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### Instructions to Request for Comments (RFC) Authors

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#### Abstract

This memo provides information for authors of Request for Comments (RFC) documents. It summarizes RFC editorial policies and formatting requirements, addresses frequently-asked questions, and serves as a model for constructing a properly formatted RFC.

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## [1.](#) Introduction

This memo provides information for authors of Request for Comments (RFC) documents. It summarizes RFC editorial policies and formatting requirements, addresses frequently-asked questions, and serves as a model for constructing a properly formatted RFC.

### 1.1 Background on the RFC Document Series

The Requests for Comments documents, commonly known as RFCs, form an archival series of more than 3800 memos about computer communication and packet switching networks. Included prominently in the RFC series are the official technical specifications of the Internet protocol suite; these are defined by the Internet Engineering Task Force (IETF) under the direction of the Internet Engineering Steering Group (IESG). As a result, RFC publication plays a significant role in the Internet standards process [[RFC2026](#)].

The RFC series was begun in 1969 as a set of technical and organizational notes by the ARPANet research community. Since the early 1980s, the series has focused on the development of the Internet and the TCP/IP protocol suite. Memos in the RFC series discuss many aspects of networking, including protocols, procedures, programs, and concepts as well as meeting notes, opinions, and sometimes humor. For more information on the history of the RFC series, see [RFC 2555](#), "30 Years of RFCs" [[Hist99](#)].

RFCs are numbered (roughly) consecutively, and these numbers provide a single unique label space for all RFCs. RFCs are published on-line through a number of repositories (see [[RFCed](#)]), and there is an online index of RFCs.

Each RFC is labeled with a category: Standards Track, Best Current Practice, Experimental, Informational, or Historic.

Note on terminology: The Category attribute of an RFC has sometimes been called its status, but the term "status" has been overloaded. In the early years, it was used to mean the requirement level of a specification, e.g., "Required" or

"Elective" (see, for example, [RFC2400](#).) Later this single status attribute proved too simplistic, so it was replaced by more general Applicability Statements [[RFC2026](#)]. More recently, we began to refer to the "category" as the "status". However, this attribute is always listed on RFCs as the Category (see [Section 4.1](#).)

RFCs in the Standards Track category are published on behalf of the IETF, with IESG approval. The IETF assigns a maturity level -- Proposed Standard, Draft Standard, or Standard -- to each Standards Track RFC. The current maturity levels of all Standards Track RFCs are specified in STD 1, "Official Internet Protocol Standards" [[STD1](#)] and in the RFC index; they are not specified on the RFCs themselves.

In addition to the master RFC index, there are secondary indexes for useful subsets or "sub-series" of the RFCs. Three sub-series are in use:

- o STD document -- Category is Standards Track, maturity level is Standard [[STD92](#)].
- o BCP document -- Category is Best Current Practice [[BCP95](#)]
- o FYI document (For Your Information) -- Category is Informational [[FYI90](#)]

An RFC in a sub-series is labeled with its sub-series number as well as its RFC number.

The RFC series is published by the RFC Editor, under funding provided by the Internet Society (ISOC) and under the supervision of the Internet Architecture Board (IAB). The RFC Editor is responsible for the final editorial review and the on-line publication of RFCs. The RFC Editor also maintains the official RFC archive and the index files and makes these accessible via the Web, FTP, and email [[RFCed](#)]. The RFC Editor also maintains a list of errata for previously-published RFCs. Since 1977, the RFC Editor function has been performed by staff at the Information Sciences Institute of the University of Southern California (USC/ISI).

In performing its function, the RFC Editor works closely with the IESG and with the Internet Assigned Numbers Authority (IANA).

## 1.2 Introduction to the RFC Publication Process

This section contains a brief overview of the submission, review, and publication process for RFCs. More details, especially for standards-track RFCs, will be found in [RFC 2026](#), "The Internet Standards Process -- Revision 3" [[RFC2026](#)], as amended by later IETF policy statements. [RFC 2026](#) and amendments, or its successor, takes precedence in the case of any apparent conflict with the following overview.



### 1.2.1 RFC Submission and Review

To be considered for publication as an RFC, a document must first be submitted as an Internet-Draft (I-D) [[RFC2026](#)]. This ensures an opportunity for feedback from members of the Internet community and from the IESG. The Internet Draft must include boilerplate that allows RFC publication (see "Guidelines to Authors of Internet-Drafts" [[IDguide](#)]).

The submission and review procedures for RFCs depend upon the document's source. RFC submissions may come from the IETF, from the IAB, from the Internet Research Task Force (IRTF), or from an individual.

#### o Submissions from the IETF

RFCs originating in the IETF are submitted to the RFC Editor via the IESG, which reviews them for technical quality and procedural conformance. These IESG submissions are transmitted to the RFC Editor via official "Protocol Action" messages that are recorded at the IETF web site. Submissions through the IESG may be in any of the categories (Standards Track, Best Current Practice, Experimental, Informational, or Historic.) All submissions in the Standards Track or Best Current Practice category must first be submitted to the IESG for approval; the IESG will submit them to the RFC Editor.

At IESG request, the RFC Editor will add an "IESG Note" to a published RFC, to provide clarification or guidance to readers.

#### o Submissions from the IAB

The IAB may submit documents directly to the RFC Editor for publication as RFCs in the Informational or Experimental category, without IESG approval or review.

#### o Independent Submissions

Individuals may submit documents directly to the RFC Editor for publication as RFCs in the Experimental or Informational category.

The RFC Editor reviews each such "independent submission" for relevancy and appropriateness as well as general compliance with the rules in Sections [2](#), [3](#) and [4](#) of this document. Updates are requested as necessary, sometimes

through several iterations, until an acceptable submission document is achieved.

To maintain the integrity of the RFC document series and to avoid wasting scarce publication resources, the RFC Editor may reject an independent submission because its content is uninteresting or irrelevant, or because its editorial quality is acceptable. The RFC Editor will attempt to explain as clearly and completely as possible the reasons for rejection. For evaluation of content, the RFC Editor may consult individuals expert in the field.

Once the RFC Editor has determined that an independent submission is acceptable, the document is passed to the IESG for review for conflict with work in progress in the IETF [[RFC2026](#)]. When its topic is closely related to an existing IETF Working Group, the IESG may request that the author coordinate with that working group. This may result in the production of a revised memo that eventually emerges from the IETF process as an IETF submission. The IESG may also provide input to the RFC Editor on content problems with the document; the RFC Editor will request that the author(s) attempt to address these concerns before publication.

If the IESG feels that the submitted document does conflict with the IETF process, they will make a "Do Not Publish" recommendation to the RFC Editor. The RFC Editor may then reject the document, or publish it with an "IESG Position" statement that defines IESG objections to the document or narrows its scope of applicability. The IESG may alternatively ask for deferred publication, via a "Do Not Publish Now" recommendation, for a maximum of two six-month intervals. This should allow completion of any conflicting working group activity.

In general, the RFC Editor is charged with the final decision about publication of an independent submission.

#### o Submission from the IRTF

RFC submissions from IRTF members are normally treated as independent submissions.

### 1.2.2 RFC Publication

A document that is submitted to the RFC Editor enters the RFC Editor's queue, which is viewable at the RFC Editor Web site [[RFCed](#)]. The document (Internet Draft) remains in the

RFC Editor queue until it is published as an RFC, unless (1) the author withdraws it, (2) the author is very unresponsive in making requested updates, or (3) it is an independent submission that is deemed unacceptable by the RFC Editor.

The RFC Editor ensures that the document follows the editorial rules described later in this document. The RFC Editor may make editorial changes to clarify readability and to provide a uniform style and format. If excessive work is required to satisfy the rules and/or to bring the RFC up to publication quality, the memo may be returned to the author or to the IESG for additional work.

When editing of the document is complete, the RFC Editor sends the result to the authors for careful proof-reading. This quality control step is critical to maintaining the quality of RFCs. Although this process is traditionally called the "Authors' 48 Hours" period, the RFC Editor is always willing to give authors reasonable additional time to review the document, and a document will not be published until all its listed authors agree. While it is helpful to have one principal author during the editing process, all listed authors will be considered responsible for the correctness of the final document.

In practice, the editorial process among the IESG, the RFC Editor, and the author(s) can be lengthy and convoluted, and the time spent in the RFC Editor's queue can vary greatly. Sometimes problems are found that require document revisions by the authors. These revisions may require the publication of another Internet-Draft, and the result must be re-reviewed. Publication may be held up awaiting IANA assignments, or in order to synchronize the publication of related RFCs.

## **2. General RFC Editorial Policies**

This section summarizes some general editorial and publication policies for RFCs. Individual policies may be modified or new policies added before the present document is revised. RFC authors should obtain the latest RFC editorial policy statements from the RFC Editor web page [[RFCed](#)].

## 2.1 Immutability

Since the RFCs form an archival series, an RFC cannot be altered once it is published. To change the contents of an RFC, a new RFC must be written that obsoletes the previous one. (Early in the

history of RFCs, the Editor did occasionally make small editorial changes after publication, but this led to confusion regarding which version was correct, and it was a slippery slope. To avoid these pitfalls, the never-change rule is now strictly enforced.)

Although RFCs are subjected to careful scrutiny by the RFC Editor and the authors before publication, errors do sometimes creep in. For this reason, the RFC Editor strongly urges the authors to thoroughly review the document during the "Authors' 48 hours" period.

The RFC Editor maintains an online list of errata for existing RFCs. If you find what you believe to be an error in an RFC, consult the errata page at the RFC Editor web site [[RFCed](#)]. If the bug is not listed, please send email to the authors of the document and to the RFC Editor.

## 2.2 Not all RFCs are Standards

Eager salesmen have been known to imply that all RFCs represent official Internet standards. This is false and misleading. While some RFCs are Standards Track documents, many have other categories and do not represent a standard of any kind.

## 2.3 Publication Language

Like the Internet itself, the IETF and the Internet Society are international organizations with participation from all areas of the world. However, English is the primary language in which IETF business is conducted, and English is the official publication language for RFCs.

RFCs submitted for publication are required to meet a reasonable standard for clear and correct English.

[RFC 2026](#) specifically allows RFCs to be translated into languages other than English. Repositories may exist for RFCs that have been translated into particular languages. This is highly desirable and useful. However, it is not possible for the RFC Editor to certify that such translations are accurate. Therefore,

the function of the RFC Editor, with respect to non-English RFCs, is limited to providing pointers to non-English language RFC repositories. Upon request, the RFC Editor will list any such repository on its Web page.



## 2.4 Publication Format(s)

RFCs are published as plain text files in the [US-]ASCII character set, with the file name extension ".txt".

The continued use of ASCII plain text for RFCs, despite the spread of "more modern" formats, is intermittently debated by the Internet community. The consensus continues to be that the great advantages of ASCII plain text -- the ability to readily edit, cut-and-paste, and search documents, the ubiquitous availability of tools for these functions, and the longevity of US-ASCII as a character standard -- make ASCII plain text the clear winner.

For the convenience of those whose operating systems have difficulty supporting plain ASCII text, the RFC Editor also maintains PDF files that are exact facsimiles of the plain text versions.

The ASCII plain text version (and its .txt.pdf facsimile) is always the official specification, and it must adequately and completely define the technical content. (A very few exceptions have been made over the 30 year history of RFCs, allowing a definitive PostScript (.ps) version with no .txt version.) The primacy of the ASCII version typically requires that the critical diagrams and packet formats be rendered as "ASCII art" in the .txt version.

However, secondary or alternative versions in PostScript and/or PDF are provided for some RFCs, to allow the inclusion of fancy diagrams, graphs, or characters that cannot possibly be rendered in ASCII plain text. If there is a PostScript (.ps) or PDF (.pdf) version of the document, the author should inform the RFC Editor at the time of submission of the .txt version.

PostScript and PDF versions suffer from a serious flaw: the RFC Editor cannot easily make editorial changes in the source file to produce a new document in either of these formats. This can make the editorial process for .ps and .pdf versions somewhat painful for both the author and editor. The following procedure is followed. When a .ps (or .pdf) version is submitted with a .txt version, the RFC Editor will first edit the .txt version. The

final form of the .txt version (or, when feasible, the diffs) will be returned to the author. The author must then update the .ps/.pdf files to match, as closely as possible, the content and format of the ASCII .txt file. When the RFC Editor agrees that the .ps/.pdf versions are acceptable, they are published simultaneously with the .txt version.

## 2.5 Consistent Document Style

The RFC Editor attempts to enforce a consistent style of RFCs. To do this, the RFC Editor may choose to reformat a submitted RFC or ask the author to reformat it. Effort is minimized when the submitted document matches the style of the most recent RFCs. Please read the rules and recommendations that are presented in following sections of this memo and look at some recent RFCs, to adopt an appropriate style.

To format most ASCII RFCs for publication, the RFC Editor uses the "nroff" program with a simple set of the formatting commands (or "requests") from the "ms" macro package (see [Appendix B](#)). If the author has an nroff source file, it will be helpful to make this available to the RFC Editor when the document is submitted.

When a .ps version is published, the RFC Editor will also publish a matching .pdf version. When a .txt version is published, the RFC Editor will also publish a matching .txt.pdf version.

## 2.6 Assignment of RFC Numbers

RFC numbers are not assigned until very late in the editorial process, to avoid gaps in the RFC number series. Requests for early assignment of an RFC number are generally denied unless they originate from the IAB or the IESG.

## 2.7 References and Citations

An RFC will generally contain bibliographic references to other documents, and the body will contain citations to these references. [Section 4.7f](#) specifies the format for the references listed at the end of the RFC body, but there is no required format for a citation.

Within an RFC, references to other documents fall into two general categories: "normative" and "informative". Normative references specify documents that must be read to understand or implement the technology in the new RFC, or whose technology must be present for the technology in the new RFC to work. An informative reference

is not normative; rather, it provides only additional information. For example, an informative reference might provide background or historical information. Material in an informative reference is not required to implement the technology in the RFC.

An RFC must include separate lists of normative and informative references (see [Section 4.7f](#) below.) The distinction between normative and informative references is often important. The IETF

standards process and the RFC Editor publication process need to know whether a reference to a work in progress is normative. A standards-track RFC cannot be published until all of the documents that it lists as normative references have been published. In practice, this often results in the simultaneous publication of a group of interrelated RFCs.

We recommend enclosing citations in square brackets ("[ ]"). Simple numeric citations ("[53]") can cause confusing gaps when the list of references is split between normative and informative. A good alternative is to have two separate series, "[n1]", "[n2]", ... "[i1]", "[i2]" for citations to normative and informative references. Other choices include author abbreviations, possibly a year ("[Smith93]"), and some brief encoding of the title and year ("[MPLS99a]").

## 2.8 URLs and DNS names in RFCs

The use of URLs in RFCs is discouraged, because many URLs are not stable references. Exceptions may be made for normative references in those cases where the URL is demonstrably the most stable reference available. References to long-lived files on [ietf.org](http://ietf.org) and [rfc-editor.org](http://rfc-editor.org) are generally acceptable.

DNS names, whether or not in URLs, that as used as generic examples in RFCs should use the particular examples defined in [RFC 2606](#), "Reserved Top-Level DNS Names" [[TLD99](#)], to avoid accidental conflicts.

## 2.9 Titles

Choosing a good title for an RFC can be a challenge. A good title should fairly represent the scope and purpose of the document without being either too general or too specific.

Abbreviations (e.g., acronyms) in a title (as well as the Abstract and the body; see Sections [4.5](#) and [4.7](#)) must generally be expanded when first encountered. The exception is abbreviations that are so common that every participant in the IETF can be expected to recognize them immediately; examples include (but are not limited to) TCP, IP, SNMP, and FTP. Some cases are marginal and the

decision on expansion may depend upon the specific title. The RFC Editor will make the final judgment, weighing obscurity against complexity.

It is often helpful to follow the expansion with the parenthesized

abbreviation, as in the following example:

Encoding Rules for the  
Common Routing Encapsulation Extension Protocol (CREEP)

Authors should be aware that the title of an RFC may be subject to policy considerations in addition to the requirement that it provide a concise and technically sound summary of the document contents. For example, at various times in the history of the IETF, the words "Requirements" and "Policies" as well as the phrase "The Directory" have been banned from RFC titles, each for its own reason.

RFCs that document a particular company's private protocol must bear a title of the form "XXX's ... Protocol" (where XXX is a company name), to clearly differentiate it from an IETF product.

#### 2.10 IANA Considerations

Many RFCs define protocol specifications that require the assignment of values to protocol parameters, and some define new parameter fields. Assignment of these parameter values is often (and sometimes must be) deferred until publication of the defining RFC. The IANA and the RFC Editor collaborate closely to ensure that all required parameters are assigned and entered into the final RFC text.

Any RFC that defines a new "namespace" of assigned numbers must include an IANA Considerations section specifying how that space should be administered. See "Guidelines for Writing an IANA Considerations Section in RFCs" [[IANA98](#)] for a detailed discussion of the issues to be considered and the contents of this section.

Current policy (not documented in [[IANA98](#)]) is to include an IANA Considerations section always, even if it is "null", i.e., even if there are no IANA considerations. This is helpful to IANA. However, the RFC Editor may remove any null IANA considerations sections before publication.

#### 2.11 Relation to other RFCs

Sometimes an RFC adds information on a topic discussed in a previous RFC or completely replaces an earlier RFC. Two terms are used for these cases: Updates and Obsoletes, respectively.



## Updates

Specifies an earlier document whose contents are modified or augmented by the new document. The new document cannot be used alone, it can only be used in conjunction with the earlier document.

## Obsoletes

Specifies an earlier document that is replaced by the new document. The new document can be used alone as a replacement for the obsoleted document. The new document may contain revised information or all of the same information plus some new information, however extensive or brief that new information may be.

In lists of RFCs and in the RFC-Index (but not on the RFCs themselves) the following are used for older documents that were referred to by Obsoletes or Updates relations in newer documents:

### Obsoleted-by

Used to specify newer document(s) that replace the older document.

### Updated-by

Used to specify newer document(s) that modify or augment the older document.

## 2.12 Authors Listed on RFC

The IESG and IETF have ratified a policy of limiting the number of authors listed in the first page header of an RFC. The specific policy is as follows:

- (1) A small set of author names, with affiliations, may appear on the front page header. These should be the lead author(s)

who are most responsible for the actual text. When there are many contributors, the best choice will be to list the person or (few) persons who acted as document editor(s) (e.g., "Tom Smith, Editor").

There is no rigid limit on the size of this set, but there is likely to be a discussion if the set exceeds five authors, in which case the right answer is probably to list one editor.

The RFC Editor will hold all the people listed on the front

page equally responsible for the final form and content of the published RFC. In particular, the "Author's 48 Hours" final approval period will require signoff from all listed authors.

- (2) An RFC may include a Contributors section, listing those contributors who deserve significant credit for the document contents. The Contributors section is intended to provide a level of recognition greater than an acknowledgment and nearly equal to listing on the front page. The choice of either, both, or none of Contributor and Acknowledgment sections in a particular RFC depends upon the circumstance.
- (3) The body of an RFC may include an Acknowledgements section, in addition to or instead of a Contributors section. An Acknowledgments section may be lengthy, and it may explain scope and nature of contributions. It may also specify affiliations.
- (4) The Author's Address section at the end of the RFC must include the authors listed in the front page header. The purpose of this section is to (1) unambiguously define author/contributor identity (e.g., the John Smith who works for FooBar Systems) and to (2) provide contact information for future readers who have questions or comments.

At the discretion of the author(s), contact addresses may also be included in the Contributors section for those contributors whose knowledge makes them useful future contacts for information about the RFC.

- (5) The RFC Editor may grant exceptions to these guidelines upon specific IESG request or in other exceptional circumstances.

Finally, it is important to note that the copyright rules governing RFC publication [[IPC04](#)] require that an RFC must:

"[acknowledge] all major Contributors. A major Contributor is any person who has materially or substantially contributed to the [RFC]."

The Contributors and Acknowledgment sections fulfill this objective.

### 2.13 April 1 RFCs

Many years ago the RFC Editor established the practice of publishing one or more satirical documents on April 1 of each

year. Readers should be aware that many of the RFCs bearing the date April 1 are not to be taken seriously. The RFC Editor reviews April 1 RFC submissions for cleverness, humor, and topical association with computer networking, and a few of the best are published. Submissions must be made to the RFC Editor in time for review and publication.

Note that in past years the RFC Editor has sometimes published serious documents with April 1 dates. Readers who cannot distinguish satire by reading the text may have a future in marketing.

#### 2.14 Requirement-Level Words

Some standards-track documents use certain capitalized words ("MUST", "SHOULD", etc.) to specify precise requirement-levels for technical points. [RFC 2119](#) ([BCP 14](#)) [[BCP14](#)] defines a default interpretation of these capitalized words in IETF documents. If this interpretation is used, [RFC 2119](#) must be cited (as specified in [RFC 2119](#)) and included as a normative reference. Otherwise, the correct interpretation must be specified in the document.

Avoid abuse of requirement-level words. They are intended to provide guidance to implementors about specific technical features, generally governed by considerations of interoperability. [RFC 2119](#) says, "Imperatives of the type defined in this memo must be used with care and sparingly. In particular, they MUST only be used where it is actually required for interoperation or to limit behavior which has potential for causing harm (e.g., limiting retransmissions). For example, they must not be used to try to impose a particular method on implementors where the method is not required for interoperability." To simply specify a necessary logical relationship; the normal lower-case words should be used. On the other hand, if the capitalized words are used in a document, they must be used consistently throughout the document.

#### 2.15 Formal Languages in RFCs

See [[Lang01](#)] for IESG guidance on the use of formal languages in RFCs. The RFC Editor will run every MIB through a MIB checker before publication, and machine verification of other formal

languages included in RFCs may be required.

### 3. General Format Rules for RFCs

This section defines the general rules governing the format of a published RFC (as opposed to requirements on submitted documents). Authors are requested to come as close to these rules as reasonable, but in any case the RFC Editor will ensure they are met before publication. For example, the RFC Editor will supply headers and footers, adjust pagination to avoid "widows", and adjust a Table of Contents accordingly.

However, author attention to these rules will streamline the publication process and reduce the average publication time. If reaching the final format requires excessive effort by the RFC Editor, the author will be asked to assist in the reformatting. Authors are admonished to proof-read the final publication form carefully, to ensure that no errors accidentally crept in.

These formatting rules are intentionally incomplete in some details. They attempt to define only what is strictly necessary for uniformity and simplicity (a virtue). Some latitude is allowed to accommodate a broad range of printers, systems, and evolving requirements. The general objective is to create a series of documents that are reasonably uniform and are easy to read, while accommodating a wide range of content.

Note that these rules govern an RFC as published. During the publication process the RFC Editor will verify compliance and will repair minor infractions.

#### 3.1 General Formatting Rules

##### (1) Character code

The character code is US-ASCII [[ASCII69](#)] (also known as ISO 646.IRV). Only the printable ASCII characters and the three control characters CR, LF, and FF are allowed.

Notes: CR and LF must be used only as provided in rule (2), and FF must be used only as provided in rule (3). Tab (HT) characters and Backspace (BS) characters are

never allowed (hence there can be no underlining; see (4) below).

(2) Width

Each line must be limited to 72 characters followed by the character sequence that denotes an end-of-line (EOL). This limit includes any left-side indentation.



Note: A plain-text RFC is expected to be stored on a disk file using the EOL sequence of that system. For example, MS DOS-based systems use the two-character sequence: CR LF (Carriage Return followed by Line Feed), Unix systems use the single character LF for EOL, and EBCDIC systems use the single character NL (New Line).

Whenever an RFC is transmitted across the Internet, Internet protocol convention requires that each line of text be followed by the two-character EOL sequence CR LF (Carriage Return followed by Line Feed). A user level protocol (e.g., FTP, Telnet, HTTP, SMTP, ...) must make the appropriate EOL transformation at each line end. Note that binary transmission of plain-text RFC files can cause the sender's EOL convention to "leak" into the receiver, causing confusion.

### (3) Height

Each page must be limited to 58 lines followed by a Form Feed (FF) character, followed by an EOL sequence. The 58 line limit includes the headers and footers specified below.

All pages, except perhaps the first and last, should have the same number of lines when headers and footers are included. That is, footers should not "bounce" from page to page.

Note: The maximum line count includes blank lines. However, the first line will normally be the first header line and the last line will be the final footer line; that is, it will not begin or end with a blank line.

Note: 58 lines is the maximum; 55 is more commonly used and may actually produce more readable formatting. The recommended page formatting parameters (see [Appendix B](#)) produce 55 line pages on many printers, for example.

Note: The effect of the Height rule is that the following character sequence will be used:

<Last non-blank line of page p> <EOL> FF <EOL>

<First line of page p+1> <EOL> ...

As transmitted across the Internet as ASCII text, the character sequence is:

<Last non-blank line of page p> CR LF FF CR LF

<First line of page p+1> CR LF ...

Finally, note that the sequence FF CR LF has an ambiguous effect: on some printers, the FF implies an EOL, so this may produce a blank line; on other printers it will produce no blank line. The number 58 and this sequence were designed to render this ambiguity unimportant, assuming the (once predominant) printer standard of 60 lines per page.

(4) No Overstriking

No overstriking (or underlining) is allowed.

(5) No Filling

Do not fill the text with extra spaces to provide a straight right margin. Do not right justify the text.

(6) No Hyphenation

Do not use hyphenation at the right margin to split existing words. However, hyphenated word sequences (e.g., "Internet-Draft") may be split at the hyphen across successive lines.

Note: There are good reasons why the right page margin is required to be "ragged", and why hyphenation of words at the right margin is prohibited. Studies have shown that text is harder to read when fixed-size spaces are inserted to adjust the right margins, regardless of which font is used or how smoothly the blank filler is inserted. In addition, when technical text in a fixed-width font is hyphenated at the right margin, the printed result is not only less readable but also ugly.

(7) Spaces at the End of a Sentence

When a sentence ended by a period is immediately followed by another sentence, there should be two blank spaces after the period. This rule provides clarity when an RFC is displayed or printed with a fixed-width font.

#### (8) Footnotes

Do not use footnotes. If such notes are necessary, put them at the end of a section, or at the end of the document.

### (9) Line Spacing

Use single-spaced text within a paragraph, and one blank line between paragraphs.

### (10) Page Numbering

Pages must be numbered consecutively, starting from 1 on the first (cover) page.

### (11) Headers and Footers

RFCs must have running headers and footers, as defined below in [Section 3.3](#). The headers and footers must be separated from the body by at least one and preferably two blank lines.

### (12) Indentation

Successive indentation of sub-subsections (as in this document, for example) is recommended but not required. Experience has shown that indentation by multiples of 3 columns works well. In any case, the careful use of indentation can make a very great improvement in the readability of a document.

## 3.2 PostScript Format Rules

(1p) Standard page size is 8 1/2 by 11 inches (216 by 279 mm).

(2p) Leave a margin of 1 inch (25 mm) on all sides (top, bottom, left, and right).

(3p) Main text should have a point size of no less than 10 points with a line spacing of 12 points.

(4p) Footnotes and graph notations no smaller than 8 points with a line spacing of 9.6 points.

(5p) Three fonts are acceptable: Helvetica, Times Roman, and Courier, plus their bold-face and italic versions. These are the three standard fonts on most PostScript printers.

(6p) Prepare diagrams and images based on lowest common denominator PostScript. Consider common PostScript printer functionality and memory requirements.

(7p) The following PostScript commands should not be used: initgraphics, erasepage, copypage, grestoreall, initmatrix,

initclip, banddevice, framedevice, nullddevice or renderbands.

### 3.3 Header and Footer Formats

RFCs must include running headers and footers that obey the following rules.

#### o Running Headers

The running header in one line (on page 2 and all subsequent pages) has the RFC number on the left (RFC nnnn), the title (possibly shortened) in the center, and the publication date (Month Year) on the right.

#### o Running Footers

All pages contain a one-line running footer, with the author's last name on the left, the category centered, and the page number on the right ("[Page nn]").

If there are two authors, the form "name & name" may be used; for more than two authors, use the form "name, et al."

### 3.4 Protocol Data Definitions

Many years ago, the RFC series adopted a pictorial approach to representing data structures such as protocol headers. Furthermore, the research community adopted a "big-endian" convention in which the bits and bytes are shown in network byte order, byte zero is the first byte shown, and bit zero is the most significant bit in a word or a field [[IEN137](#)].

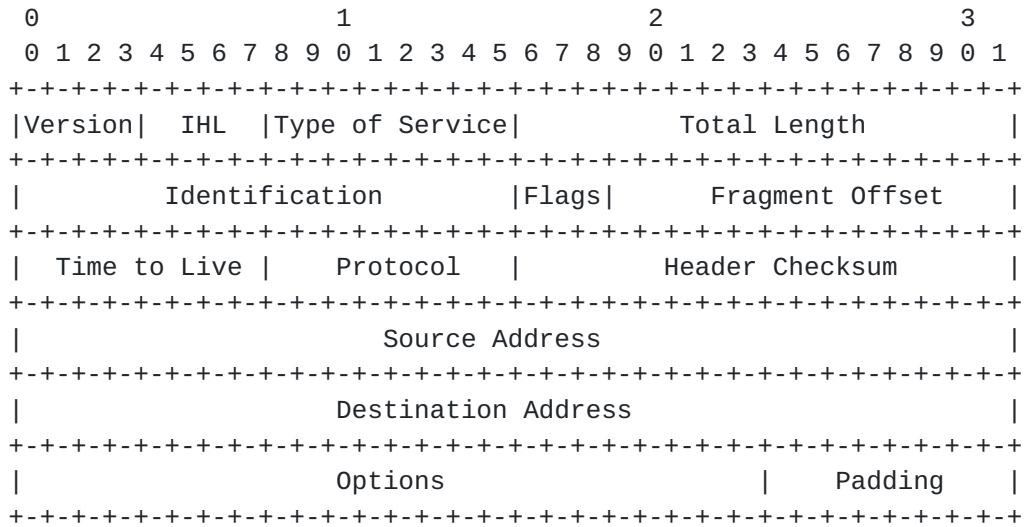
For example, [RFC 791](#) contains the following definition of the IP header format.

RFC Editor

Informational

[Page 20]





Example Internet Datagram Header

We strongly recommend that a new RFC follow the same formatting conventions, which have been found to work well. Any alternative style must meet the same level of clarity, readability, and lack of ambiguity. An author wishing to use an alternative style should discuss it with the RFC Editor.

4. Sections in an RFC

A published RFC may contain the sections in the following list. Some of these sections are required, as noted. The order shown is required, except that the order shown for the sub-items 7a-7f within Body of Memo is generally recommended but not required.

- 1. First-page header [Required]
- 2. Status of this Memo [Required\*]
- 3. Copyright Notice [Required\*]
- 4. IESG Note [As requested by IESG\*]
- 5. Abstract [Required]
- 6. Table of Contents [Required for large documents]
- 7. Body of the Memo [Required]
  - 7a. Contributors
  - 7b. Acknowledgments
  - 7c. Security Considerations [Required]
  - 7d. IANA Considerations
  - 7e. Appendixes

- 7f. References
- 8. Author's Address [Required]
- 9. IPR Boilerplate [Required\*]

Those sections marked with \* will be supplied by the RFC Editor

during the editorial process when necessary.

The rules for each of these sections are described below in corresponding subsections.

The Body of the Memo will normally contain section numbers (or Appendix labels). Sections listed as 1-6 and 8-9 are to be unnumbered.

#### 4.1. First-Page Header

Please see the front page of this memo for an example of the front page heading. On the first page there is no running header. The top of the first page has the following items left justified:

"Network Working Group"

This traditional title must be left-justified on the first line of the heading. It denoted the ARPAnet research group that founded the RFC series.

"Request for Comments: nnnn"

Identifies this as an RFC and specifies the RFC number, left-justified on the second line. The actual number is filled in at the last moment prior to publication by the RFC Editor.

"BCP: nn" or

"FYI: nn" or

"STD: nn"

One of these optional left-justified items indicates the sub-series number, if the RFC is a member of a sub-series. The actual number is filled in at the last moment prior to publication by the RFC Editor.

"Updates: nnnn" or "Updates: nnnn, ..., nnnn"

Optional left-justified field, containing an RFC number or a comma-separated list of RFC numbers that are updated by this RFC. See [Section 2.11](#).

"Obsoletes: nnnn" or "Obsoletes: nnnn, ... , nnnn"

Optional left-justified field containing an RFC number or a comma-separated list of RFC numbers that are obsoleted by this RFC. See [Section 2.11](#).

"Category: xxxxxxxx"

Required left-justified field specifying the category of this RFC. Here xxxxxxxx may be one of: Standards Track, Best Current Practice, Informational, or Experimental. Will be supplied by RFC Editor, according to request of submittor.

The following information appears right-justified in the header:

#### Author

The author's name (initial of first given name followed by family name), right-justified on the first line of the heading.

#### Organization

The author's organization, indicated on the line following the Author name.

For multiple authors, each author name appears right-justified on its own line, followed by that author's organization. When more than one author has the same organization, the organization can be "factored out" and appear only once following the corresponding Author lines. However, such factoring is not necessary if it results in an unacceptable reordering of author lines.

The total number of authors is generally limited; see [Section 2.12](#).

#### Date

The month and year of the RFC Publication, right-justified on the line after the last Organization line.

The title appears, centered, below the rest of the heading, preceded and followed by at least one blank line. Periods ("dots") are not allowed in the title.

The title should be carefully chosen to accurately reflect the contents of the document. See also [Section 2.9](#).

#### 4.2. Status of this Memo

The RFC Editor will supply a "Status of this Memo" section that contains two elements: (1) a paragraph describing the category of the RFC, and (2) the distribution statement. The contents of this section will be found in [Appendix A](#).

An RFC that is (re-)publishing a specification produced by another (non-IETF) standards organization or is publishing a proprietary protocol may include the following paragraph in the Status of the Memo section [[IPC04](#)]:

"This document may not be modified, and derivative works of it may not be created, except to publish it as an RFC and to translate it into languages other than English [other than to extract section XX as-is for separate use]."

Here the optional clause delimited by [ ] is for programmatic material that is mean to be be extracted, e.g., MIB or PIB modules. The IETF does not have change control over such documents, which are published as Informational RFCs.

#### 4.3 Copyright Notice

The Copyright Notice section is required. It contains the statement, "Copyright (C) The Internet Society (date)." The full copyright statement described in [Section 4.9](#) must also appear at the end of the document.

#### 4.4 IESG Note

This optional section will appear when the IESG requires a warning or clarifying message on an RFC.

#### 4.5 Abstract

Every RFC must have an Abstract section following the Copyright notice. An Abstract will typically be 5-10 lines. An Abstract of more than 20 lines is generally not acceptable.

The Abstract section should provide a concise and comprehensive overview of the purpose and contents of the entire document, to give a technically knowledgeable reader a general overview of the function of the document. In addition to its function in the RFC itself, the Abstract section text will appear in publication announcements and in the online index of RFCs.

Composing a useful Abstract generally requires thought and care. Usually an Abstract should begin with a phrase like "This memo ..." or "This document ...". A satisfactory abstract can often be constructed in part from material within the Introduction section, but a good abstract will be shorter, less detailed, and perhaps broader in scope than the Introduction. Simply copying and pasting the first few paragraphs of the Introduction is tempting, but it may result in an Abstract that is both incomplete and



redundant. Note also that an Abstract is not a substitute for an Introduction; the RFC should be self-contained as if there were no Abstract section.

An Abstract should be complete in itself; it should not contain citations unless they are completely defined within the Abstract. Abbreviations appearing in the Abstract should generally be expanded in parentheses. There is a small set of reasonable exceptions to this rule; see the discussion under Titles, [Section 2.9](#).

#### 4.6 Table of Contents

A Table of Contents (TOC) section is required in RFCs longer than 30 pages and recommended for an RFC longer than 15 pages.

A TOC must be positioned after the Abstract and before the Introduction section (i.e., after the "boilerplate" and before the body of the RFC.)

The TOC itself should not be too long or detailed, or it loses value. For example, if many successive TOC entries point to the same pages of the memo, the TOC probably needs to be coarser.

No specific format is required, but the following example illustrates a useful format:

- [1.](#) INTRODUCTION ..... [5](#)
- [1.1](#) The Internet Architecture ..... [6](#)
- [1.1.1](#) Internet Hosts ..... [6](#)
- [1.1.2](#) Architectural Assumptions ..... [7](#)
- [1.1.3](#) Internet Protocol Suite ..... [8](#)
- [1.1.4](#) Embedded Gateway Code ..... [10](#)
- [1.2](#) General Considerations ..... [12](#)
- [1.2.1](#) Continuing Internet Evolution ..... [12](#)
- [1.2.2](#) Robustness Principle ..... [12](#)
- [1.2.3](#) Error Logging ..... [13](#)

#### 4.7 Body of the Memo

Following the Table of Contents, if any, comes the body of the memo. Depending upon the length of the TOC, a judicious page break can improve readability.

Each RFC should have an Introduction section that (among other things) explains the motivation for the RFC and (if appropriate) describes the applicability of the document, e.g., whether it specifies a protocol, provides a discussion of some problem, is

simply of interest to the Internet community, or provides a status report on some activity.

All abbreviations that are used in the body must be expanded the first time they occur. A few exceptions will be made for very well-known abbreviations; see the discussion under Titles in [Section 2.9](#).

Abbreviation overload is an increasingly common problem in RFCs. We recommend that complex RFCs include a brief glossary at the end. On the other hand, a glossary is never a substitute for an explanation.

Cross references within the body of the text should use section numbers rather than page numbers, as the RFC Editor generally adjusts pagination during final editing. The only exception is the Table of Contents, which necessarily shows page numbers.

#### 4.7a Contributors Section

This optional section lists those contributors who deserve significant credit for the document. When a long author list is replaced by a single Editor in the front page header, the displaced authors can be properly and fully acknowledged in the Contributors section.

The Contributors section may include brief statements about the nature of particular contributions ("Sam contributed [section 3](#)") and it may also include affiliations of listed contributors. At the discretion of the author(s), contact addresses (see Author's Address section below) may also be included in the Contributors section, for those contributors whose knowledge makes them useful future contacts for information about the RFC.

#### 4.7b Acknowledgment Section

This optional section may be used instead of, or in addition to, a Contributors section, when appropriate.

#### 4.7c Security Considerations Section

All RFCs must contain a section that discusses the security considerations relevant to the specification in the RFC; see [[Secur03](#)] for more information.

#### 4.7d IANA Considerations Section

See [Section 2.10](#) above and [[IANA98](#)].

#### 4.7e Appendixes

Many RFC documents have appendices, some of which may be very extensive. Common practice is to position Appendixes at the very end of a document, after the references. However, a significant set of RFCs have large and dense Appendix sections for technical details, which are actually an integral part of the document. In this case, it can be difficult to locate the references. We therefore recommend that, in general, references follow the Appendixes in an RFC.

#### 4.7f References Section

There are many styles for references, and the RFCs have one of their own. Please follow the reference style used in recent RFCs; in particular, see the Reference section of this RFC for an example. (Note: the ordering of multiple authors is intended to be as shown.) On the other hand, there is no required format for a citation; see the discussion in [Section 2.7](#).

A reference to an RFC that has been assigned an STD, BCP, or FYI subseries number must include the subseries number of the document.

Reference lists must indicate whether each reference is normative or informative. For example, the reference section might be split into two sections, e.g.:

##### s. Normative References

xxx  
...  
xxx

##### s+1. Informative References

xxx  
...  
xxx

Non-normative references to Internet-Drafts are allowed, but they must take the following restricted form: the author(s), the title, the phrase "Work in Progress", and the date; for example:

[doe13] Doe, J., "The Deployment of IPv6",  
Work in Progress, May 2013.

Normative references to Internet Drafts will cause publication of the RFC to be suspended until the referenced draft is also ready for publication; the RFC Editor will then replace the reference by an RFC reference and publish both simultaneously.

The use of URLs in references in RFCs is discouraged, because URLs are often not stable references. Exceptions will be made in certain cases where the World Wide Web is demonstrably the most stable reference available.

#### 4.8 Author's Address Section

This required section gives the name(s) and contact information for the author(s) listed in the first-page header. Contact information must include at least one, and ideally would include all, of a postal address, a telephone number and/or FAX number, and a long-lived email address. The purpose of this section is to (1) unambiguously define author/contributor identity (e.g., the John Smith who works for FooBar Systems) and to (2) provide contact information for future readers who have questions or comments. Note that some professional societies offer long-lived email addresses for their members.

#### 4.9 IPR Boilerplate

The IPR boilerplate is dictated by [BCP 78 \(RFC 3667\)](#) [[IPC04](#)] and [BCP 79 \(RFC 3668\)](#) [[IPT04](#)]. It includes a full notice of copyright by the Internet Society, and an IETF disclaimer on intellectual property rights over the contents. The actual text is reproduced in [Appendix A](#).

A specific request from the IAB is required before the RFC Editor can include a dual copyright, or for any other variation of the standard ISOC copyright notice.

An RFC should not contain a notice of the existence of relevant intellectual property (patents, etc.). That is, the Intellectual

Property notice at the end of the document should be \*all\* that is said about IPR in the document.

## **5. Intellectual Property**

RFC publication is intertwined with issues of intellectual property (IP). The following two distinct kinds of IP issues for RFCs are sometimes confused.



- o Rights in Contributions.

This set of issues concerns copyright protection on the RFC text as a document. The present rules for rights in contributions are contained in [BCP 78 \(RFC 3667\)](#) [[IPC04](#)]. These rules call for a Copyright Statement in every RFC (see [Section 4.9](#) and [Appendix A](#)).

[BCP 78](#) specifies the copyright rules applicable to RFCs, aligning these rules with modern copyright law. The resulting rules are generally intended to continue the historical RFC Editor policy of maximal freedom for distribution of RFCs. It adds safeguards for the integrity, future availability, and usefulness of published RFCs but otherwise preserves author rights. For example, a published RFC must be open to reading by anybody, and it must be protected against alteration after it is published.

- o Rights to Technology

An RFC may describe technology -- e.g., a protocol or other technical specification -- that is subject to intellectual property right (IPR) claims (e.g., through patents). The present rules for this case are contained in [BCP 79 \(RFC 3668\)](#) [[IPT04](#)].

The RFC Editor's responsibility is limited to including a "Disclaimer of validity" ([Section 5 of BCP 79](#), [Appendix A](#) of this document) in all IETF submissions and in most independent submissions. The RFC Editor may omit this Disclaimer statement from independent submissions when it is clear that there are no claimed intellectual property rights on the RFC contents, and when including the Disclaimer would make little sense.

Note also that an RFC should *\*not\** contain a notice of the existence of specific relevant intellectual property. For example, an RFC may not contain a patent number.

The IETF rules for intellectual property [[IPC04](#), [IPT04](#)] have the following specific implications for RFC republication.

5.1 Copying and distributing an entire RFC (including all IPR-related boilerplate) without changes:

- 1a. Copying for free redistribution is allowed and encouraged. This validates the widespread mirroring of RFCs on many web sites.

- 1b. Inclusion of RFC copies within other documents or collections that are distributed for a fee is allowed. Anyone can take some RFCs, put them in a book, copyright the book, and sell it. This in no way inhibits anyone else from doing the same thing, or inhibits any other distribution of the RFCs.

In this case, it is a courtesy to ask the RFC author(s) and to provide a copy of the final document or collection.

## 5.2 Translating RFCs into other languages

Translation and publication of an entire RFC into another language is allowed. However, it is courtesy to inform the RFC author(s) of such translation.

## 5.3 Copying and distributing an entire RFC with changes in format, font, etc.:

Changing format, font, etc. is allowed only with permission of the author(s). With this permission, (1) applies.

## 5.4 Copying and distributing portions of an RFC:

This is what the lawyers call "preparation of derivative works". It is allowed under conditions that differ depending upon the source of the RFC (see [BCP 78](#) for details and definitions.)

- 4a. Preparation of derivative works from an RFC that was an IETF or IAB submission is permitted, but only for use within the IETF standards process. Proper credit and citations must be provided ([BCP 78 Section 3.3\(a\)](#)).
- 4b. Preparation of derivative works from an RFC that was an independent submission is permitted. Proper credit and citations must be provided ([BCP 78 Section 4.2\(a\)](#)).



**6. RFC Information and Contacts**

```

*****
*
*   RFC Editor Email:  rfc-editor@rfc-editor.org
*
*
*   RFC Editor URL:   http://www.rfc-editor.org
*
*
*****

```

In particular, authors should look for the latest version of this document at the URL listed above.

RFC publication announcements are distributed via two mailing lists: the "IETF-Announce" list and the "RFC-DIST" list. The IETF-Announce list announces publication of both Internet Drafts and RFCs; instructions for subscription and unsubscription to this list are available on the IETF web site [www.ietf.org](http://www.ietf.org). The RFC-DIST list announces only RFC publication; subscription information is available at the RFC Editor URL listed above.

RFC readers should be aware that the many mirrors of RFCs and RFC indexes that appear on other sites vary a great deal in reliability. Consulting the official RFC-Editor site listed above is recommended.

**7. Security Considerations**

This RFC describes the Security Considerations sections of an RFC. It raises no new security issues itself.

**8. Acknowledgments**

This memo includes wording taken from a draft written by Robert W. Shirey of GTE/BBN Technologies, 29 December 1999, with permission. Shirey's deconstruction of the formatting rules was very helpful in writing Sections [3](#) and [4](#) of the present memo.

We are grateful for the many thoughtful and helpful suggestions made

by IETF participants during the Last Call on a previous version of this document. We especially acknowledge the thorough analysis by John Klensin.

## APPENDIX A: RFC Boilerplate

### A.1 Status of Memo

The RFC Editor supplies the appropriate one of the following boilerplate paragraphs in the Status of the Memo section (see [Section 4.2](#)).

#### Standards Track

"This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited."

#### Best Current Practice

"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."

#### Experimental

"This memo defines an Experimental Protocol for the Internet community. This memo does not specify an Internet standard of any kind. Discussion and suggestions for improvement are requested. Distribution of this memo is unlimited."

#### Informational

"This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited."

### A.2 IPR Boilerplate

At the end of each RFC there must be IPR boilerplate including a full copyright statement and an IETF disclaimer about rights over technology. There are two forms, depending upon the source of the document.

For a document originating in the IETF, these statements will read as follows [[IPC04](#), [IPT04](#)]:

Full Copyright Statement



Copyright (C) The Internet Society (2004).

This document is subject to the rights, licenses and restrictions contained in [BCP 78](#), and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

## Intellectual Property

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Copies of IPR disclosures made to the IETF Secretariat 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 implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at [ietf-ipr@ietf.org](mailto:ietf-ipr@ietf.org).

For an independent submission to the RFC Editor, these statements take the following form:

## Full Copyright Statement

Copyright (C) The Internet Society (2004).

This document is subject to the rights, licenses and restrictions contained in [BCP 78](#) and at [www.rfc-editor.org](http://www.rfc-editor.org), and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at [ietf-ipr@ietf.org](mailto:ietf-ipr@ietf.org).

## APPENDIX B: RFC Preparation Tools

As indicated earlier, the primary submission format for RFCs is ASCII text. Authors have found various tools to be useful for preparing this text in the format required by RFCs and Internet-Drafts. For more complete and up-to-date information, see the RFC Editor Web page.

This Appendix surveys some of the possibilities.

nroff, groff

The nroff program is widely available for Unix systems, while its freeware equivalent groff is available for an even wider range of platforms, including Windows. These programs use directives in the text to control the formatting. The RFC

Editor, in particular, uses nroff for final RFC formatting. A template is available as 2-nroff.template.

#### XML

An XML DTD for RFCs has been developed [[XMLrf99](#)] and a tool to format RFCs from XML source. There is also an XML-to-nroff translator suitable for creating RFC text. Authors have had a generally good experience with these tools.

#### Microsoft Word

Microsoft Word is an important example of a WYSIWYG editor. [RFC 3285](#) [14] describes in detail how to configure Word to produce an ASCII text file in RFC format. A version of this document as a Word file (2-Word.template.rtf) can be used as a template file to initialize this configuration for entering and displaying RFCs. There is also a DOS executable (crlf.exe) for a post-processor to establish RFC end-of-line conventions in the Word output file.

Note that these template files are suitable only for fairly simple text formatting; they may be incompatible with the more advanced features of Word.

#### LaTeX

LaTeX is widely used for text preparation in many academic environments. A convenient LaTeX template is available as 2-latex.template. Latex in general does not produce plain ASCII text in the RFC format, but there are tools that translate LaTeX to nroff; see the RFC Editor web page.



## APPENDIX C: Checklist

Topic	Section of this doc.
<b>A. Editorial/Content Issues</b>	
o Reasonably clear and correct English > Also, run spell checker	2.3
o All abbreviations (with a few exceptions) are expanded when they first appear.	4.7
o References:	2.7, 4.7f
> Complete and current	2.7
> Normative and Informative listed separately	4.8
> Internet Drafts correctly referenced	
o All URLs are suspect: they must be stable.	2.8
o Title:	2.9
> Descriptive and not misleading.	
> No suspect words, e.g., Proposed, Standard, Requirements, Policy.	
> Abbreviations expanded	
o Author list not too long	2.12
o Category field correct	4.1
<b>B. Basic Formatting</b>	
o Only printable ASCII characters	3.1(1), 3.1(4)
o No lines exceeding 72 characters [This is especially important for "as is" tables and figures, which cannot be easily reformatted by the RFC Editor.]	3.1(2)
o Maximum page size is 58 lines. [RFC Editor may re-paginate, but this limit may be an issue for large "as is" tables and figures.	3.1(3)
o Must be ragged-right	3.1(5)
o No word-breaking hyphenation at end of line	3.1(6)

o Two blanks after periods ending sentences

|  
| 3.1(7)



- o No footnotes (end notes OK) | 3.1(8)
- o Line spacing OK | 3.1(9)
- o Pages numbered | 3.1(10)
- o Running headers and footers OK | 3.3
- o Formatted for easy reading; consistent spacing and indentation | 3.1(12)
- o "Big-Endian" data definitions | 3.4

**C. Required Sections supplied by author** | 4

- o Abstract | 4.5
  - > Clarity and content OK |
  - > Reasonable length |
  - > All abbreviations expanded |
  - > No references |
  - > Unnumbered section |
- o Body of the Memo | 4.7
  - > Security Considerations | 4.7c
- o Author's Address | 4.8

**D. Other Sections** |

- o Table of Contents | 4.6
  - > Must be present in large document |
- o Body of the Memo | 4.7
  - > Contributors and/or Acknowledgments | 4.7a, b
  - > IANA Considerations, if needed | 4.7d
  - > Appendixes | 4.7e
  - > References | 4.7f



APPENDIX D: Changes from [RFC 2223](#)

In general, this document contains the following major changes from [RFC 2223](#).

- o [Section 1](#): Introduction

The Introduction section was completely rewritten, using material from several sections of [RFC 2223](#), bringing the discussion into conformance with [RFC 2026](#) and adding additional clarification.

- o [Section 2](#): General RFC Editorial Policies

This section combines material from several sections of [RFC 2223](#). New material is included about the RFC Editor errata page, normative references, URLs, titles, RFC number pre-assignment, author lists, and IANA Considerations.

Major procedural changes include: (1) publication of an RFC in both ASCII and PostScript versions now requires that both be published simultaneously, (2) all listed authors must give approval during the "Authors' 48 Hour" process, (3) long author lists are generally prohibited, and (4) a Contributors section is defined as an alternative to long author lists.

- o [Section 3](#): General Format Rules

This section is expanded with much additional explanatory material. For example:

- (1) The requirement for printable ASCII characters is stated, and the use of CR, LF, and FF is clarified.
- (2) The requirement for page numbers is specified.
- (3) The requirement for running headers and footers is specified.

- o [Section 4](#): Required Sections in an RFC

This section is reorganized to cover all the required sections of an RFC in order. It adds the current conventions for formatting multiple author names and organizations, and it defines section ordering more precisely.

This section describes five major changes in RFC formatting.

- (1) The style and contents of the Abstract section are more

completely specified, in order to make RFC abstracts useful for searching and indexing.

- (2) A Table of Contents section is required or recommended in all but very short RFCs.
  - (3) Separate lists are now required for normative references and informative references.
  - (4) A new optional section, Contributors, is defined.
  - (5) The intellectual property boilerplate was updated.
- o Appendixes

Former [Appendix A](#), which contained the source for the fix.pl post-processor Perl script and an nroff RFC template, has been removed. These files are available at the RFC Editor web site.

[Appendix B](#), RFC Preparation Tools, and [Appendix C](#), Checklist, are new.

#### Normative References

- [BCP14] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [IPC04] Bradner, S., "IETF Rights in Contributions", [BCP 78](#), [RFC 3667](#), February 2004.
- [IPT04] Bradner, S., "Intellectual Property Rights in IETF Technology", [BCP 79](#), [RFC 3668](#), February 2004.
- [RFCed] RFC Editor web page, "<http://www.rfc-editor.org>".

[RFC2026] Bradner, S., "The Internet Standards Process -- Revision 3", [BCP 9](#), [RFC 2026](#), October 1996.

#### Informative References

[ASCII69] Cerf, V., "ASCII Format for Network Interchange", [RFC 20](#), October 1969.

[BCP95] Postel, J., Li, T. and Y. Rekhter, "Best Current Practices", [BCP 1](#), [RFC 1818](#), August 1995.

[FYI90] Malkin, G. and J. Reynolds, "F.Y.I. on F.Y.I. --

Introduction to the F.Y.I. Notes", FYI 1, [RFC 1150](#), March 1990.

- [Hist99] RFC Editor et al., "30 Years of RFCs", [RFC 2555](#), April 1999.
- [IANA98] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 2434](#), October 1998.
- [IDguide] IETF, "Guidelines to Authors of Internet Drafts". Available as `1id-guidelines.txt` at <http://www.ietf.org>.
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- [Lang01] IESG, "Guidance for the use of formal languages in IETF specifications", <http://www.ietf.org/IESG/STATEMENTS>, October 2001.
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- [STD1] Internet Engineering Task Force, Reynolds, J., Braden, R., Ginoza, S., and A. De La Cruz, Ed., "Official Internet Protocol Standards", STD 1. Latest version [RFC 3300](#), November 2002.
- [STD92] Postel, J., Editor, "Introduction to the STD Notes", [RFC 1311](#), March 1992.
- [TLD99] Eastlake, D. and E. Panitz, "Reserved Top Level DNS Names", [RFC 2606](#), June 1999.
- [Word02] Gahrns, M. and T. Hain, "Using Microsoft Word to create Internet Drafts and RFCs", [RFC 3285](#), May 2002.

[XMLrf99] Rose, M., "Writing I-Ds and RFCs using XML", [RFC 2629](#), June 1999.



CHANGES (To be removed by RFC Editor before publication)

Changes from -07 version

1. The intellectual property discussion and boilerplate was updated to incorporate the current rules in [BCP 78](#), [BCP 79](#).
2. The term "individual submission" was changed to "independent submission", to avoid confusion with documents that are submitted to the IESG by individuals (rather than working groups) and are then published by the RFC Editor as official IETF documents.

Changes from -06 version

1. Changed document status from BCP to Informational. All RFC Editor policy documents have been Informational RFCs.
2. Eliminated duplicate wording (numbers numbers) [1.1].

Changes from -05 version

1. Add [Section 2.16](#) on Intellectual Property [2.16].
2. Note that all major contributors must be acknowledged [2.12].
3. Note that the RFC Editor fills in the sub-series number and the Categories field of the header, as well as the Status of this Memo field [4.1, 4.2].
4. Specify that internal cross references within the body of the memo should use section numbers, not page numbers [4.7].
5. Separate the list of changes that have been made in successive Internet Draft versions of this document from [Appendix D](#), which summarizes changes from [RFC 2223](#). The former material is to be removed before publication.

6. Reduce the set of normative references.

7. Correct several minor nits.

Changes from -04 version

1. Replace overloaded "Status" attribute name with "Category" [1.1].

2. Clarify the relation of this document to [RFC 2026](#) [1.2].
3. Clarify the submission rules, including rules for IAB and IRTF documents and for BCPs [1.2]
4. Specify that RFC Editor reviews independent submissions for content as well as format [1.2.1].
5. Document "Do Not Publish Now" recommendation from the IESG [1.2.1].
6. Distinguish between the plain text format and the US-ASCII character set [2.4, 3.1].
7. Clarify the distinction between citation format and reference format, and use a more appropriate format for citations in this document [2.7].
8. State that [RFC 2119](#) is not required, but some meaning must be defined for capitalized applicability words [2.14].
9. Checking of MIBs and other formal languages [2.15]
10. Clarify that [Section 3](#) defines published format, not submission format [3.].
11. Reorganize the sections in [section 4](#) to clarify and simplify the section ordering rules, and move appendixes to match our recommendation [4].
12. Suggest Glossary [4.7].
13. Fix many typos reported by ever-vigilant IETF members.

1. Combine sections [1.3.1](#) and [1.3.2](#) into one [section 1.3.1](#).
2. Clarify the section ordering rules in [section 4](#).

Changes from -02 version

1. Removed old [Appendix C](#) (definition of ASCII) and replace it with

a reference to [RFC 20](#).

- 2 Added new [Appendix C](#), a Checklist.
- 3 Made a few editorial changes and typo fixes.
- 4 Clarified that .txt.pdf versions are equally authoritative with .txt versions of RFCs.
- 5 Stated policy that (nearly) all abbreviations in body of the document must be expanded when first encountered.

#### Changes from -01 version

1. Incorporated new author list guidelines.
2. Clarified rules for hyphenation ([Section 3.1](#) (6)).
3. Added guideline on example URLs ([Section 2.8](#)).
4. Clarified that dangling normative references are strictly prohibited only for standards-track documents ([Section 2.7](#)).

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