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The Internet Standards Process -- Revision 3

Status of this Memo

This document specifies an Internet Best Current Practices for the Internet Community, and requests discussion and suggestions for improvements. Distribution of this memo is unlimited.

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 (IESG).

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 interconnected networks, which are not connected to the global 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 normally applies 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 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:

- technical excellence;
- prior implementation and testing;
- clear, concise, and easily understood documentation;
- openness and fairness; and
- timeliness.

The procedures described in this document are designed to be fair, open, and objective; to reflect existing (proven) practice; and to be flexible.

- 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.

- 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.

- 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. Section 3 describes the types of Internet standard specifications. Section 4 describes the Internet standards specifications track. Section 5 describes Best Current Practice RFCs. Section 6 describes the process and rules for Internet standardization. Section 7 specifies the way in which externally-sponsored specifications and practices, developed and controlled by other standards bodies or by others, are handled within the Internet Standards Process. Section 8 describes the requirements for notices and record keeping Section 9 defines a variance process to allow one-time exceptions to some of the requirements in this document Section 10 presents the rules that are required to protect intellectual property rights in the context of the development and use of Internet Standards. Section 11 includes acknowledgments of some of the people involved in creation of this document. Section 12 notes that security issues are not dealt with by this document. Section 13 contains a list of numbered references. Section 14 contains definitions of some of the terms used in this document. Section 15 lists the author's email and postal addresses. 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 in addition to Internet Standards, 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 [5]. Every RFC is available in ASCII text. Some RFCs are also available in other formats. The other versions 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. (see section 4.1.3)

Some RFCs standardize the results of community deliberations about statements of principle or conclusions about what is the best way to perform some operations or IETF process function. These RFCs form the 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. (see section 5)

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      *
*   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 [6] for further information.             *
*                                                     *
*******************************************************
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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.

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*******************************************************
*                                                     *
*   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".

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 might or might 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 7.

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 4.1). 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.

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. For example, the TELNET protocol should be implemented by all systems that would benefit from remote access.

(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. For example, the DECNET MIB could be seen as valuable in an environment where the DECNET protocol is used.

As noted in section 4.1, 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 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 (STD1) 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 6.

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.

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.

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 environment is not recommended.

4.1.2 Draft Standard

A specification from which at least two independent and interoperable implementations from different code bases have been developed, and for which sufficient successful operational experience has been obtained, may be elevated to the "Draft Standard" level. For the purposes of this section, "interoperable" means to be functionally equivalent or interchangeable components of the system or process in which they are used. If patented or otherwise controlled technology is required for implementation, the separate implementations must also have resulted from separate exercise of the licensing process. Elevation to Draft Standard 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.

The Working Group chair is responsible for documenting the specific implementations which qualify the specification for Draft or Internet Standard status along with documentation about testing of the interoperation of these implementations. The documentation must include information about the support of each of the individual options and features. This documentation should be submitted to the Area Director with the protocol action request. (see Section 6)

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 a disruption sensitive environment.

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.

A specification that reaches the status of Standard is assigned a number in the STD series while retaining its RFC number.

4.2 Non-Standards Track Maturity Levels

Not every specification is on the standards track. A specification 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 specification 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". The documents bearing these labels are not Internet Standards in any sense.

4.2.1 Experimental

The "Experimental" designation 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 section 4.2.3).

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 10 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 they will be labeled or grouped in the I-D directory so they are easily recognizable. 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, is unrelated to Internet activity or 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 work being done, or expected to be done, within 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 6.1.1.

4.2.4 Historic

A specification 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.)

Note: Standards track specifications normally must not depend on other standards track specifications which are at a lower maturity level or on non standards track specifications other than referenced specifications from other standards bodies. (See Section 7.)

5. BEST CURRENT PRACTICE (BCP) RFCs

The BCP subseries of the RFC series is designed to be a way to standardize practices and the results of community deliberations. A BCP document is subject to the same basic set of procedures as standards track documents and thus is a vehicle by which the IETF community can define and ratify the community's best current thinking on a statement of principle or on what is believed to be the best way to perform some operations or IETF process function.

Historically Internet standards have generally been concerned with the technical specifications for hardware and software required for computer communication across interconnected networks. However, since the Internet itself is composed of networks operated by a great variety of organizations, with diverse goals and rules, 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.

While it is recognized that entities such as the IAB and IESG are composed of individuals who may participate, as individuals, in the technical work of the IETF, it is also recognized that the entities

themselves have an existence as leaders in the community. As leaders in the Internet technical community, these entities should have an outlet to propose ideas to stimulate work in a particular area, to raise the community's sensitivity to a certain issue, to make a statement of architectural principle, or to communicate their thoughts on other matters. The BCP subseries creates a smoothly structured way for these management entities to insert proposals into

the consensus-building machinery of the IETF while gauging the community's view of that issue.

Finally, the BCP series may be used to document the operation of the IETF itself. For example, this document defines the IETF Standards Process and is published as a BCP.

5.1 BCP Review Process

Unlike standards-track documents, the mechanisms described in BCPs are not well suited to the phased roll-in nature of the three stage standards track and instead generally only make sense for full and immediate instantiation.

The BCP process is similar to that for proposed standards. The BCP is submitted to the IESG for review, (see section 6.1.1) and the existing review process applies, including a Last-Call on the IETF Announce 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.

Specifically, a document to be considered for the status of BCP must undergo the procedures outlined in sections 6.1, and 6.4 of this document. The BCP process may be appealed according to the procedures in section 6.5.

Because BCPs are meant to express community consensus but are arrived at more quickly than standards, BCPs require particular care. Specifically, BCPs should not be viewed simply as stronger Informational RFCs, but rather should be viewed as documents suitable for a content different from Informational RFCs.

A specification, or group of specifications, that has, or have been approved as a BCP is assigned a number in the BCP series while retaining its RFC number(s).

6. 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.

6.1 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.

6.1.1 Initiation of Action

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) unless it has not changed since publication as an RFC. It shall remain as an Internet-Draft for a period of time, not less than two weeks, that permits useful community review, after which a recommendation for action may be initiated.

A standards action is initiated by a recommendation by the IETF Working group responsible for a specification to its Area Director, copied to the IETF Secretariat or, in the case of a specification not associated with a Working Group, a recommendation by an individual to the IESG.

6.1.2 IESG Review and Approval

The IESG shall determine whether or not a specification submitted to it according to section 6.1.1 satisfies the applicable criteria for the recommended action (see sections 4.1 and 4.2), and shall in addition determine whether or not the technical quality and clarity of the specification is consistent 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.

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 Announce mailing list. Comments on a Last-Call shall be accepted from anyone, and should be sent as directed in the Last-Call announcement.

The Last-Call period shall be no shorter than two weeks except in those cases where the proposed standards action was not initiated by an IETF Working Group, in which case the Last-Call period shall be no shorter than four weeks. If the IESG believes that the community interest would be served by allowing more time for comment, it may decide on a longer Last-Call period or to explicitly lengthen a current Last-Call period.

The IESG is not bound by the action recommended when the specification was submitted. For example, the IESG may decide to consider the specification for publication in a different category than that requested. If the IESG determines this before the Last-Call is issued then the Last-Call should reflect the IESG's view. The IESG could also decide to change the publication category based

on the response to a Last-Call. If this decision would result in a specification being published at a "higher" level than the original Last-Call was for, a new Last-Call should be issued indicating the IESG recommendation. In addition, the IESG may decide to recommend the formation of a new Working Group in the case of significant controversy in response to a Last-Call for specification not originating from an IETF Working Group.

In a timely fashion after the expiration of the Last-Call period, 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 Announce mailing list.

6.1.3 Publication

If a standards action is approved, notification is sent to the RFC Editor and copied to the IETF with instructions to 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.

The RFC Editor shall publish periodically an "Internet Official Protocol Standards" RFC [1], summarizing the status of all Internet protocol and service specifications.

6.2 Advancing in the Standards Track

The procedure described in section 6.1 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 the announcement of the 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 effort, 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 Announce 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.

6.3 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 be moved 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).

6.4 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 standards track specifications for the same function should be retired. In this case, or when it is felt for some other reason that an existing standards track specification should be retired, the IESG shall approve a change of status of the old specification(s) to Historic. This recommendation shall be issued with the same Last-Call and notification procedures used for any

other standards action. A request to retire an existing standard can originate from a Working Group, an Area Director or some other interested party.

6.5 Conflict Resolution and Appeals

Disputes are possible at various stages during the IETF process. As much as possible the process is designed so that compromises can be made, and genuine consensus achieved, 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.

6.5.1 Working Group Disputes

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, any of the parties involved may bring it 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) any of the parties involved may then appeal to the IESG as a whole. The IESG shall then review the situation and attempt to resolve it in a manner of its own choosing.

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. The IAB shall then review the situation and attempt to resolve it in a manner of its own choosing.

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.

6.5.2 Process Failures

This document sets forward procedures required to be followed to ensure openness and fairness of the Internet Standards Process, and the technical viability of the standards created. The IESG is the principal agent of the IETF for this purpose, and it is the IESG that is charged with ensuring that the required procedures have been followed, and that any necessary prerequisites to a standards action have been met.

If an individual should disagree with an action taken by the IESG in this process, that person should first discuss the issue with the ISEG Chair. If the IESG Chair is unable to satisfy the complainant then the IESG as a whole should re-examine the action taken, along with input from the complainant, and determine whether any further action is needed. The IESG shall issue a report on its review of the complaint to the IETF.

Should the complainant not be satisfied with the outcome of the IESG review, an appeal may be lodged to the IAB. The IAB shall then review the situation and attempt to resolve it in a manner of its own choosing and report to the IETF on the outcome of its review.

If circumstances warrant, the IAB may direct that an IESG decision be annulled, and the situation shall then be as it was before the IESG decision was taken. The IAB may also recommend an action to the IESG, or make such other recommendations as it deems fit. The IAB may not, however, pre-empt the role of the IESG by issuing a decision which only the IESG is empowered to make.

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

6.5.3 Questions of Applicable Procedure

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. 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. The Trustees shall review the

situation in a manner of its own choosing and report to the IETF on the outcome of its review.

The Trustees' decision upon completion of their review shall be final with respect to all aspects of the dispute.

6.5.4 Appeals Procedure

All appeals must include a detailed and specific description of the facts of the dispute.

All appeals must be initiated within two months of the public knowledge of the action or decision to be challenged.

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.

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.

[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.]

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

Various national and international standards bodies, such as ANSI, ISO, IEEE, and ITU-T, 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) Other Specifications

Other proprietary specifications that have come to be widely used in the Internet may be treated by the Internet community as if they were a "standards". Such a specification is not generally developed in an open fashion, is typically proprietary, and is controlled by the vendor, vendors, or organization that produced it.

7.1 Use of External Specifications

To avoid conflict between competing versions of a specification, the Internet community will not standardize a specification 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.

7.1.1 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]. Whenever possible, the referenced specification shall be available online.

7.1.2 Incorporation of Other Specifications

Other proprietary specifications may be incorporated by reference to a version of the specification as long as the proprietor meets the requirements of section 10. If the other proprietary specification is not widely and readily available, the IESG may request that it be published as an Informational RFC.

The IESG generally should not favor a particular proprietary specification over technically equivalent and competing specification(s) by making any incorporated vendor specification "required" or "recommended".

7.1.3 Assumption

An IETF Working Group may start from an external specification and develop it into an Internet specification. This is acceptable if (1) the specification is provided to the Working Group in compliance with the requirements of section 10, and (2) change control has been conveyed to IETF by the original developer of the specification for the specification or for specifications derived from the original specification.

8. 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 Announce 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:

- the charter of the organization (or a defining document equivalent to a charter);
- complete and accurate minutes of meetings;
- the archives of Working Group electronic mail mailing lists; and
- all written contributions 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 IETF Secretariat except that 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. Also, the Working Group chair is responsible for providing the IETF Secretariat with complete and accurate minutes of all Working Group meetings. 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.

9. VARYING THE PROCESS

This document, which sets out the rules and procedures by which Internet Standards and related documents are made is itself a product of the Internet Standards Process (as a BCP, as described in section 5). It replaces a previous version, and in time, is likely itself to be replaced.

While, when published, this document represents the community's view of the proper and correct process to follow, and requirements to be met, to allow for the best possible Internet Standards and BCPs, it cannot be assumed that this will always remain the case. From time to time there may be a desire to update it, by replacing it with a new version. Updating this document uses the same open procedures as are used for any other BCP.

In addition, there may be situations where following the procedures leads to a deadlock about a specific specification, or there may be situations where the procedures provide no guidance. In these cases it may be appropriate to invoke the variance procedure described below.

9.1 The Variance Procedure

Upon the recommendation of the responsible IETF Working Group (or, if no Working Group is constituted, upon the recommendation of an ad hoc

committee), the IESG may enter a particular specification into, or advance it within, the standards track even though some of the requirements of this document have not or will not be met. The IESG may approve such a variance, however, only if it first determines that the likely benefits to the Internet community are likely to outweigh any costs to the Internet community that result from noncompliance with the requirements in this document. In exercising this discretion, the IESG shall at least consider (a) the technical merit of the specification, (b) the possibility of achieving the goals of the Internet Standards Process without granting a variance, (c) alternatives to the granting of a variance, (d) the collateral and precedential effects of granting a variance, and (e) the IESG's ability to craft a variance that is as narrow as possible. In determining whether to approve a variance, the IESG has discretion to limit the scope of the variance to particular parts of this document and to impose such additional restrictions or limitations as it

determines appropriate to protect the interests of the Internet community.

The proposed variance must detail the problem perceived, explain the precise provision of this document which is causing the need for a variance, and the results of the IESG's considerations including consideration of points (a) through (d) in the previous paragraph. The proposed variance shall be issued as an Internet Draft. The IESG shall then issue an extended Last-Call, of no less than 4 weeks, to allow for community comment upon the proposal.

In a timely fashion after the expiration of the Last-Call period, the IESG shall make its final determination of whether or not to approve the proposed variance, and shall notify the IETF of its decision via electronic mail to the IETF Announce mailing list. If the variance is approved it shall be forwarded to the RFC Editor with a request that it be published as a BCP.

This variance procedure is for use when a one-time waving of some provision of this document is felt to be required. Permanent changes to this document shall be accomplished through the normal BCP process.

The appeals process in section 6.5 applies to this process.

9.2 Exclusions

No use of this procedure may lower any specified delays, nor exempt any proposal from the requirements of openness, fairness, or consensus, nor from the need to keep proper records of the meetings and mailing list discussions.

Specifically, the following sections of this document must not be subject of a variance: 5.1, 6.1, 6.1.1 (first paragraph), 6.1.2, 6.3 (first sentence), 6.5 and 9.

10. INTELLECTUAL PROPERTY RIGHTS

10.1. General Policy

In all matters of intellectual property rights and procedures, the

intention is to benefit the Internet community and the public at large, while respecting the legitimate rights of others.

10.2 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.

10.3. 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.

10.3.1. 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, on behalf of the organization (if any) he represents and on behalf of the owners of any propriety rights in the contribution.. 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, on behalf of any organization he may represent and any known owner of any proprietary rights in the contribution.

1. Some works (e.g. works of the U.S. Government) are not subject to copyright. However, to the extent that the submission is or may be subject to copyright, the contributor, the organization he represents (if any) and the owners of any proprietary rights in the contribution, grant an unlimited perpetual, non-exclusive, royalty-free, world-wide right and license to the ISOC and the IETF under any copyrights in the contribution. This license includes the right to copy, publish and distribute the contribution in any way, and to prepare derivative works that are based on or incorporate all or part of the contribution, the license to such derivative works to be of the same scope as the license of the original contribution.

2. The contributor acknowledges that the ISOC and IETF have no duty to publish or otherwise use or disseminate any contribution.

3. The contributor grants permission to reference the name(s) and address(es) of the contributor(s) and of the organization(s) he represents (if any).

4. The contributor represents that contribution properly acknowledge major contributors.

5. The contribuitor, the organization (if any) he represents and the owners of any proprietary rights in the contribution, agree that no information in the contribution is confidential and that the ISOC and its affiliated organizations may freely disclose any information in the contribution.

6. The contributor represents that he has disclosed the existence of any proprietary or intellectual property rights in the contribution that are reasonably and personally known to the contributor. The contributor does not represent that he personally knows of all potentially pertinent proprietary and intellectual property rights owned or claimed by the organization he represents (if any) or third parties.

7. The contributor represents that there are no limits to the contributor's ability to make the grants acknowledgments and agreements above that are reasonably and personally known to the contributor.

   By ratifying this description of the IETF process the Internet Society warrants that it will not inhibit the traditional open and free access to IETF documents for which license and right have been assigned according to the procedures set forth in this section, including Internet-Drafts and RFCs. This warrant is perpetual and will not be revoked by the Internet Society or its successors or assigns.

10.3.2. Standards Track Documents

(A) Where any patents, patent applications, or other proprietary rights are known, or claimed, with respect to any specification on the standards track, and brought to the attention of the IESG, the IESG shall not advance the specification without including in the document a note indicating the existence of such rights, or claimed rights. Where implementations are required before advancement of a specification, only implementations that have, by statement of the implementors, taken adequate steps to comply with any such rights, or claimed rights, shall be considered for the purpose of showing the adequacy of the specification.

(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.

(C) Where the IESG knows of rights, or claimed rights under (A), the IETF Executive Director shall attempt to obtain from the claimant of such rights, a written assurance that upon approval by the IESG

of the relevant Internet standards track specification(s), any party will be able to obtain the right to implement, use and distribute the technology or works when implementing, using or distributing technology based upon the specific specification(s) under openly specified, reasonable, non-discriminatory terms. The Working Group proposing the use of the technology with respect to which the proprietary rights are claimed may assist the IETF Executive Director in this effort. The results of this procedure shall not affect advancement of a specification along the standards track, except that the IESG may defer approval where a delay may facilitate the obtaining of such assurances. The results will, however, be recorded by the IETF Executive Director, and made available. The IESG may also direct that a summary of the results be included in any RFC published containing the specification.

10.3.3 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 specification that are required to advance from Proposed Standard to Draft Standard have been produced by different organizations or individuals or if the "significant implementation and successful operational experience" required to advance from Draft Standard to 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.

10.4. Notices

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

"The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in BCP-11. Copies of claims of rights made

available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification can be obtained from the IETF Secretariat."

(B) The IETF encourages all interested parties to bring to its 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 may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director."

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

"Copyright (C) The Internet Society (date). All Rights Reserved.

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

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

(D) Where the IESG is aware at the time of publication of proprietary rights claimed with respect to a standards track document, or the technology described or referenced therein, such document shall contain the following notice:

"The IETF has been notified of intellectual property rights claimed in regard to some or all of the specification contained in this document. For more information consult the online list of claimed rights."

11. 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, to Andy Ireland, Geoff Stewart, Jim Lampert, and Dick Holleman for their reviews of the legal aspects of the procedures described herein, and to John Stewart, Robert Elz and Steve Coya for their extensive input on the final version.

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.

12. SECURITY CONSIDERATIONS

Security issues are not discussed in this memo.

13. REFERENCES

[1] Postel, J., "Internet Official Protocol Standards", STD 1, USC/Information Sciences Institute, March 1996.

[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", STD 2, USC/Information Sciences Institute, October 1994.

[4] Postel, J., "Introduction to the STD Notes", RFC 1311, USC/Information Sciences Institute, March 1992.

[5] Postel, J., "Instructions to RFC Authors", RFC 1543, USC/Information Sciences Institute, October 1993.

[6] Huitema, C., J. Postel, and S. Crocker "Not All RFCs are Standards", RFC 1796, April 1995.

14. DEFINITIONS OF TERMS

IETF Area - A management division within the IETF. An Area consists of Working Groups related to a general topic such as routing. An Area is managed by one or two Area Directors.

Area Director - The manager of an IETF Area. The Area Directors along with the IETF Chair comprise the Internet Engineering Steering Group (IESG).

File Transfer Protocol (FTP) - An Internet application used to transfer files in a TCP/IP network.

gopher - An Internet application used to interactively select and retrieve files in a TCP/IP network.

Internet Architecture Board (IAB) - An appointed group that assists in the management of the IETF standards process.

Internet Engineering Steering Group (IESG) - A group comprised of the IETF Area Directors and the IETF Chair. The IESG is responsible for the management, along with the IAB, of the IETF and is the standards approval board for the IETF.

interoperable - For the purposes of this document, "interoperable" means to be able to interoperate over a data communications path.

Last-Call - A public comment period used to gage the level of consensus about the reasonableness of a proposed standards action. (see section 6.1.2)

online - Relating to information made available over the Internet. When referenced in this document material is said to be online when it is retrievable without restriction or undue fee using standard Internet applications such as anonymous FTP, gopher or the WWW.

Working Group - A group chartered by the IESG and IAB to work on a specific specification, set of specifications or topic.

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APPENDIX A: GLOSSARY OF ACRONYMS

ANSI:	American National Standards Institute
ARPA:	(U.S.) Advanced Research Projects Agency
AS:	Applicability Statement
FTP:	File Transfer Protocol
ASCII:	American Standard Code for Information Interchange
ITU-T:	Telecommunications Standardization sector of the International Telecommunication Union (ITU), a UN treaty organization; ITU-T 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
WWW:	World Wide Web