

Network Working Group  
Internet-Draft  
Expires in six months

S. Bradner  
Harvard University  
Editor  
October 1995

## The Internet Standards Process -- Revision 3

a proposed revision of part of [RFC 1602](#)

<[draft-ietf-poised95-std-proc-3-01.txt](#)>

### Status of this Memo

This document is an Internet-Draft. Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as ``work in progress.''

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### Abstract

This memo documents the process used by the Internet community for the standardization of protocols and procedures. It defines the stages in the standardization process, the requirements for moving a document between stages and the types of documents used during this process. It also addresses the intellectual property rights and copyright issues associated with the standards process.

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## 1. INTRODUCTION

This memo documents the process currently used by the Internet community for the standardization of protocols and procedures. The Internet Standards process is an activity of the Internet Society that is organized and managed on behalf of the Internet community by the Internet Architecture Board (IAB) and the Internet Engineering Steering Group.

### 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.

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.

## [1.2](#) The Internet Standards Process

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

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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.

The goals of the Internet standards process are:

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

The procedures described in this document are designed to be fair, open, and objective; to reflect existing (proven) practice; 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 must be 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 demands timely development of standards. The Internet standards process is intended to balance these conflicting goals. The process is believed to be as short and simple as possible without sacrificing technical excellence, thorough testing before adoption of a standard,

or openness and fairness.

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 a number of years of evolution, driven both by the needs of the growing and increasingly diverse Internet community, and by experience.

### 1.3 Organization of This Document

[Section 2](#) describes the publications and archives of the Internet standards process, and specifies the requirements for record-keeping and public access to information. [Section 3](#) describes the Internet standards track. [Section 4](#) describes the types of Internet standard specification. [Section 5](#) describes the process and rules for Internet standardization. [Section 6](#) specifies the way in which externally-sponsored specifications and practices, developed and controlled by

other standards bodies or by vendors, are handled within the Internet standards process. [Section 7](#) presents the rules that are required to protect intellectual property rights in the context of the development and use of Internet Standards. [Section 8](#) contains a list of numbered references.

[Appendix A](#) contains a list of frequently-used acronyms.

## [2.](#) INTERNET STANDARDS-RELATED PUBLICATIONS

### [2.1](#) Requests for Comments (RFCs)

Each distinct version of an Internet standards-related 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 can be obtained from a number of Internet hosts using anonymous FTP, gopher, World Wide Web, and other Internet document-retrieval systems.

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

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The rules for formatting and submitting an RFC are defined in [\[5\]](#). Every RFC is available in ASCII text. Some RFCs are also available in PostScript(R). The PostScript(R) version 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 "Internet 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](#)).

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 "STDxxx", but it keeps its RFC number and its place in the RFC series.

Some RFCs describe Best Current Practices for the Internet community. These RFCs form the 'BCP' (Best Current Practice) subseries of the RFC series. [7] When a specification has been adopted as a BCP, it is given the additional label "BCPxxx", 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 or BCPs. Such non-standards track specifications are not subject to the rules for Internet standardization. Non-standards track specifications may be published directly as "Experimental" or "Informational" RFCs at the discretion of the RFC editor in consultation with the IESG (see [section 4.2](#)).

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

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★ Internet Standard. In the same way, not all RFCs ★  
★ which describe current practices have been given ★  
★ the review and approval to become BCPs. See ★  
★ [RFC-1796](#) for further information. ★  
★ ★  
\*\*\*\*\*

## [2.2](#) 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-Drafts 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, 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 reasonably be expected to be published as an RFC using the phrase "Work in Progress" without referencing an Internet-Draft. This may also be done in a standards track document itself as long as the specification in which the reference is made would stand as a complete and understandable document with or without the reference to the "Work in Progress".

### [2.3](#) Notices and Record Keeping

Each of the organizations involved in the development and approval of

Internet Standards shall publicly announce, and shall maintain a

publicly accessible record of, every activity in which it engages, to the extent that the activity represents the prosecution of any part of the Internet standards process. For purposes of this section, the organizations involved in the development and approval of Internet Standards includes the IETF, the IESG, the IAB, all IETF working groups, and the Internet Society board of trustees.

For IETF and working group meetings announcements shall be made by electronic mail to the IETF mailing list and shall be made sufficiently far in advance of the activity to permit all interested parties to effectively participate. The announcement shall contain (or provide pointers to) all of the information that is necessary to support the participation of any interested individual. In the case of a meeting, for example, the announcement shall include an agenda that specifies the standards-related issues that will be discussed.

The formal record of an organization's standards-related activity shall include at least the following:

- o the charter of the organization (or a defining document equivalent to a charter);
- o complete and accurate minutes of meetings;
- o the archives of the working group electronic mail mailing lists; and
- o all written contributions (in paper or electronic form) from participants that pertain to the organization's standards-related activity.

As a practical matter, the formal record of all Internet standards process activities is maintained by the IETF Secretariat, and is the responsibility of the Executive Director of the IETF. Each IETF working group is expected to maintain their own email list archive and must make a best effort to ensure that all traffic is captured and included in the archives. The entire record is available to any interested party upon request to the Executive Director. Internet drafts that have been removed (for any reason) from the internet-drafts directories shall be archived by the IETF Secretariat for the sole purpose of preserving an historical record of Internet standards activity and thus are not retrievable except in special circumstances.

### [3.](#) INTERNET STANDARD SPECIFICATIONS

Specifications subject to the Internet standards process fall into one of two categories: Technical Specification (TS) and Applicability Statement (AS).

### [3.1](#) 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, are defined by an Applicability Statement.

### [3.2](#) Applicability Statement (AS)

An Applicability Statement specifies how, and under what circumstances, one or more TSs may be applied to support a particular Internet capability. An AS may specify uses for TSs that are not Internet Standards, as discussed in [Section 6](#).

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 (see [section 3.3](#)).

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 on which the AS relies (see [section 5.1](#)). 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.

An AS may refer to a TS that is either a standards-track

specification or is "Informational", but not to a TS with a maturity level of "Experimental" or "Historic" (see [section 4.2](#)).

### [3.3](#) Requirement Levels

An AS shall 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 3.2](#), 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 these TSs:

- (d) Limited Use: The TS is considered to be 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.

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

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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.

The "Official Protocol Standards" RFC lists a general requirement level for each TS, using the nomenclature defined in this section. This RFC is updated periodically. 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.

#### 4. THE INTERNET STANDARDS TRACK

Specifications that are intended 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 in [section 4.1](#). The way in which specifications move along the standards track is described in [section 5](#).

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 4.2](#) to cover these and other specifications that are not considered to be on the standards track.

## [4.1](#) Standards Track Maturity Levels

Internet specifications 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.

### [4.1.1](#) Proposed Standard

The entry-level maturity for the standards track is "Proposed Standard". A specific action by the IESG is required to move a specification onto the standards track at the "Proposed Standard" level (see [section 5](#)).

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 status (see [section 4.2.1](#)), 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 waive this requirement in order to allow a specification to advance

to the Proposed Standard state when it is considered to be useful and necessary (and timely) even with known technical omissions.

Implementors should treat Proposed Standards as immature specifications. It is desirable to implement them in order to gain experience and to validate, test, and clarify the specification. However, since the content of Proposed Standards may be changed if problems are found or better solutions are identified, deploying implementations of such standards into a disruption-sensitive customer base is not recommended.

#### [4.1.2](#) Draft Standard

A specification from which at least two independent and interoperable implementations from different code bases, and for which sufficient successful operational experience has been obtained, may be elevated to the "Draft Standard" level. If patented or otherwise controlled technology is required for implementation, the separate implementations must also have resulted from separate exercise of the licensing process. This is a major advance in status, indicating a strong belief that the specification is mature and will be useful.

The requirement for at least two independent and interoperable

implementations applies to all of the options and features of the specification. In cases in which one or more options or features have not been demonstrated in at least two interoperable implementations, the specification may advance to the Draft Standard level only if those options or features are removed.

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.

A Draft Standard is normally considered to be a final specification, and changes are likely to be made only to solve specific problems encountered. In most circumstances, it is reasonable for vendors to deploy implementations of draft standards into the customer base.

### [4.1.3](#) 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.

## [4.2](#) 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 a more recent Internet Standard, or have otherwise fallen into disuse or disfavor.

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

### [4.2.1](#) Experimental

The "Experimental" designation on a TS typically denotes 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, subject only to editorial considerations and to verification that there has been adequate coordination with the standards process (see below). An Experimental specification may be the output of an organized Internet research effort (e.g., a Research Group of the IRTF), an IETF working group, or it may be an individual contribution.

### [4.2.2](#) 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 Informational designation is intended to provide for the timely publication of a very broad range of responsible informational documents from many sources, subject only to editorial considerations and to verification that there has been adequate coordination with the standards process (see below).

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 6](#) may be published as Informational RFCs, with the permission of the owner and the concurrence of the RFC Editor.

#### [4.2.3](#) Procedures for Experimental and Informational RFCs

Unless they are the result of IETF working group action, documents intended to be published with Experimental or Informational status should be submitted directly to the RFC Editor . The RFC Editor will publish any such documents as Internet-Drafts which have not already been so published. In order to differentiate these Internet-Drafts the filename will include "-rfcded-". The RFC Editor will wait two weeks after this publication for comments before proceeding further. The RFC Editor is expected to exercise his or her judgment concerning the editorial suitability of a document for publication with Experimental or Informational status, and may refuse to publish a document which, in the expert opinion of the RFC Editor, falls below the technical and/or editorial standard for RFCs.

To ensure that the non-standards track Experimental and Informational designations are not misused to circumvent the Internet standards process, the IESG and the RFC Editor have agreed that the RFC Editor will refer to the IESG any document submitted for Experimental or Informational publication which, in the opinion of the RFC Editor, may be related to, or of interest to, the IETF community. The IESG shall review such a referred document within a reasonable period of time, and recommend either that it be published as originally

submitted or referred to the IETF as a contribution to the Internet standards process.

If (a) the IESG recommends that the document be brought within the

IETF and progressed within the IETF context, but the author declines to do so, or (b) the IESG considers that the document proposes something that conflicts with, or is actually inimical to, an established IETF effort, the document may still be published as an Experimental or Informational RFC. In these cases, however, the IESG may insert appropriate "disclaimer" text into the RFC either in or immediately following the "Status of this Memo" section in order to make the circumstances of its publication clear to readers.

Documents proposed for Experimental and Informational RFCs by IETF working groups go through IESG review. The review is initiated using the process described in [section 5.1.1](#).

#### [4.2.4](#) 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.)

### [5](#). THE INTERNET STANDARDS PROCESS

The mechanics of the Internet standards process involve decisions of the IESG concerning the elevation of a specification onto the standards track or the movement of a standards-track specification from one maturity level to another. Although a number of reasonably objective criteria (described below and in [section 4](#)) are available to guide the IESG in making a decision to move a specification onto, along, or off the standards track, there is no algorithmic guarantee of elevation to or progression along the standards track for any specification. The experienced collective judgment of the IESG concerning the technical quality of a specification proposed for elevation to or advancement in the standards track is an essential component of the decision-making process.

#### [5.1](#) Standards Actions

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

##### [5.1.1](#) Initiation of Action

A standards action is initiated by a recommendation to the appropriate IETF Area Director or to the IESG as a whole by the individual or group that is responsible for the specification (usually an IETF Working Group).

A specification that is intended to enter or advance in the Internet standards track shall first be posted as an Internet-Draft (see [section 2.2](#)), by sending the document in an electronic mail message to the Internet-Drafts address at the IETF Secretariat. It shall remain as an Internet-Draft for a period of time, not less than two weeks, that permits useful community review, after which it may be submitted to the relevant Area Director for review by sending an electronic mail message to the Area Director with a copy to the IESG Secretary, specifying the name of the document and the recommended action. The Area Director, after reviewing the submission, may request that the IESG consider the document for action.

#### [5.1.2](#) IESG Review and Approval

The IESG shall determine whether or not a specification submitted to it according to [section 5.1.1](#) satisfies the applicable criteria for the recommended action (see sections [5.3](#) and [5.4](#)), and shall in addition determine whether or not the technical quality and clarity of the specification comports with that expected for the maturity level to which the specification is recommended.

In order to obtain all of the information necessary to make these determinations, particularly when the specification is considered by the IESG to be extremely important in terms of its potential impact on the Internet or on the suite of Internet protocols, the IESG may, at its discretion, commission an independent technical review of the specification. Such a review shall be commissioned whenever the circumstances surrounding a recommended standards action are considered by the IESG to require a broader basis than is normally available from the IESG itself for agreement within the Internet community that the specification is ready for advancement. The IESG shall communicate the findings of any such review to the IETF.

The IESG will send notice to the IETF of the pending IESG consideration of the document(s) to permit a final review by the general Internet community. This "Last-Call" notification shall be via electronic mail to the IETF mailing list. Comments on a Last-Call shall be accepted from anyone, and should be sent to the email address specified in the Last-Call.

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 of whether or not to approve the standards

action, and shall notify the IETF of its decision via electronic mail to the IETF mailing list. In those cases in which the IESG believes that the community interest would be served by allowing more time for comment, it may decide to explicitly lengthen the Last-Call period. In those cases in which the proposed standards action involves a document for which no corresponding IETF working group is currently active, the Last-Call period shall be no shorter than four weeks.

### [5.1.3](#) Publication

Following IESG approval and any necessary editorial work, the RFC Editor shall publish the specification as an RFC. The specification shall at that point 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's newsletter. This shall constitute the "publication 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.

Finally, the RFC Editor shall publish periodically an "Internet Official Protocol Standards" RFC [[1](#)], summarizing the status of all Internet protocol and service specifications, both within and outside the standards track.

## [5.2](#) 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.

Case (a) accounts for the great majority of specifications that enter the standards track. 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. Ad hoc review committees may also be convened in other circumstances when the nature of review required is too small to require the formality of Working Group creation. 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.

### [5.3](#) Advancing in the Standards Track

The procedure described in [section 5.1](#) is followed for each action that attends the advancement of a specification along 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.

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 a new number) with corrections, and this will not reset the minimum time-at-level clock.

When a standards-track specification has not reached the Internet Standard level but has remained at the same maturity 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 and the usefulness of the technology. Following each such review, the IESG shall approve termination or continuation of the development, at the same time the IESG shall decide to maintain the specification at the same maturity level or to move it to Historic status. This decision shall be communicated to the IETF by 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.

#### [5.4](#) 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. (Sections [5.1](#) and [5.3](#)) 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 3.2](#)).

## [5.5](#) 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.

## [5.6](#) Conflict Resolution and Appeals

IETF Working Groups are generally able to reach consensus, which

sometimes requires difficult compromises between or among different technical proposals. However, there are times when even the most reasonable and knowledgeable people are unable to agree. To achieve the goals of openness and fairness, such conflicts must be resolved by a process of open review and discussion. This section specifies the procedures that shall be followed to deal with Internet standards issues that cannot be resolved through the normal processes whereby IETF Working Groups and other Internet standards process participants ordinarily reach consensus.

An individual (whether a participant in the relevant Working Group or not) may disagree with a Working Group recommendation based on his or her belief that either (a) his or her own views have not been adequately considered by the Working Group, or (b) the Working Group has made an incorrect technical choice which places the quality and/or integrity of the Working Group's product(s) in significant jeopardy. The first issue is a difficulty with Working Group process; the latter is an assertion of technical error. These two types of disagreement are quite different, but both are handled by

the same process of review.

A person who disagrees with a Working Group recommendation shall always first discuss the matter with the Working Group's chair(s), who may involve other members of the Working Group (or the Working Group as a whole) in the discussion. If the disagreement cannot be resolved in this way, it shall be brought to the attention of the Area Director(s) for the area in which the Working Group is chartered. The Area Director(s) shall attempt to resolve the dispute. If the disagreement cannot be resolved by the Area Director(s) the matter may be brought before the IESG as a whole. In all cases a decision concerning the disposition of the dispute, and the communication of that decision to the parties involved, must be accomplished within a reasonable period of time.

A person who disagrees with an IESG decision should first discuss the matter with the IESG chair, who may involve other members of the IESG, or the whole IESG, in the discussion.

If the disagreement is not resolved to the satisfaction of the parties at the IESG level, any of the parties involved may appeal the decision to the IAB by sending notice of such appeal to the IAB electronic mail list. The IAB's review of the dispute shall be informed by the findings of the IESG, by any additional representation that the original petitioner(s) or others wish to make in response to the IESG's findings, and by its own investigation of the circumstances and the claims made by all parties. The IAB shall make and announce its decision within a reasonable period of time.

[NOTE: These procedures intentionally and explicitly do not establish a fixed maximum time period that shall be considered "reasonable" in all cases. The Internet standards process places a premium on consensus and efforts to achieve it, and deliberately foregoes deterministically swift execution of procedures in favor of a latitude within which more genuine technical agreements may be reached.]

The IAB decision is final with respect to the question of whether or not the Internet standards procedures have been followed and with respect to all questions of technical merit.

Further recourse is available only in cases in which the procedures themselves (i.e., the procedures described in this document) are claimed to be inadequate or insufficient to the protection of the rights of all parties in a fair and open Internet standards process. Claims on this basis may be made to the Internet Society Board of Trustees, by formal notice to the ISOC electronic mail list. The President of the Internet Society shall acknowledge such an appeal within two weeks, and shall at the time of acknowledgment advise the petitioner of the expected duration of the Trustees' review of the appeal (which shall be completed within a reasonable period of time). The Trustees' decision upon completion of their review shall be final with respect to all aspects of the dispute.

At all stages of the appeals process, the individuals or bodies responsible for making the decisions have the discretion to define the specific procedures they will follow in the process of making their decision.

## [6.](#) BEST CURRENT PRACTICE (BCP) RFCs

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.

### [6.1](#) BCP Review Process

The BCP process is similar to that for proposed standards. The BCP is submitted to the IESG for review, and the existing review process applies, including a Last-Call on the IETF announcement mailing list.

However, once the IESG has approved the document, the process ends and the document is published. The resulting document is viewed as having the technical approval of the IETF, but it is not, and cannot become an official Internet Standard.

Specifically, a document to be considered for the status of BCP must undergo the procedures outlined in sections [5.1](#), and [5.5](#) of this document. It is also under the restrictions of [section 5.2](#) and the process may be appealed according to the procedures in [section 5.6](#).

## [7.](#) 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. All of these are considered to be "open external standards" for the purposes of the Internet standards process.

### (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. For example, many Internet Standards incorporate by reference the ANSI standard character set "ASCII" [2]. 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. Whenever possible, the referenced specification shall be 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 8](#), and the specification shall be made available online.

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

(c) Assumption

An IETF Working Group may start from an external specification and develop it into an Internet TS or AS. This is acceptable only if (1) the specification is provided to the Working Group in compliance with the requirements of [section 8](#), and (2) change control has been conveyed to IETF by the original developer of the specification. Sample text illustrating the way in which a vendor might convey change control to the Internet Society is contained in [10].

## [8](#). INTELLECTUAL PROPERTY RIGHTS

### [8.1](#). General Policy

In all matters of intellectual property rights and procedures, the intention is to benefit the Internet community and the public at

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large, while respecting the legitimate rights of others.

## [8.2](#) Confidentiality Obligations

No contribution that is subject to any requirement of confidentiality or any restriction on its dissemination may be considered in any part of the Internet standards process, and there must be no assumption of any confidentiality obligation with respect to any such contribution.

## [8.3](#). Rights and Permissions

In the course of standards work, the IETF receives contributions in various forms and from many persons. To best facilitate the dissemination of these contributions, it is necessary to understand any intellectual property rights (IPR) relating to the contributions.

### [8.3.1](#). All Contributions

By submission of a contribution, each person actually submitting the contribution is deemed to agree to the following terms and conditions on his own behalf and/or on behalf of the organization he represents. Where a submission identifies contributors in addition to the contributor(s) who provide the actual submission, the actual submitter(s) represent that each other named contributor was made aware of and agreed to accept the same terms and conditions on his own behalf and/or on behalf of any organization he represents.

1. Contributor grants a perpetual, non-exclusive, royalty-free, world-wide right and license under Contributor's copyrights to publish and distribute in any way the contribution, and to develop derivative works that are based on or incorporate all or part of the contribution, and that such derivative works will inherit the right and license of the original contribution.
2. The contributor acknowledges that the IETF has no duty to publish or otherwise use or disseminate every contribution.
3. The contributor grants permission to reference the name(s) and address(s) of the contributor.
4. The contributor represents that there no limits to the contributor's ability to make the grants and acknowledgments above

that are reasonably and personally known to the contributor.

### [8.3.2.](#) Standards Track Documents

- (A) The IESG shall not approve any TS, or advance any TS along the

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standards track which can be practiced only by using technology that is subject to known patents or patent applications, or other proprietary rights, except with the prior written assurance of the claimer of such rights that upon approval by the IESG of the relevant Internet standards track TS(s), any party will be able to obtain the right to implement and use the technology or works under specified, reasonable, non-discriminatory terms.

- (B) The IESG disclaims any responsibility for identifying the existence of or for evaluating the applicability of any claimed copyrights, patents, patent applications, or other rights in the fulfilling of the its obligations under (A), and will take no position on the validity or scope of any such rights.

### [8.3.3](#) Determination of Reasonable and Non-discriminatory Terms

The IESG will not make any explicit determination that the assurance of reasonable and non-discriminatory terms for the use of a technology has been fulfilled in practice. It will instead use the normal requirements for the advancement of Internet Standards to verify that the terms for use are reasonable. If the two unrelated implementations of the standard that are required to advance from Proposed to Draft have been produced by different organizations or individuals or if the "significant implementation and successful operational experience" required to advance from Draft to full Standard has been achieved the assumption is that the terms must be reasonable and to some degree, non-discriminatory. This assumption may be challenged during the Last-Call period.

## [8.4.](#) Notices

- (A) Standards track documents shall include the following notice:

"The IETF takes no position on the validity or scope of any claimed encumbrances to the implementation or use of the

technology described in this document, nor that it has made any effort to identify any such intellectual property rights. For further information on the IETF's procedures with respect to rights in standards and standards-related documentation, see RFC-1602bis, dated in the future. Copies of all claims of intellectual property rights submitted to the IETF for posting and copies of all statements of the ability to obtain the right to implement and use the technology under reasonable, non-discriminatory terms that have been received by the IETF referring to this technology may be found in the "rights" subdirectory in the RFC archives."

- (B) The IETF encourages all interested parties to bring to its

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attention, at the earliest possible time, the existence of any intellectual property rights pertaining to Internet Standards. For this purpose, each standards document shall include the following invitation:

"The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which purport to cover technology that may be required to practice this standard. Please address the information to the Executive Director of the Internet Engineering Task Force Secretariat."

- (C) The following copyright notice and disclaimer shall be included in all ISOC standards-related documentation:

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The document may be modified as needed for the purpose of developing Internet standards provided this notice is (1) included in the modified document without change and (2) the person or organization making the modifications clearly identifies, within the modified document, the changes that have been made and who made them.

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## 9. ACKNOWLEDGMENTS

There have been a number of people involved with the development of the documents defining the IETF standards process over the years. The process was first described in [RFC 1310](#) then revised in [RFC 1602](#) before the current effort (which relies heavily on its predecessors). Specific acknowledgments must be extended to Lyman Chapin, Phill Gross and Christian Huitema as the editors of the previous versions, to Jon Postel and Dave Crocker for their inputs to those versions,

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and to Andy Ireland, Geoff Stewart, Jim Lampert and Dick Holleman for their reviews of the legal aspects of the procedures described herein.

In addition much of the credit for the refinement of the details of the IETF processes belongs to the many members of the various incarnations of the POISED working group.

## 10. SECURITY CONSIDERATIONS

Security issues are not discussed in this memo.

## 12. REFERENCES

- [1] Postel, J., "Internet Official Protocol Standards", STD 1, USC/Information Sciences Institute, March 1994.
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## [12](#) ..AUTHORS' ADDRESS

Scott O. Bradner Harvard University Holyoke Center, Room 813  
1350 Mass. Ave. Cambridge, MA 02138 USA +1 617 495 3864

sob@harvard.edu

## APPENDIX A: GLOSSARY OF ACRONYMS

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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 Interna
	treaty organization; ITU-TS was formerly called CCITT.
IAB:	Internet Architecture Board
IANA:	Internet Assigned Numbers 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
IRSG	Internet Research Steering Group

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