr format in Internet Mail	Elective	2303*
TIFF	Tag Image File Format	Elective	2302*
FFIF	File Format for Internet Fax	Elective	2301*
EMF-MDN	Extensible Message Format for MDN	Elective	2298*
OR-ADD	O/R Address hierarchy in X.500	Elective	2294*
SUBTABLE	Tables and Subtrees in X.500	Elective	2293*
-----	Mobile-IPv4 Config Opt for PPP IPCP	Elective	2290*
SLM-APP	System-Level Managed Objects for Apps	Elective	2287*
PPP-EAP	PPP Extensible Authentication Protocol	Elective	2284*
MEXT-BGP4	Multiprotocol Extensions for BGP-4	Elective	2283*
RPSL	Routing Policy Specification Language	Elective	2280*
UTF-8	UTF-8 transformation format of ISO 10646	Elective	2279*
VACM-SNMP	View-based Access Control Model for SMMP	Elective	2275*
USM-SNMPV3	User-based Security Model for SNMPv3	Elective	2274*
SNMPV3-APP	SNMPv3 Applications	Elective	2273*
MPD-SNMP	Message Processing & Dispatching SNMP	Elective	2272*
ARCH-SNMP	Architecture Describing SNMP Frameworks	Elective	2271*
-----	IEEE 802.12 Repeater MIB	Elective	2266*
AGENTX	Agent Extensibility Protocol	Elective	2257*
-----	Summary of the X.500(96) with LDAPv3	Elective	2256*
LDAP-URL	LDAP URL Format	Elective	2255*
STR-LDAP	String Rep of LDAP Search Filters	Elective	2254*
LDAP3-UTF8	LDAPv3: UTF-8 String Rep	Elective	2253*
LDAP3-ATD	LDAP3-: Attribute Syntax Definitions	Elective	2252*
LDAPV3	Lightweight Directory Access Protocol	Elective	2251*
RTP-MPEG	RTP Payload Format for MPEG1/MPEG2	Elective	2250*
MAIL-MIB	Mail Monitoring MIB	Elective	2249*
NSM-MIB	Network Services Monitoring MIB	Elective	2248*
-----	Using Domains LDAP/X.500 Dist. Names	Elective	2247*
SASL-ANON	Anonymous SASL Mechanism	Elective	2245*

ACAP	Application Configuration Access	Elective	2244*
OTP-ER	OTP Extended Responses	Elective	2243*
NETWAREIP	NetWare/IP Domain Name and Information	Elective	2242*
DHCP-NDS	DHCP Options for Novell Directory Serv.	Elective	2241*
MAUS-MIB	IEEE 802.3 Medium Attachment Units MIB	Elective	2239*
HPR-MIB	Definitions of Managed Objects for HPR	Elective	2238*
IGMP	Internet Group Management Protocol V2	Elective	2236*
ABNF	Augmented BNF for Syntax Specifications	Elective	2234*
INTERGRMIB	Interfaces Group MIB	Elective	2233*
DLUR-MIB	Definitions of Managed Objects for DLUR	Elective	2232*
MIME-EXT	MIME Parameter Value & Encoded Word Ext	Elective	2231*
FTPSECEXT	FTP Security Extensions	Elective	2228*
-----	Simple Hit-Metering, Usage-Limiting HTTP	Elective	2227*
-----	IP Broadcast over ATM Networks	Elective	2226*
AAL5-MTU	Default IP MTU for use over ATM AAL5	Elective	2225*
SASL	Simple Authentication and Security Layer	Elective	2222*
IMAP4LOGIN	IMAP4 Login Referrals	Elective	2221*
-----	Schema for Internet White Pages Service	Elective	2218*
-----	Characterization Parameters for ISNE	Elective	2215*
-----	Integrated Services MIB Guar Serv Ext	Elective	2214*
-----	Integrated Services MIB using SMIV2	Elective	2213*
GQOS	Spec. of Guaranteed Quality of Service	Elective	2212*
-----	Spec. of Controlled-Load Net Ele Serv	Elective	2211*
RSVP-IS	Use of RSVP with IETF Integrated Serv	Elective	2210*
RSVP-MPR	RSVP Messaging Processing Rules	Elective	2209*
RSVP-APP	RSVP Applicability Statement	Elective	2208*
RSVP-IPSEC	RSVP Extensions for IPSEC Data Flows	Elective	2207*
RSVP-MIB	RSVP Management Information Base	Elective	2206*
RSVP	Resource ReSerVation Protocol V1	Elective	2205*
RPCSEC-GSS	RPCSEC_GSS Protocol Specification	Elective	2203*
RTP-RAD	RTP Payload for Redundant Audio Data	Elective	2198*
IMAPPOPAU	IMAP/POP AUTHorize Extension	Elective	2195*
IMAP4MAIL	IMAP4 Mailbox Referrals	Elective	2193*
IMAP-URL	IMAP URL Scheme	Elective	2192*
-----	RTP Payload Format for H.263 Video ST	Elective	2190*
MIME-EXT	MIME Parameter Value & Encoded Word Ext	Elective	2184*
-----	The Content-Disposition Header Field	Elective	2183*
DNS-CLAR	Clarifications to the DNS Specification	Elective	2181*
IMAP4-IDLE	IMAP4 IDLE command	Elective	2177*
SLP	Service Location Protocol	Elective	2165*
-----	X.500/LDAP Directory/MIXER Address Map.	Elective	2164*
DNS-MCGAM	Using DNS to Distribute MCGAM	Elective	2163*
-----	Carrying PostScript in X.400 and MIME	Elective	2160*
-----	A MIME Body Part for FAX	Elective	2159*
-----	X.400 Image Body Parts	Elective	2158*
-----	Mapping between X.400 and RFC-822/MIME	Elective	2157*
MIXER	Mime Internet X.400 Enhanced Relay	Elective	2156*
APPN-MIB	Definitions of Managed Objects for APPN	Elective	2155*

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
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
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-SRT	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
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
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
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
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
TMUX	Transport Multiplexing Protocol	Elective	1692
SNANAU-MIB	SNA NAUs MIB using SMiv2	Elective	1666
PPP-TRANS	PPP Reliable Transmission	Elective	1663
-----	Ethernet-like Interface Types MIB	Elective	1650
-----	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
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
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
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
TCP-EXT	TCP Extensions for High Performance	Elective	1323
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:

## 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	
TOPR-RSP Telnet Remote Serial Port	43	Exp			
TOPT-COMPORT Telnet Com Port Control	44	Exp		2217	*
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
=====	=====	=====
-----	Domain Names and Company Name Retrieval	2345*
RTP-MPEG	RTP Payload Format for Bundled MPEG	2343*
-----	Intra-LIS IP Multicast/Routers over ATM using PIM	2337*
-----	Safe Response Header Field	2310*
LDAP-NIS	Approach Using LDAP as a Network Information Service	2307*
HTTP-RVSA	HTTP Remote Variant Selection Algorithm	2296*
TCN-HTTP	Transparent Content Negotiation in HTTP	2295*
-----	Core Based Trees (CBT) Multicast Routing Architecture	2201*
-----	Core Based Trees (CBT version 2) Multicast Routing	2189*
-----	Trivial Convention using HTTP in URN Resolution	2169*
-----	Resolution of URIs using DNS	2168*
MAP-MAIL	X.400 Mapping and Mail-11	2162*
MIME-ODA	A MIME Body Part for ODA	2161*
OSPF-DIG	OSPF with Digital Signature	2154*
GKMP-ARCH	Group Key Management Protocol (GKMP) Architecture	2094*
GKMP-SPEC	Group Key Management Protocol (GKMP) Specification	2093*
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
-----	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-ENCODE	DNS Encoding of Geographical Location	1712
TCP-POS	An Extension to TCP: Partial Order Service	1693
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
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
=====	=====	=====
-----	Mapping Airline Reservation, Ticketing, Messaging	2351*
KOI8-U	Ukrainian Character Set KOI8-U	2319*
TEXT-CSS	The text/css Media Type	2318*
PKCS-7	PKCS #7: Cryptographic Message Syntax Version 1.5	2315*
PKCS-10	PKCS #10: Certification Request Syntax Version 1.5	2314*
PKCS-1	PKCS #1: RSA Encryption Version 1.5	2313*
SMIME-CERT	S/MIME Version 2 Certificate Handling	2312*
SMIME-MSG	S/MIME Version 2 Message Specification	2311*
TIFF	Tag Image File Format F Profile for Facsimile	2302*
GSMP	Ipsilon's General Switch Management Protocol	2297*
HSRP	Cisco Hot Standby Router Protocol (HSRP)	2281*
RC2-ENCRP	A Description of the RC2(r) Encryption Algorithm	2268*
SNQP	Simple Nomenclator Query Protocol	2259*
-----	Japanese Character Encoding for Internet Messages	2237*
KEYX-DNS	Key Exchange Delegation Record for the DNS	2230*
DSP	A Dictionary Server Protocol	2229*
NFS-URL	NFS URL Scheme	2224*
APP-MARC	The Application/MARC Content-type	2220*
ODETTE-FTP	ODETTE File Transfer Protocol	2204*
ESRO	AT&T/Neda's Efficient Short Remote Operations Protocol	2188*
ICP	Internet Cache Protocol Version 2	2186*
IPV4-MAPOS	IPv4 over MAPOS Version 1	2176*
MAPOS-SONET	Multiple Access Protocol over SONET/SDH Version 1	2171*
RWHOIS	Referral Whois Protocol	2167*
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 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
-----	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
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
=====	=====		=====	=====
L2F	Cisco Layer Two Forwarding Protocol		2341	*
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  
Executive Director of the IAB  
Intel, JF2-64  
2111 NE 25th Avenue  
Hillsboro, OR 97124

1-503-696-8972

AWinerib@ibeam.jf.intel.com

Brian E. Carpenter  
Chair of the IAB  
IBM United Kingdom Laboratories  
Hursley Park  
Winchester  
Hampshire SO21 2JN

+44 1962 816833

brian@hursley.ibm.com

#### 7.1.2. Internet Engineering Task Force (IETF) Contact

Contacts:

Fred Baker  
Chair of the IETF  
Cisco Systems, Inc.  
519 Lado Drive  
Santa Barbara, CA 93111

1-805-681-0115

fred@cisco.com

Steve Coya  
IESG Secretary  
Corporation for National Research Initiatives  
1895 Preston White Drive, Suite 100  
Reston, VA 22091

1-703-620-8990

scoya@IETF.ORG

Steve Coya  
Executive Director of the IETF  
Corporation for National Research Initiatives  
1895 Preston White Drive, Suite 100  
Reston, VA 22091

1-703-620-8990

scoya@IETF.ORG

#### 7.1.3. Internet Research Task Force (IRTF) Contact

##### Contact:

Abel Winerib  
Chair of the IRTF  
Intel, JF2-64  
2111 NE 25th Avenue  
Hillsboro, OR 97124

1-503-696-8972

AWinerib@ibeam.jf.intel.com

## 7.2. Internet Assigned Numbers Authority Contact

### Contact:

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

1-310-822-1511

IANA@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

RFCs can be obtained via FTP from FTP.ISI.EDU, with the pathname in-notes/rfcnnnn.txt (where "nnnn" refers to the number of the RFC). Login with FTP username "anonymous" and password "name@host.domain".

RFCs can also be obtained via electronic mail from ISI.EDU by using the RFC-INFO service. Address the request to "rfc-info@isi.edu" with a message body of:

Retrieve: RFC  
Doc-ID: RFCnnnn

(Where "nnnn" refers to the number of the RFC (always use 4 digits - the DOC-ID of RFC 822 is "RFC0822")). The RFC-INFO@ISI.EDU server provides other ways of selecting RFCs based on keywords and such; for more information send a message to "rfc-info@isi.edu" with the message body "help: help".

contact: RFC-Manager@ISI.EDU

### 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

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

Phone: 310-822-1511  
Fax: 310-823-6714

EMail: Postel@ISI.EDU

## Full Copyright Statement

Copyright (C) The Internet Society (1998). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

