

The Internet Standards Process -- Revision 2

****DRAFT****

Status of this Memo

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Abstract

This document is a draft of the first revision of [RFC-1310](#), which defines the official procedures for creating and documenting Internet Standards. This draft revision is being distributed to the Internet community for comments and suggestions.

This revision includes the following major changes:

- (a) The new management structure arising from the POISED Working Group is reflected. These changes were agreed to by the IETF plenary and by the IAB and IESG in November 1992 and accepted by the ISOC Board of Trustees at their December 1992 meeting.
- (b) Prototype status is added to the non-standards track maturity levels ([Section 2.4.1](#)).
- (c) The Intellectual Property Rights section is completely revised, in accordance with legal advice. [Section 5](#) of this document replaces Sections [5](#) and [6](#) of [RFC-1310](#). Note however, that the new [Section 5](#) is still incomplete and that it is awaiting review by legal counsel.
- (d) An appeals procedure is added ([Section 3.6](#)).

Finally, the document was reorganized into a more logical and coherent structure.

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[1. INTRODUCTION](#)

This memo documents the process currently used by the Internet community for the standardization of protocols and procedures.

1.1 Internet Standards.

The Internet, a loosely-organized international collaboration of autonomous, interconnected networks, supports host-to-host communication through voluntary adherence to open protocols and procedures defined by Internet Standards. There are also many isolated internets, i.e., sets of interconnected networks, which are not connected to the Internet but use the Internet Standards.

Internet Standards were once limited to those protocols composing what has been commonly known as the "TCP/IP protocol suite". However, the Internet has been evolving towards the support of multiple protocol suites, especially the Open Systems Interconnection (OSI) suite. The Internet Standards process described in this document is concerned with all protocols, procedures, and conventions that are used in or by the Internet, whether or not they are part of the TCP/IP protocol suite. In the case of protocols developed and/or standardized by non-Internet organizations, however, the Internet Standards process may apply only to the application of the protocol or procedure in the Internet context, not to the specification of the protocol itself.

In general, an Internet Standard is a specification that is stable and well-understood, is technically competent, has multiple, independent, and interoperable implementations with substantial operational experience, enjoys significant public support, and is recognizably useful in some or all parts of the Internet.

The procedures described in this document are designed to be fair, open and objective; to be retrospective; and to be flexible.

- o These procedures are intended to provide a fair, open, and objective basis for developing, evaluating, and adopting Internet Standards. They provide ample opportunity for participation and comment by all interested parties. At each stage of the standardization process, a specification is repeatedly discussed and its merits debated in open meetings and/or public electronic mailing lists, and it is made available for review via world-wide on-line directories.
- o These procedures are explicitly aimed at recognizing and adopting generally-accepted practices. Thus, a candidate specification is implemented and tested for correct operation and interoperability by multiple independent parties and utilized in increasingly demanding environments, before it can be adopted as an Internet Standard.
- o These procedures provide a great deal of flexibility to adapt to the wide variety of circumstances that occur in the standardization process. Experience has shown this flexibility to be vital in achieving the goals listed above.

The goal of technical competence, the requirement for prior implementation and testing, and the need to allow all interested parties to comment, all require significant time and effort. On the other hand, today's rapid development of networking technology places an urgency on timely development of standards. The

Internet standardization rules described here are intended to balance these conflicting goals. The process is believed to be as short and simple as possible without undue sacrifice of technical competence, prior testing, or openness and fairness.

In summary, the goals for the Internet standards process are:

- * technical excellence;
- * prior implementation and testing;
- * clear, short, and easily understandable documentation;
- * openness and fairness; and
- * timeliness.

In outline, the process of creating an Internet Standard is straightforward: a specification undergoes a period of development and several iterations of review by the Internet community and revision based upon experience, is adopted as a Standard by the appropriate body (see below), and is published. In practice, the process is more complicated, due to (1) the difficulty of creating specifications of high technical quality; (2) the need to consider the interests of all of the affected parties; (3) the importance of establishing widespread community consensus; and (4) the difficulty of evaluating the utility of a particular specification for the Internet community.

From its inception, the Internet has been, and is expected to remain, an evolving system whose participants regularly factor new requirements and technology into its design and implementation. Users of the Internet and providers of the equipment, software, and services that support it should anticipate and embrace this evolution as a major tenet of Internet philosophy.

The procedures described in this document are the result of three years of evolution, driven both by the needs of the growing and increasingly diverse Internet community, and by experience. Comments and suggestions are invited for improving these procedures.

The remainder of this section describes the organizations and publications involved in Internet standardization. [Section 2](#) presents the nomenclature for different kinds and levels of Internet standard technical specifications and their applicability. [Section 3](#) describes the process and rules for Internet standardization. [Section 4](#) defines how relevant

externally-sponsored specifications and practices, developed and controlled by other standards bodies or by vendors, are handled in the Internet standardization process. [Section 5](#) presents the rules that are required to protect intellectual property rights and to assure unrestricted ability for all interested parties to practice Internet Standards.

1.2 Organizations

The following organizations are involved in setting Internet standards.

* ISOC

Internet standardization is an organized activity of the Internet Society (ISOC). The ISOC is a professional society that is concerned with the growth and evolution of the worldwide Internet, with the way in which the Internet is and can be used, and with the social, political, and technical issues that arise as a result.

* IETF

The Internet Engineering Task Force (IETF) is the primary body developing new Internet Standard specifications. The IETF is composed of many Working Groups, which are organized into areas, each of which is coordinated by one or more Area Directors.

* IESG

The Internet Engineering Steering Group (IESG) is responsible for technical management of IETF activities and the approval of Internet standards specifications, using the rules given in later sections of this document. The IESG is composed of the IETF Area Directors, some at-large members, and the chairperson of the IESG/IETF.

* IAB

The Internet Architecture Board (IAB) has been chartered by the Internet Society Board of Trustees to provide quality control and process appeals for the standards process, as well as external technical liaison, organizational oversight, and long-term architectural planning and research.

Any member of the Internet community with the time and interest is urged to participate actively in one or more IETF Working Groups

and to attend IETF meetings. In many cases, active Working Group participation is possible through email alone; furthermore, Internet video conferencing is being used experimentally to allow remote participation. Participation is by individual technical contributors rather than formal representatives of organizations. The process works because the IETF Working Groups display a spirit of cooperation as well as a high degree of technical maturity; IETF participants recognize that the greatest benefit for all members of the Internet community results from cooperative development of technically superior protocols and services.

Members of the IESG and IAB are nominated for two-year terms by a committee that is drawn from the roll of recent participation in the IETF and chartered by the ISOC Board of Trustees. The appointment of IESG and of IAB members are made from these nominations by the IAB and by the ISOC Board of Trustees, respectively.

The Internet Research Task Force (IRTF) is not directly part of the standards process. It investigates topics considered to be too uncertain, too advanced, or insufficiently well-understood to be the subject of Internet standardization. When an IRTF activity generates a specification that is sufficiently stable to be considered for Internet standardization, the specification is processed through the IETF using the rules in this document.

1.3 Standards-Related Publications

1.3.1 Requests for Comments (RFCs)

Each distinct version of a specification is published as part of the "Request for Comments" (RFC) document series. This archival series is the official publication channel for Internet standards documents and other publications of the IESG, IAB, and Internet community. RFCs are available for anonymous FTP from a number of Internet hosts.

The RFC series of documents on networking began in 1969 as part of the original ARPA wide-area networking (ARPANET) project (see [Appendix A](#) for glossary of acronyms). RFCs cover a wide range of topics, from early discussion of new research concepts to status memos about the Internet. RFC publication is the direct responsibility of the RFC Editor, under the general direction of the IAB.

The rules for formatting and submitting an RFC are defined in reference [5]. Every RFC is available in ASCII text, but some RFCs are also available in PostScript*. The PostScript version

*PostScript is a registered trademark of Adobe Systems,

IAB

Expires: December 1993

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of an RFC may contain material (such as diagrams and figures) that is not present in the ASCII version, and it may be formatted differently.

```

*****
*   A stricter requirement applies to standards-track   *
*   specifications: the ASCII text version is the       *
*   definitive reference, and therefore it must be a    *
*   complete and accurate specification of the standard,*
*   including all necessary diagrams and illustrations.  *
*                                                       *
*****

```

The status of Internet protocol and service specifications is summarized periodically in an RFC entitled "Official Protocol Standards" [1]. This RFC shows the level of maturity and other helpful information for each Internet protocol or service specification. See [Section 3.1.3](#) below.

Some RFCs document Internet standards. These RFCs form the 'STD' subseries of the RFC series [4]. When a specification has been adopted as an Internet Standard, it is given the additional label "STDxxxx", but it keeps its RFC number and its place in the RFC series.

Not all specifications of protocols or services for the Internet should or will become Internet Standards. Such non-standards track specifications are not subject to the rules for Internet standardization. Generally, they will be published directly as RFCs at the discretion of the RFC editor and the IESG. These RFCs will be marked "Prototype", "Experimental" or "Informational" as appropriate (see [section 2.3](#)).

```

*****
*   It is important to remember that not all RFCs     *
*   are standards track documents, and that not all    *
*   standards track documents reach the level of      *
*   Internet Standard.                                 *
*****

```

1.3.2 Internet Drafts

During the development of a specification, draft versions of the document are made available for informal review and comment by placing them in the IETF's "Internet Drafts" directory,

which is replicated on a number of Internet hosts. This makes an evolving working document readily available to a wide audience, facilitating the process of review and revision.

An Internet Draft that is published as an RFC, or that has remained unchanged in the Internet Drafts directory for more than six months without being recommended by the IESG for publication as an RFC, is simply removed from the Internet Draft directory. At any time, an Internet Draft may be replaced by a more recent version of the same specification, restarting the six-month timeout period.

An Internet Draft is NOT a means of "publishing" a specification; specifications are published through the RFC mechanism described in the previous section. Internet Drafts have no formal status, are not part of the permanent archival record of Internet activity, and are subject to change or removal at any time.

```
*****
* Under no circumstances should an Internet Draft *
* be referenced by any paper, report, or Request-for-*
* Proposal, nor should a vendor claim compliance *
* with an Internet-Draft. *
*****
```

Note: It is acceptable to reference a standards-track specification that may be reasonably be expected to be published as an RFC using the phrase "RFC in preparation", without referencing an Internet Draft.

1.4 Internet Assigned Number Authority (IANA)

Many protocol specifications include numbers, keywords, and other parameters that must be uniquely assigned. Examples include version numbers, protocol numbers, port numbers, and MIB numbers. The IAB has delegated to the Internet Assigned Numbers Authority (IANA) the task of assigning such protocol parameters for the Internet. The IANA publishes tables of all currently assigned numbers and parameters in RFCs titled "Assigned Numbers" [3].

Each category of assigned numbers typically arises from some protocol that is on the standards track or is an Internet Standard. For example, TCP port numbers are assigned because TCP is a Standard. A particular value within a category may be assigned in a variety of circumstances; the specification requiring the parameter may be in the standards track, it may be Experimental, or it may be private. Note that assignment of a

number to a protocol is independent of, and does not imply, acceptance of that protocol as a standard.

Chaos could result from accidental conflicts of parameter values, so we urge that every protocol parameter, for either public or private usage, be explicitly assigned by the IANA. Private protocols often become public. Programmers are often tempted to choose a "random" value or to guess the next unassigned value of a parameter; both are hazardous.

The IANA is expected to avoid frivolous assignments and to distinguish different assignments uniquely. The IANA accomplishes both goals by requiring a technical description of each protocol or service to which a value is to be assigned. Judgment on the adequacy of the description resides with the IANA. In the case of a standards track or Experimental protocol, the corresponding technical specifications provide the required documentation for IANA. For a proprietary protocol, the IANA will keep confidential any writeup that is supplied, but at least a short (2 page) writeup is still required for an assignment.

2. NOMENCLATURE

2.1 The Internet Standards Track

Specifications that are destined to become Internet Standards evolve through a set of maturity levels known as the "standards track". These maturity levels -- "Proposed Standard", "Draft Standard", and "Standard" -- are defined and discussed below in [Section 3.2](#).

Even after a specification has been adopted as an Internet Standard, further evolution often occurs based on experience and the recognition of new requirements. The nomenclature and procedures of Internet standardization provide for the replacement of old Internet Standards with new ones, and the assignment of descriptive labels to indicate the status of "retired" Internet Standards. A set of maturity levels is defined in [Section 3.3](#) to cover these and other "off-track" specifications.

2.2 Types of Specifications

Specifications subject to the Internet standardization process fall into two categories: Technical Specifications (TS) and Applicability Statements (AS).

2.2.1 Technical Specification (TS)

A Technical Specification is any description of a protocol, service, procedure, convention, or format. It may completely describe all of the relevant aspects of its subject, or it may leave one or more parameters or options unspecified. A TS may be completely self-contained, or it may incorporate material from other specifications by reference to other documents (which may or may not be Internet Standards).

A TS shall include a statement of its scope and the general intent for its use (domain of applicability). Thus, a TS that is inherently specific to a particular context shall contain a statement to that effect. However, a TS does not specify requirements for its use within the Internet; these requirements, which depend on the particular context in which the TS is incorporated by different system configurations, is defined by an Applicability Statement.

2.2.2 Applicability Statement (AS)

An Applicability Statement specifies how, and under what circumstances, one or more TSs are to be applied to support a particular Internet capability. An AS may specify uses for TSs that are not Internet Standards, as discussed in [Section 4](#).

An AS identifies the relevant TSs and the specific way in which they are to be combined, and may also specify particular values or ranges of TS parameters or subfunctions of a TS protocol that must be implemented. An AS also specifies the circumstances in which the use of a particular TS is required, recommended, or elective.

An AS may describe particular methods of using a TS in a restricted "domain of applicability", such as Internet routers, terminal servers, Internet systems that interface to Ethernets, or datagram-based database servers.

The broadest type of AS is a comprehensive conformance specification, commonly called a "requirements document", for a particular class of Internet systems, such as Internet routers or Internet hosts.

An AS may not have a higher maturity level in the standards track than any standards-track TS to which the AS applies. For example, a TS at Draft Standard level may be referenced by an AS at the Proposed Standard or Draft Standard level, but not by an AS at the Standard level. Like a TS, an AS does not come

into effect until it reaches Standard level.

Although TSs and ASs are conceptually separate, in practice a standards-track document may combine an AS and one or more related TSs. For example, Technical Specifications that are developed specifically and exclusively for some particular domain of applicability, e.g., for mail server hosts, often contain within a single specification all of the relevant AS and TS information. In such cases, no useful purpose would be served by deliberately distributing the information among several documents just to preserve the formal AS/TS distinction. However, a TS that is likely to apply to more than one domain of applicability should be developed in a modular fashion, to facilitate its incorporation by multiple ASs.

2.3 Standards Track Maturity Levels

ASs and TSs go through stages of development, testing, and acceptance. Within the Internet standards process, these stages are formally labeled "maturity levels".

This section describes the maturity levels and the expected characteristics of specifications at each level. The general procedures for developing a specification and processing it through the maturity levels along the standards track were discussed in [Section 2](#) above.

2.3.1 Proposed Standard

The entry-level maturity for the standards track is "Proposed Standard". A Proposed Standard specification is generally stable, has resolved known design choices, is believed to be well-understood, has received significant community review, and appears to enjoy enough community interest to be considered valuable. However, further experience might result in a change or even retraction of the specification before it advances.

Usually, neither implementation nor operational experience is required for the designation of a specification as a Proposed Standard. However, such experience is highly desirable, and will usually represent a strong argument in favor of a Proposed Standard designation.

The IESG may require implementation and/or operational experience prior to granting Proposed Standard status to a specification that materially affects the core Internet protocols or that specifies behavior that may have significant

operational impact on the Internet. Typically, such a specification will be published initially with Experimental or Prototype status (see below), and moved to the standards track only after sufficient implementation or operational experience has been obtained.

A Proposed Standard should have no known technical omissions with respect to the requirements placed upon it. However, the IESG may recommend that this requirement be explicitly reduced in order to allow a protocol to advance into the Proposed Standard state, when a specification is considered to be useful and necessary (and timely), even absent the missing features. For example, some protocols have been advanced by explicitly deciding to omit security features, since an overall security architecture was still under development.

2.3.2 Draft Standard

A specification from which at least two independent and interoperable implementations have been developed, and for which sufficient successful operational experience has been obtained, may be elevated to the "Draft Standard" level. This is a major advance in status, indicating a strong belief that the specification is mature and will be useful.

A Draft Standard must be well-understood and known to be quite stable, both in its semantics and as a basis for developing an implementation. A Draft Standard may still require additional or more widespread field experience, since it is possible for implementations based on Draft Standard specifications to demonstrate unforeseen behavior when subjected to large-scale use in production environments.

2.3.3 Internet Standard

A specification for which significant implementation and successful operational experience has been obtained may be elevated to the Internet Standard level. An Internet Standard (which may simply be referred to as a Standard) is characterized by a high degree of technical maturity and by a generally held belief that the specified protocol or service provides significant benefit to the Internet community.

2.4 Non-Standards Track Maturity Levels

Not every TS or AS is on the standards track. A TS may not be intended to be an Internet Standard, or it may be intended for eventual standardization but not yet ready to enter the standards

track. A TS or AS may have been superseded by more recent Internet Standards, or have otherwise fallen into disuse or disfavor.

Specifications not on the standards track are labeled with one of four off-track maturity levels: "Prototype", "Experimental", "Informational", and "Historic". There are no time limits associated with these non-standard track labels, and the documents bearing these labels are not Internet standards in any sense.

2.4.1 Prototype

The "Prototype" designation on a TS indicates a specification for which the eventual destination may be the standards track, but which is not at present sufficiently mature to enter the standards track. For example, a Prototype TS may result in behavior that is not completely understood, or it may have known technical omissions or architectural defects. It may undergo significant changes before entering the standards track, or it may be discarded in favor of another proposal. One use of the Prototype designation is the dissemination of a specification as it undergoes development and testing.

A Prototype specification will generally be the output of an organized Internet engineering effort, for example a Working Group of the IETF. An IETF Working Group should submit a document that is intended for Prototype status to the IESG. The IESG will forward it to the RFC Editor for publication, after verifying that there has been adequate coordination with the standards process.

2.4.2 Experimental

The "Experimental" designation on a TS typically indicates a specification that is part of some research or development effort. Such a specification is published for the general information of the Internet technical community and as an archival record of the work. An Experimental specification may be the output of an organized Internet research effort (e.g., a Research Group of the IRTF), or it may be an individual contribution.

Documents intended for Experimental status should be submitted directly to the RFC Editor for publication. The procedure is intended to expedite the publication of any responsible Experimental specification, subject only to editorial considerations, and to verification that there has been adequate coordination with the standards process.

2.4.3 Informational

An "Informational" specification is published for the general information of the Internet community, and does not represent an Internet community consensus or recommendation. The procedure is intended to expedite the publication of any responsible informational document, subject only to editorial considerations and to verification that there has been adequate coordination with the standards process.

Specifications that have been prepared outside of the Internet community and are not incorporated into the Internet standards process by any of the provisions of [Section 4](#) may be published as Informational RFCs, with the permission of the owner.

2.4.4 Historic

A TS or AS that has been superseded by a more recent specification or is for any other reason considered to be obsolete is assigned to the "Historic" level. (Purists have suggested that the word should be "Historical"; however, at this point the use of "Historic" is historical.)

2.5 Requirement Levels

An AS may apply one of the following "requirement levels" to each of the TSs to which it refers:

- (a) Required: Implementation of the referenced TS, as specified by the AS, is required to achieve minimal conformance. For example, IP and ICMP must be implemented by all Internet systems using the TCP/IP Protocol Suite.
- (b) Recommended: Implementation of the referenced TS is not required for minimal conformance, but experience and/or generally accepted technical wisdom suggest its desirability in the domain of applicability of the AS. Vendors are strongly encouraged to include the functions, features, and protocols of Recommended TSs in their products, and should omit them only if the omission is justified by some special circumstance.
- (c) Elective: Implementation of the referenced TS is optional within the domain of applicability of the AS; that is, the AS creates no explicit necessity to apply the TS. However, a particular vendor may decide to implement it, or a particular user may decide that it is a necessity in a specific environment.

As noted in [Section 2.4](#), there are TSs that are not in the standards track or that have been retired from the standards track, and are therefore not required, recommended, or elective. Two additional "requirement level" designations are available for such TSs:

- (d) Limited Use: The TS is considered appropriate for use only in limited or unique circumstances. For example, the usage of a protocol with the "Experimental" designation should generally be limited to those actively involved with the experiment.
- (e) Not Recommended: A TS that is considered to be inappropriate for general use is labeled "Not Recommended". This may be because of its limited functionality, specialized nature, or historic status.

The "Official Protocol Standards" RFC lists a general requirement level for each TS, using the nomenclature defined in this section. In many cases, more detailed descriptions of the requirement levels of particular protocols and of individual features of the protocols will be found in appropriate ASs.

3. THE INTERNET STANDARDS PROCESS

3.1 Review and Approval

A "standards action" -- entering a particular specification into, advancing it within, or removing it from, the standards track -- must be approved by the IESG.

3.1.1 Initiation of Action

Typically, a standards action is initiated by a recommendation to the appropriate IETF Area Director by the individual or group that is responsible for the specification, usually an IETF Working Group.

After completion to the satisfaction of its author and the cognizant Working Group, a document that is expected to enter or advance in the Internet standardization process shall be made available as an Internet Draft. It shall remain as an Internet Draft for a period of time that permits useful community review, at least two weeks, before submission to the IESG with a recommendation for action.

3.1.2 IESG Review and Approval

The IESG shall determine whether a specification satisfies the applicable criteria for the recommended action (see Sections 3.2 and 3.3 of this document).

The IESG shall determine if an independent technical review of the specification is required, and shall commission one when necessary. This may require creating a new Working Group, or an existing group may agree to take responsibility for reviewing the specification. When a specification is sufficiently important in terms of its potential impact on the Internet or on the suite of Internet protocols, the IESG shall form an independent technical review and analysis committee to prepare an evaluation of the specification. Such a committee is commissioned to provide an objective basis for agreement within the Internet community that the specification is ready for advancement.

The IESG shall communicate its findings to the IETF to permit a final review by the general Internet community. This "last-call" notification shall be via electronic mail to the IETF mailing list. In addition, for important specifications there shall be a presentation or statement by the appropriate Working Group or Area Director during an IETF plenary meeting. Any significant issues that have not been resolved satisfactorily during the development of the specification may be raised at this time for final resolution by the IESG.

In a timely fashion, but no sooner than two weeks after issuing the last-call notification to the IETF mailing list, the IESG shall make its final determination on whether or not to approve the standards action, and shall notify the IETF of its decision via email.

3.1.3 Publication

Following IESG approval and any necessary editorial work, the RFC Editor shall publish the specification as an RFC. The specification shall then be removed from the Internet Drafts directory.

An official summary of standards actions completed and pending shall appear in each issue of the Internet Society Newsletter. This shall constitute the Journal of Record for Internet standards actions. In addition, the IESG shall publish a monthly summary of standards actions completed and pending in the Internet Monthly Report, which is distributed to all

members of the IETF mailing list.

Finally, the IAB shall publish quarterly an "Official Protocol Standards" RFC, summarizing the status of all Internet protocol and service specifications, both within and outside the standards track.

3.2 Entering the Standards Track

A specification that is potentially an Internet Standard may originate from:

- (a) an ISOC-sponsored effort (typically an IETF Working Group),
- (b) independent activity by individuals, or
- (c) an external organization.

Here (a) represents the great majority of cases. In cases (b) and (c), the work might be tightly integrated with the work of an existing IETF Working Group, or it might be offered for standardization without prior IETF involvement. In most cases, a specification resulting from an effort that took place outside of an IETF Working Group will be submitted to an appropriate Working Group for evaluation and refinement. If necessary, an appropriate Working Group will be created.

For externally-developed specifications that are well-integrated with existing Working Group efforts, a Working Group is assumed to afford adequate community review of the accuracy and applicability of the specification. If a Working Group is unable to resolve all technical and usage questions, additional independent review may be necessary. Such reviews may be done within a Working Group context, or by an ad hoc review committee established specifically for that purpose. It is the responsibility of the appropriate IETF Area Director to determine what, if any, review of an external specification is needed and how it shall be conducted.

3.3 Advancing in the Standards Track

A specification shall remain at the Proposed Standard level for at least six (6) months.

A specification shall remain at the Draft Standard level for at least four (4) months, or until at least one IETF meeting has occurred, whichever comes later.

These minimum periods are intended to ensure adequate opportunity

for community review without severely impacting timeliness. These intervals shall be measured from the date of publication of the corresponding RFC(s), or, if the action does not result in RFC publication, the date of IESG approval of the action.

When a standards-track specification has not reached the Internet Standard level but has remained at the same status level for twenty-four (24) months, and every twelve (12) months thereafter until the status is changed, the IESG shall review the viability of the standardization effort responsible for that specification. Following each such review, the IESG shall approve termination or continuation of the development. This decision shall be communicated to the IETF via electronic mail to the IETF mailing list, to allow the Internet community an opportunity to comment. This provision is not intended to threaten a legitimate and active Working Group effort, but rather to provide an administrative mechanism for terminating a moribund effort.

A specification may be (indeed, is likely to be) revised as it advances through the standards track. At each stage, the IESG shall determine the scope and significance of the revision to the specification, and, if necessary and appropriate, modify the recommended action. Minor revisions are expected, but a significant revision may require that the specification accumulate more experience at its current maturity level before progressing. Finally, if the specification has been changed very significantly, the IESG may recommend that the revision be treated as a new document, re-entering the standards track at the beginning.

Change of status shall result in republication of the specification as an RFC, except in the rare case that there have been no changes at all in the specification since the last publication. Generally, desired changes will be "batched" for incorporation at the next level in the standards track. However, deferral of changes to the next standards action on the specification will not always be possible or desirable; for example, an important typographical error, or a technical error that does not represent a change in overall function of the specification, may need to be corrected immediately. In such cases, the IESG or RFC Editor may be asked to republish the RFC with corrections, and this will not reset the minimum time-at-level clock.

3.4 Revising a Standard

A new version of an established Internet Standard must progress through the full Internet standardization process as if it were a

completely new specification. Once the new version has reached the Standard level, it will usually replace the previous version, which will move to Historic status. However, in some cases both versions may remain as Internet Standards, to honor the requirements of an installed base. In this situation, the relationship between the previous and the new versions must be explicitly stated in the text of the new version or in another appropriate document (e.g., an Applicability Statement; see [Section 2.2.2](#)).

3.5 Retiring a Standard

As the technology changes and matures, it is possible for a new Standard specification to be so clearly superior technically that one or more existing Internet Standards for the same function should be retired. In this case, the IESG shall approve a change of status of the superseded specification(s) from Standard to Historic. This recommendation shall be issued with the same Last-Call and notification procedures used for any other standards action.

3.6 Conflict Resolution and Appeals

IETF Working Groups are generally able to reach consensus, which sometimes requires difficult compromises between differing technical solutions. However, there are times when even reasonable and knowledgeable people are unable to agree. To achieve the goals of openness and fairness, such conflicts must be resolved with a process of open review and discussion. Participants in a Working Group may disagree with Working Group decisions, based either upon the belief that their own views are not being adequately considered or the belief that the Working Group made a technical choice which essentially will not work. The first issue is a difficulty with Working Group process, and the latter is an assertion of technical error. These two kinds of disagreements may have different kinds of final outcome, but the resolution process is the same for both cases.

Working Group participants always should first attempt to discuss their concerns with the Working Group chair. If this proves unsatisfactory, they should raise their concerns with an IESG Area Director or other IESG member. In most cases, issues raised to the level of the IESG will receive consideration by the entire IESG, with the relevant Area Director or the IETF Chair being tasked with communicating results of the discussion.

For the general community as well as Working Group participants seeking a larger audience for their concerns, there are two

opportunities for explicit comment. (1) When appropriate, a specification that is being suggested for advancement along the standards track will be presented during an IETF plenary. At that time, IETF participants may choose to raise issues with the plenary or to pursue their issues privately, with any of the relevant IETF/IESG management personnel. (2) Specifications that are to be considered by the IESG are publicly announced to the IETF mailing list, with a request for comments.

Finally, if a problem persists, the IAB may be asked to adjudicate the dispute.

- * If a concern involves questions of adequate Working Group discussion, the IAB will attempt to determine the actual nature and extent of discussion that took place within the Working Group, based upon the Working Group's written record and upon comments of other Working Group participants.
- * If a concern involves questions of technical adequacy, the IAB may convene an appropriate review panel, which may then recommend that the IESG and Working Group re-consider an alternate technical choice.
- * If a concern involves a reasonable difference in technical approach, but does not substantiate a claim that the Working Group decision will fail to perform adequately, the Working Group participant may wish to pursue formation of a separate Working Group. The IESG and IAB encourage alternative points of view and the development of technical options, allowing the general Internet community to show preference by making its own choices, rather than by having legislated decisions.

4. EXTERNAL STANDARDS AND SPECIFICATIONS

Many standards groups other than the IETF create and publish standards documents for network protocols and services. When these external specifications play an important role in the Internet, it is desirable to reach common agreements on their usage -- i.e., to establish Internet Standards relating to these external specifications.

There are two categories of external specifications:

(1) Open Standards

Accredited national and international standards bodies, such as ANSI, ISO, IEEE, and ITU-TS, develop a variety of protocol and

service specifications that are similar to Technical Specifications defined here. National and international groups also publish "implementors' agreements" that are analogous to Applicability Statements, capturing a body of implementation-specific detail concerned with the practical application of their standards.

(2) Vendor Specifications

A vendor-proprietary specification that has come to be widely used in the Internet may be treated by the Internet community as if it were a "standard". Such a specification is not generally developed in an open fashion, is typically proprietary, and is controlled by the vendor or vendors that produced it.

To avoid conflict between competing versions of a specification, the Internet community will not standardize a TS or AS that is simply an "Internet version" of an existing external specification, unless an explicit cooperative arrangement to do so has been made. However, there are several ways in which an external specification that is important for the operation and/or evolution of the Internet may be adopted for Internet use.

(a) Incorporation of an Open Standard

An Internet Standard TS or AS may incorporate an open external standard by reference. The reference must be to a specific version of the external standard, e.g., by publication date or by edition number, according to the prevailing convention of the organization that is responsible for the specification.

For example, many Internet Standards incorporate by reference the ANSI standard character set "ASCII" [2]. Whenever possible, the referenced specification shall be made available online.

(b) Incorporation of a Vendor Specification

Vendor-proprietary specifications may be incorporated by reference to a specific version of the vendor standard. If the vendor-proprietary specification is not widely and readily available, the IESG may request that it be published as an Informational RFC.

For a vendor-proprietary specification to be incorporated within the Internet standards process, the proprietor must meet the requirements of [section 5](#) below, and in general the specification shall be made available online.

The IESG shall not favor a particular vendor's proprietary specification over the technically equivalent and competing specifications of other vendors by making it "required" or "recommended".

(c) Assumption

An IETF Working Group may start from an external specification and develop it into an Internet TS or AS, if the specification is provided to the Working Group in compliance with the requirements of [section 5](#) below, and if change control must have been conveyed to IETf by the original developer of the specification. Continued participation in the IETF work by the original owner is likely to be valuable, and it is encouraged.

The following sample text illustrates how a vendor might convey change control to the Internet Society, per (c):

"XXXX Organization asserts that it has the right to transfer to the Internet Society responsibility for further evolution of the YYYY protocol documented in References (1-n) below. XXXX Organization hereby transfers to the Internet Society responsibility for all future modification and development of the YYYY protocol, without reservation or condition."

5. INTELLECTUAL PROPERTY RIGHTS

[This section is current under review by ISOC counsel, and is not final.]

In all matters of intellectual property rights, the intention is to benefit the Internet community and the public at large, while respecting the known, legitimate rights of others.

In this section:

- o "applicable patents" or "applicable pending patents" means purportedly valid patents or patent applications that purportedly apply to technology required to practice an Internet standard.
- o "Trade secrets" means confidential, proprietary information.
- o "ISOC" includes the Internet Society, its trustees, officers, employees, contractors, and agents, IAB, IETF, IESG, IRTF, IRSG, and Internet Working Groups, Research Groups, and committees.

- o "Standards work" includes the creation, development, testing, revision, adoption, or maintenance of an Internet standard.
- o "Standards documents" include specifications, RFCs, and Proposed, Draft, and Internet Standards.
- o "Internet community" means the entire set of people using the Internet standards, directly or indirectly.

5.1 Trade Secret Rights

ISOC will not accept, in connection with its standards work, any technology or information subject to any commitment, understanding, or agreement to keep it confidential or otherwise restrict its use or dissemination.

5.2 Patent Rights

- (A) ISOC will not propose, adopt, or continue to maintain any standard which can only be practiced using technology that is subject to known applicable patents or patent applications, except with prior written assurance that:
1. ISOC may, without cost, freely use the technology in its standards work, and
 2. upon adoption and during maintenance of a standard, any party will be able to obtain the right to use the technology under specified, reasonable, non-discriminatory terms.
 3. the party giving the assurance has the right and power to grant the licenses and knows of no other applicable patents or patent applications or other intellectual property rights that may prevent ISOC and users of Internet standards from practicing the standard.

When such written assurance has been obtained, the standards documents shall include the following notice:

"_____(name of patent owner) has provided written assurance to the Internet Society that any party will be able to obtain, under reasonable, nondiscriminatory terms, the right to use the technology covered by_____(list patents and patent applications) to practice the standard. A copy of the assurance may be obtained from _____. The Internet Society takes no position on the validity or scope of the patents and

patent applications, nor on the appropriateness of the terms of the assurance. The Internet Society makes no representation there are no other intellectual property rights which apply to practicing this standard, nor that it has made any effort to identify any such intellectual property rights."

- (B) ISOC encourages all interested parties to bring to its attention, at the earliest possible time, the existence of any applicable patents or patent applications. For this purpose, each standards document will include the following invitation:

"The Internet Society invites any interested party to bring to its attention any patents or patent applications which purport to cover technology that may be required to practice this standard. Address the information to the Executive Director of the Internet Society."

When applicable, the following sentence will be included in the notice:

"As of _____, no information about any applicable patents or patent applications has been received."

- (C) ISOC disclaims any responsibility for identifying the existence of or for evaluating applicable patents or patent applications on behalf of or for the benefit of any member of the Internet community.
- (D) ISOC takes no position on the validity or scope of any applicable patent or patent application.
- (E) ISOC will take no position on the ownership of inventions made during standards work, except for inventions of which an employee or agent of the Internet Society is a joint inventor. In the latter case, the Internet Society will make its rights available to anyone in the Internet community on a royalty-free basis.

[The following sections are to be written.]

5.3 Copyright

5.4 Notices And Agreements

5.4.1 Notices to appear in Standards Documents

5.4.2 Confirmation of implied Licenses

5.4.3 Text

6. REFERENCES

[1] Postel, J., "IAB Official Protocol Standards", [RFC 1410](#), IAB, March 1993.

[2] ANSI, Coded Character Set -- 7-Bit American Standard Code for Information Interchange, ANSI X3.4-1986.

[3] Reynolds, J., and J. Postel, "Assigned Numbers", [RFC 1340](#), ISI, July 1992.

[4] Postel, J., "Introduction to the STD Notes", [RFC 1311](#), ISI, March 1992.

[5] Postel, J., "Request for Comments on Request for Comments", [RFC 1111](#), August 1989.

APPENDIX A: GLOSSARY OF ACRONYMS

ANSI: American National Standards Institute
ARPA: (U.S.) Advanced Research Projects Agency
AS: Applicability Statement
ASCII: American Standard Code for Information Interchange
ITU-TS: Telecommunications Standardization sector of the International
Telecommunications Union (ITU), a UN treaty organization;
ITU-TS was formerly called CCITT.
IAB: Internet Architecture Board
IANA: Internet Assigned Number Authority
IEEE: Institute of Electrical and Electronics Engineers
ICMP: Internet Control Message Protocol
IESG: Internet Engineering Steering Group
IETF: Internet Engineering Task Force
IP: Internet Protocol
IRTF: Internet Research Task Force
ISO: International Organization for Standardization
ISOC: Internet Society
MIB: Management Information Base
OSI: Open Systems Interconnection
RFC: Request for Comments
TCP: Transmission Control Protocol
TS: Technical Specification

APPENDIX B: CONTACT POINTS

To contact the RFC Editor, send an email message to: "rfc-editor@isi.edu".

To contact the IANA for information or to request a number, keyword or parameter assignment send an email message to: "iana@isi.edu".

To contact the IESG, send an email message to: "iesg@isi.edu".

To contact the IAB, send an email message to: "iab-contact@isi.edu"

To contact the Executive Director of the ISOC, send an email message to Executive-Director@isoc.org".

APPENDIX C: FUTURE ISSUES

It has been suggested that additional procedures in the following areas should be considered.

- o Policy Recommendations and Operational Guidelines

Internet standards have generally been concerned with the technical specifications for hardware and software required for computer communication across interconnected networks. The Internet itself is composed of networks operated by a great variety of organizations, with diverse goals and rules. However, good user service requires that the operators and administrators of the Internet follow some common guidelines for policies and operations. While these guidelines are generally different in scope and style from protocol standards, their establishment needs a similar process for consensus building. Specific rules for establishing policy recommendations and operational guidelines for the Internet in an open and fair fashion should be developed, published, and adopted by the Internet community.

- o Industry Consortia

The rules presented in [Section 4](#) for external standards should be expanded to handle industry consortia.

- o Tracking Procedure

It has been suggested that there should be a formal procedure for tracking problems and change requests as a specification moves through the standards track. Such a procedure might include written responses, which were cataloged and disseminated, or simply a database that listed changes between versions. At the present time, there are not sufficient resources to administer such a procedure.

A simpler proposal is to keep a change log for documents.

- o Time Limit

An explicit time limit (e.g., 3 months) has been suggested for IESG resolution concerning a standards action under the rules of [Section 3.1.2](#). If it were necessary to extend the time for some reason, the IETF would have to be explicitly notified.

- o Bug Reporting

There is no documented mechanism for an individual community member to use to report a problem or bug with a standards-track specification. One suggestion was the every standards RFC should include an email list for the responsible Working Group.

Security Considerations

Security issues are not substantially discussed in this memo.

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