RFC Editor Tutorial

IETF-64

Vancouver, BC

7 Nov 2005

Overview of this Tutorial

- Background: The RFC Series and the RFC Editor
- The Publication Process
- How to Write an RFC

The RFC Series

- Earliest document series to be published online.
- 1969 – today: 36 years old.
- 4100+ documents.
- *An ARCHIVAL* series: RFCs are *forever*!
- A nearly-complete record of Internet technical history
  - Early RFCs: a treasure trove of technical history.
  - Many "wheels" that we repeatedly re-invent.

RFCs

- RFC document series
  - Begun by Steve Crocker [RFC 3] and Jon Postel in 1969.
  - Informal memos, technical specs, and much more.
- Jon Postel quickly became *the* RFC Editor.
  - 28 years: 1970 until his death in 1998.
  - He established and maintained the consistent style and editorial quality of the RFC series.
  - Jon was a 2-finger typist.

Jon Postel

- Postel had an enormous influence on the developing ARPAnet & Internet protocols – the "Protocol Czar" and the "Deputy Internet Architect" as well as the IANA and RFC Editor.

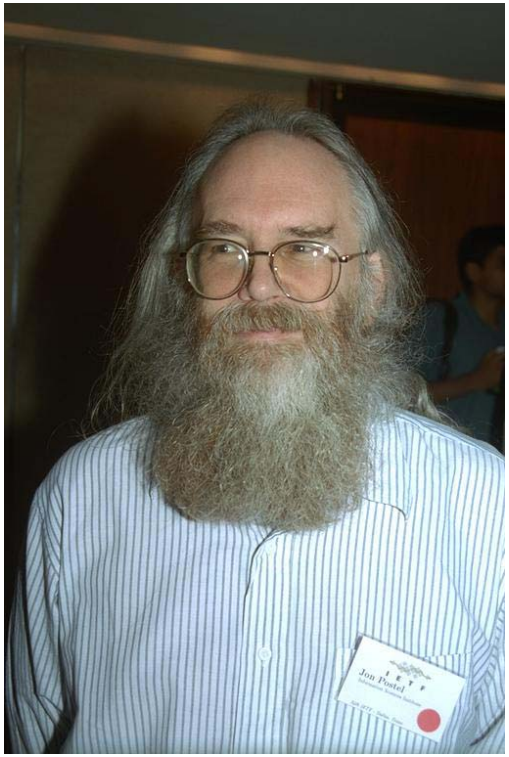
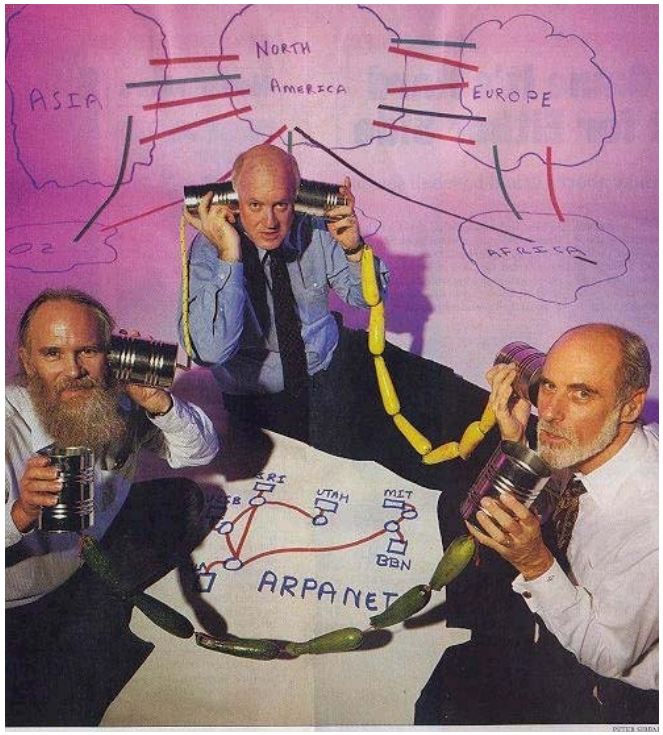


Photo by Peter Lothberg – IETF34 Aug 1995

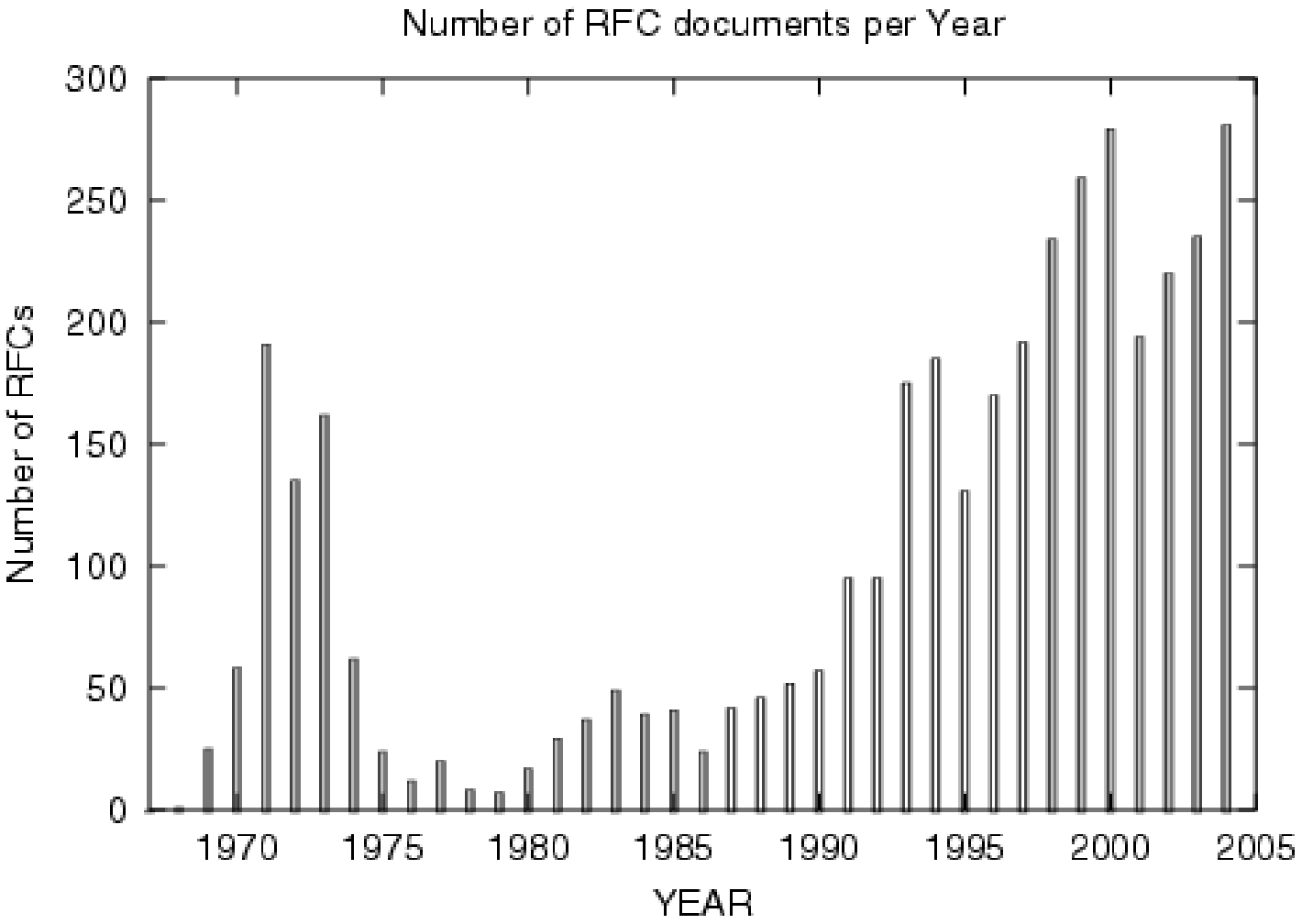


Newsweek Aug 8, 1994

Historical Context of RFC Series

- 1969: Building ARPAnet; RFC 1
- 1975: TCP/IP research begun; ~RFC 700
  - Recorded in separate IEN series
- 1983: Internet born 1 Jan; ~RFC 830
- 1985: IETF created; ~RFC 950
- 1993: Modern IESG/IAB org; ~RFC 1400
- 1998: Postel passed away; ~RFC 2430
- Today: ~RFC 4200

RFC Publication Rate



Jon Postel's Playful Side

- April 1 RFCs
  - A little humorous self-parody is a good thing…
  - Most, but not all, April 1 RFCs are satirical documents.
    - We expect you can tell the difference ;-)
- April 1 submissions are reviewed for cleverness, humor, and topical relation to IETF themes.
  - Avian Carriers is famous [RFC 1149]
  - The Evil Bit is my favorite [RFC 3514]

The RFC Editor today

- A small group at Jon's long-term home,
  - the Information Sciences Institute (ISI) of USC.
  - ~5 FTEs
- Funded by ISOC.
- Current leadership:
  - Joyce Reynolds, Postel's chief editorial assistant 83-98.
  - Bob Braden, colleague of Postel 1970-1998.
  - Aaron Falk, relative newcomer.
- RFC Editorial Board
  - Provides advice and counsel to the RFC Editor, particularly about independent submissions.

Editorial Staff

Joyce Reynolds

Sandy Ginoza

Alice Hagens

Eric Nord

The RFC Editor Web site

http://www.rfc-editor.org

- Search engines for RFCs, Internet Drafts
- RFC publication queue
- Master index to RFCs: rfc-index.txt, .xml
- "Official Internet Protocols Standards" list
- Errata
- Policy changes, news, …

RFCs and the IETF

- It was natural to adapt the existing RFC series to publication of Internet standards documents.
- The RFC Editor is therefore a component of the Internet standards process [RFC 2026].

RFC Categories

- RFC 2026 defines document maturity levels:
  - Standards track: Proposed, Draft, Standard.
  - Non-standards track: Experimental, Informational, Historical.
  - "Almost standard": Best Current Practice.
- Shown on RFC header as "Category:"
  - Except, one category "Standards Track" for PS, DS, S.
  - Often called "status".
- A published RFC can NEVER change, but its *category* can change (see rfc_index.txt).

Sources for RFCs

- IETF submissions
  - Mostly from Working Groups.
  - Rest are *individual submissions* via the IESG.
  - All are submitted to the RFC Editor by the IESG after approval process [RFC2026].
- IAB submissions
  - Submitted directly by IAB Chair
  - Informational category

More RFC Sources

- RFC Editor ("*independent*") submissions
  - Submitted directly to RFC Editor.
  - RFC Editor reviews and decides whether publication is appropriate.
  - IESG reviews for conflict with any WG, makes publish/do-not-publish recommendation.
  - RFC Editor has final decision, with advice from Editorial Board.
  - Only Experimental or Informational category.
- IRTF? Under consideration.

Review of Independent Submissions

- RFC Editor generally finds competant reviewer(s), with advice and aid from the Editorial Board.
- Possible recommendations from reviewer/Ed Board :
  - Out of scope for RFC series.
  - Incompetant or redundant, not worth publication.
  - Important, but should go through IETF process first ("Throw it over the wall to the IESG!")
  - Serious flaws – report to author, reject for now.
  - Suggest changes to author, then OK to publish.
  - Great! Publish it.

RFC Sub-Series

- All RFCs are numbered sequentially.
- There was a desire to identify significant subsets of RFCs, so Postel invented "sub-series." An RFC may have a sub-series designator and number.
  - E.g., "RFC 2026, BCP 9"
- Subseries designations:
  - BCP Best Current Practice category
  - STD Standard category
  - FYI Informational category: user documentation

STD Sub-Series

- Originally: all protocol specs were expected to quickly reach (full) Standard category.
  - Then the STD sub-series would include all significant standards documents.
  - Of course, it did not work out that way; most standards-track documents do not get beyond Proposed Standard.
  - See "Official Internet Protocol Standards"
    - See: www.rfc-editor.org/rfcxx00.html (occasionally published as STD 1) for the REAL list of current relevant standards-track docs.

STD Sub-Series

- STDs were overloaded to represent "complete standards"; one STD # can contain multiple RFCs.
- Examples:
  - STD 5 = "IP", includes RFCs 791, 792, 919, 922, 950, 1112
  - STD 13 = "DNS", includes RFCs 1034, 1035
  - STD 12 = "Network Time Protocol", currently no RFCs.

STDs as Protocol Names

- Really, "RFCxxxx" is only a *document name.*
  - But, people often talk about "RFC 821" or "821" when they mean "SMTP".
- As protocols evolve, RFC numbers make confusing names for protocols. Postel hoped that STD numbers would function as protocol names.
  - But reality is too complicated for this to work well.
  - It HAS been working for BCPs.
- We need a better way to name protocols.
  - ISD (Internet Standards Document) proposal ??

RFC Publication Process

- Overview
- Queue states
- AUTH48 procedure

Publication Process: Overview (1)

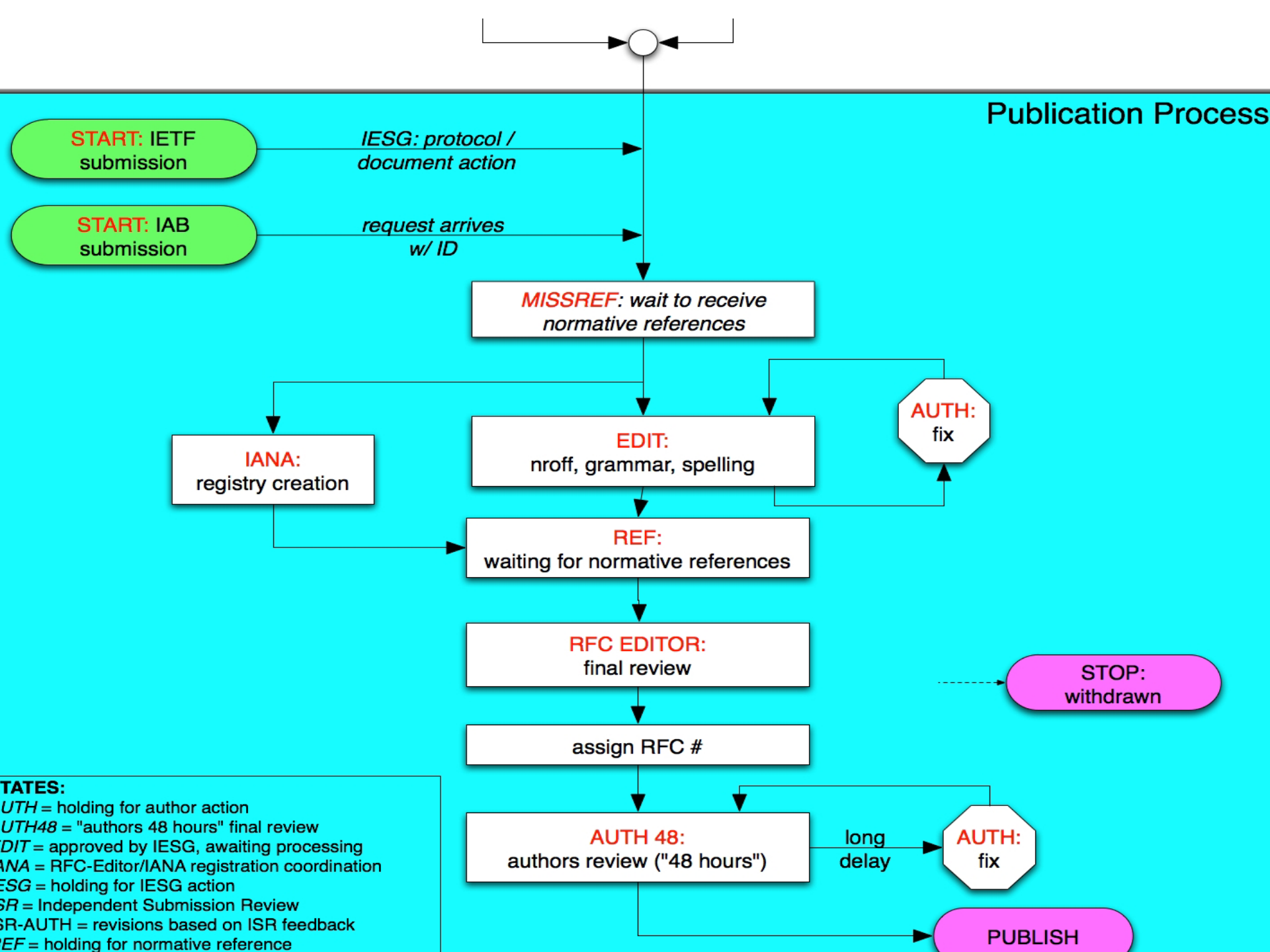
- First published as an Internet Draft
  - Send us the `nroff` or `xml2rfc` source, if available.
- RFC Editor
  - Edits and formats the document
  - Makes many consistency checks
- IANA acts on IANA Considerations
  - Creates new registries and assigns numbers.
  - RFC Editor plugs assigned numbers into document.

Publication Process: Overview (2)

- An RFC # is assigned.
- Document and diff file sent to authors for final check
  - "AUTH48" state.
  - All named authors are responsible.
- Finished document added to archive and index.
  - Announcement on ietf-announce list.
  - .nroff files archived, for later revision.

Normative References

- RFC set linked by Normative refs must be published simultaneously.
- Two hold points:
  - MISSREF state: a doc with Norm Ref to a doc not yet received by RFC Editor.
  - REF state: a doc that is edited but waiting for dependent docs to be edited.
- (This is new scheme; some docs held in other states now)


Publication Process
START: IETF submission
IESG: protocol / document action
START: IAB submission
request arrives w/ ID
MISSREF: wait to receive normative references
IANA: registry creation
EDIT: nroff, grammar, spelling
AUTH: fix
REF: waiting for normative references
RFC EDITOR: final review
STOP: withdrawn
assign RFC #
AUTH 48: authors review ("48 hours")
long delay
AUTH: fix
PUBLISH
TATES:
UTH = holding for author action
UTH48 = "authors 48 hours" final review
DIT = approved by IESG, awaiting processing
NA = RFC-Editor/IANA registration coordination
ESG = holding for IESG action
SR = Independent Submission Review
SR-AUTH = revisions based on ISR feedback
EF = holding for normative reference

AUTH48 State: Final Author Review

- Last-minute editorial changes allowed – But should not substantive or too extensive.
  - Else, must get OK from AD, WG chair.
- This process can involve a fair amount of work & time
  - AT LEAST 48 hours!
  - All listed authors must sign off on final document
  - Authors should take it seriously - review the entire document, not just the diffs.
  - Your last chance to avoid enrollment in the *Errata Hall of Infamy*!

How to Write an RFC

- Contents of an RFC
- Some editorial guidelines
- Improving your writing
- Tools
- MIBs and formal languages

"Instructions to Request for Comments (RFC) Authors". Draft-rfc-editor-rfc2223bis-08.txt aka ftp.rfc-editor.org/in-notes/rfceditor/instructions2authors.txt

General RFC Policies

- Immutability (but we get pretty close to the wire…)
- Not all RFC's are standards
- All RFCs in in English
  - RFC2026 allows translations
  - British English is allowed in principle, but…
- Consistent Publication Format
  - ASCII (also .txt.pdf for Windows victims)
  - Also .ps or .pdf (special process for handling)

RFC Formatting Rules

- ASCII, 72 char/line.
- 58 lines per page, followed by FF (^L).
- No overstriking or underlining.
- No “filling” or (added) hyphenation across a line.
- <.><sp><sp> between sentences.
- No footnotes.

RFC Editing

- For correct syntax, spelling, punctuation: always.
  - Sometimes exposes ambiguities
- To improve clarity and consistency: sometimes.
  - E.g., expand each abbreviation when first used.
- To improve quality of the technical prose: occasionally.
- By general publication standards, we edit lightly.
  - Balance: author preferences against consistency and accepted standards of technical English.

Preserving the Meaning

- A comment that does not faze us:

  "How dare you change my perfect prose…"?
  - Sorry… we are just doing our job as editors.
- A comment that concerns us very much:

  "You have changed the meaning of what I wrote".
  - Often, because we misunderstood what you meant.
  - That implies that your prose is ambiguous.
  - You should recast the sentence/paragraph to make it clear and unambiguous, so even the dumb RFC Editor cannot mistake the meaning. ;-)

The RFC Editor checks many things

- Header format and content
- Title format
- Abstract length and format
- Table of Contents
- Presence of required sections
- No uncaught IANA actions
- Spelling checked
- ABNF/MIB/XML OK, using algorithmic checker
- Citations match references
- Most recent RFC/I-D cited
- Pure ASCII, max 72 char lines, hyphens, etc.
- Header and footer formats
- “Widows” removed
- References split into Normative, Informative
- Boilerplate OK

Parsing an RFC

- Header
- Title
- Header boilerplate (Short copyright, Status of Memo)
- IESG Note (when requested by IESG)
- Abstract

- Table of Contents (not req'd for short docs)
- Body
- Authors' Addresses

- IPR boilerplate
  - See RFC 3667/BCP 78, RFC 3668/BCP 79.

RFC Header

```
Network Working Group                                  T. Berners-Lee
Request for Comments: 3986                                  W3C/MIT
STD: 66                                                   R. Fielding
Updates: 1738                                           Day Software
Obsoletes: 2732, 2396, 1808                               L. Masinter
Category: Standards Track                              Adobe Systems
                                                          January 2005
```

- STD sub-series number 66
- Updates, Obsoletes: relation to earlier RFCs.

RFC Header: another example

```
Network Working Group                                  T. Berners-Lee
Request for Comments: 2396                                  MIT/LCS
Updates: 1808, 1738                                      R. Fielding
Category: Standards Track                              U. C. Irvine
                                                          L. Masinter
                                                   Xerox Corporation
                                                        August 1998
```

Corresponding RFC Index entry (search on "2396")

RFC2396	T. Berners-Lee, R. Fielding, L. Masinter	August 1998	ASCII	Obsoleted by RFC3986, Updates RFC1808, RFC1738, Updated by RFC2732 Errata	**DRAFT STANDARD**

Red fields were not known when RFC was published

Authors in Header

- Limited to lead authors, document editors.
- There must be very good reason to list more than 5.
- All authors in header are responsible for “48 hour” review.
- Authors section should provide unambiguous contact information.
- Other names can be included in Contributors and/or Acknowledgments sections.

Titles

- Should be thoughtfully chosen
- No un-expanded abbreviations - except for very well-known ones (eg, IP, TCP, HTTP, MIME, MPLS…)
- We like short, snappy titles, but sometimes we get…
  - *"An alternative to XML Configuration Access Protocol (XCAP) for manipulating resource lists and authorization lists, Using HTTP extensions for Distributed Authoring and Versioning (DAV)"**
    - (*So far, only an Internet Draft)

Abstracts

- Abstracts
  - Carefully written for clarity (*HARD* to write!)
  - No unexpanded abbreviations (again, except well-known)
  - No citations
    - Use "RFC xxxx", not "[RFCxxxx]" or "[5]"
  - Less than 20 lines! Shorter is good.
  - Not a substitute for the Introduction; redundancy is OK.
  - I dislike abstracts that bury "This document…" 10 lines down, or omit it entirely!

Body of RFC

- First section should generally be “1. Introduction”.
- Special sections that may appear:
  - References
  - Contributions, Acknowledgments
  - Internationalization Considerations
    - When needed -- see Sect 6, RFC 2277/BCP 18.
- Sections that MUST appear:
  - Security Considerations
  - IANA Considerations

References

- Normative vs. Informative
  - Normative refs in stds-track documents can hold up pub.
  - [Normative gets over-used?]
- Recommend against numeric citations "[37]".
- Citations and references must match.
- Handy file of RFC reference text:
  - ftp://ftp.rfc-editor.org/in-notes/rfc-ref.txt

Copyrights and Patents

- Copyright Issues
  - Specified in RFC 3977/BCP 77 "IETF Rights in Contributions"
  - Independent submissions: generally follow IETF rules
- Patent ("IPR") issues
  - RFC boilerplate specified in RFC 3978/BCP 78 "Intellectual Property Rights in IETF Technology"

Security Considerations Section

- Security Considerations section required in every RFC.
- See: RFC 3552: "Guidelines for Writing RFC Text on Security Considerations"
- IESG is (rightfully!) suspicious of "There are no security considerations in this document."

IANA Considerations Section

- Primary input to IANA
- Defines:
  - Individual code points, in one place
  - New registries (number spaces), with instructions on future assignment rules.
- Section is required in draft, but "No IANA Considerations" section will be removed by RFC Editor.
- See: RFC 2434, "Guidelines for Writing an IANA Considerations Section in RFCs"

RFC Contents

- Primary goal: clear, unambiguous technical prose.
  - Some preference for American English style
- The RFC Editor staff generally follows two sources for style advice:
  - Strunk & White (4th Edition, 2000)
  - "A Pocket Style Manual" by Diana Hacker (4th Ed., 2004).
- In any case, internally consistent usage is objective.

RFC Editor conventions

- A comma before the last item of a series:
  - "TCP service is reliable, ordered, and full-duplex"
  - Avoids ambiguities, clearly shows parallelism.
- Punctuation outside quote marks:
  "This is a sentence"{.|?|!}
  - To avoid computer language ambiguities.

Writing RFCs

- Simple fact: writing clear, unambiguous technical prose is very ***HARD*** !!
- Not *literary* English, but *comprehensibility* would be nice!
  - Avoid ambiguity
  - Use consistent terminology and notation
  - Define each term and abbreviation at first use.
  - Expand every abbreviation at first use.

Writing Hints

- Simple declarative sentences are good.
  - Flowery, literary language is not good.
  - Say enough, but not more than enough
- Avoid long, involuted sentences. You are not James Joyce.
  - Use ";" | ", and" | ", or" sparingly to glue successive sentences together.
- Make parallel clauses parallel in syntax.

  Bad: "... whether the name should be of fixed length or whether it is variable length".

A Few Common Errors

- Some Protocol Engineers over-capitalize Nouns.
- Keep your sentences short and direct.
  - Don't make simple things complex
- Ideal: simple descriptions of complex ideas.
  - Not always possible…
  - At least, simple descriptions of simple ideas!

Writing…

- Avoid passive voice –
  - "The nail was hit on the head by you.
- Backwards sentence:
  - "In this section, the network interface is described." vs.
  - "This section describes the network interface."
- "which" VS. "that"
  - "Which" is used parenthetically and follows a comma.
  - "The interface which the users sees is too complex."
    that /
  - Or better: "The user interface is too complex."

Lean and Mean

- You often improve your writing, by simply crossing out extraneous ~~extra~~ words.
  - Look at each sentence and ask yourself,
    "Do I need every word to make my meaning clear and unambiguous?"
  - English professors call it the "Lard Factor" (LF) [Lanham79]
  - *"If you've not paid attention to your own writing before, think of a LF of 1/3 to ½ as normal and don't stop revising until you've removed it."* [Lanham79]

- [Lanham79] Richard Lanham, "Revising Prose", Scribner's, New York, 1979

A Real Example

- *"When the nature of a name is decided one must decide whether the name should be of fixed length or whether it is variable length."* (25 words)
- A. "One must decide whether the length of a name should be fixed or variable." (14 words, LF = .44)
- B. "We may choose fixed or variable length for a particular class of name." (13 words)
- C. "A name may have fixed or variable length." (7 words, LF = .72)

Another Real Example

- *"One way to avoid a new administrative overhead would be for individuals to be able to generate statistically unique names."* (20 words)

- A. "New administrative overhead can be avoided by allowing individuals to generate statistically unique names."
  (14 words, LF = .30)

- B. "Allowing individuals to generate statistically unique names will avoid new administrative overhead."
  (12 words, LF = .40)

Another (reality-based) Example

- "This is the kind of situation in which the receiver is the acknowledger and the sender gets the acknowedgments." (19 words)
  - "An acknowledgment action is taking place from the receiver and the sender." (11, LF=.42)
  - "The receiver returns acknowledgments to the sender." (7, LF=.63)

Another Real Example

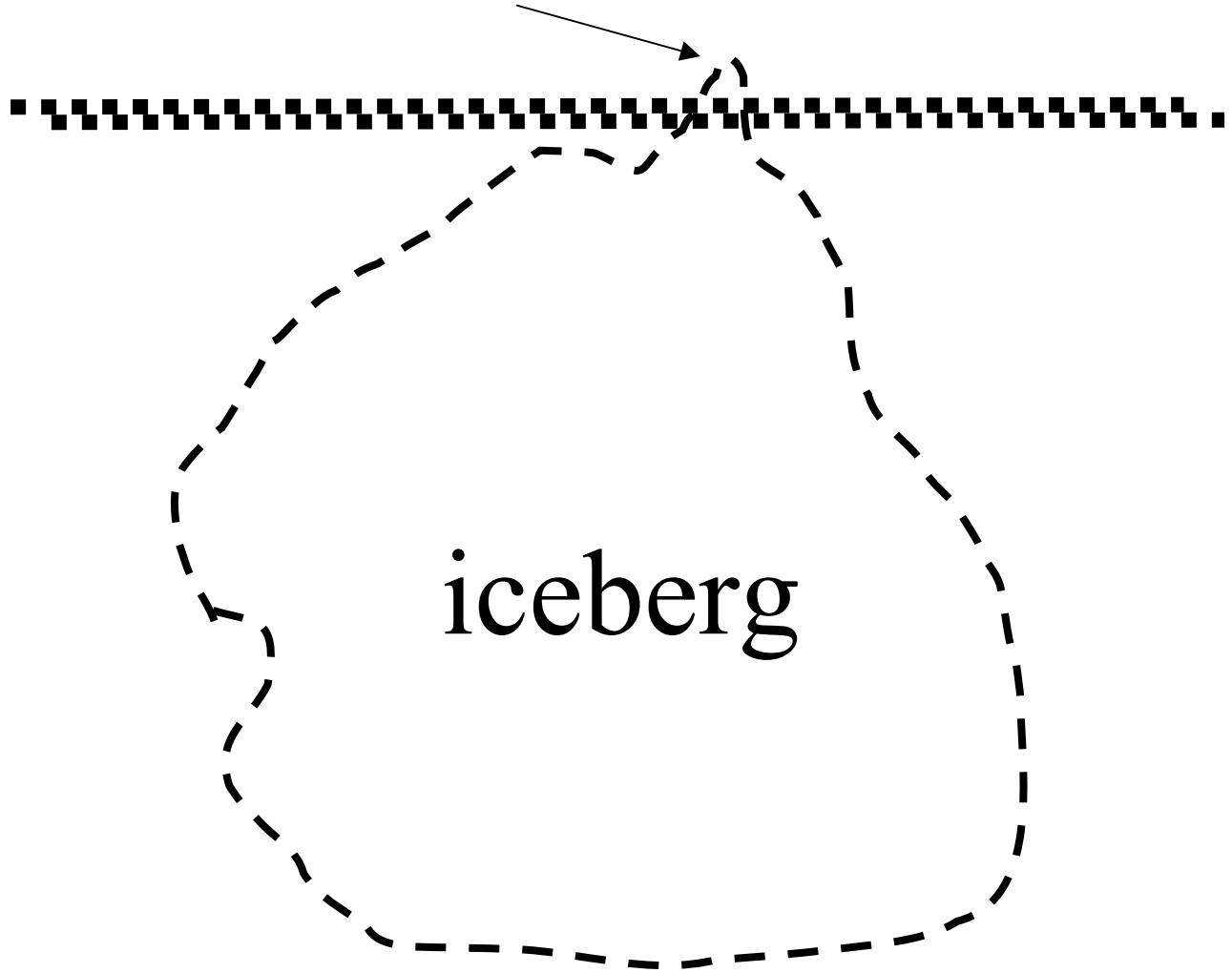
- "*Also outside the scope are all aspects of network security which are independent of whether a network is a PPVPN network or a private network (for example, attacks from the Internet to a web-server inside a given PPVPN will not be considered here, unless the way the PPVPN network is provisioned could make a difference to the security of this server).”*
  - Two sentences!!
  - “make a difference to” -> “affect”

Seeking Clarity, Resolving Ambiguity

- *"With appropriate consideration in router design, in the event of failure of a BGP peer to provide the equivalent filtering, the risk of compromise can be limited to the peering session on which filtering is not performed by the peer or the interface or line card on which the peering is supported."*
  - *"Appropriate router design can limit the risk of compromise when a BGP peer fails to provide adequate filtering. The risk can be limited to the peering session on which filtering is not performed by the peer, or to the interface or line card on which the peering is supported." [??]*

Removing ambiguity

- *"Consequently, BGP security is secondarily dependent on the security of the protocols by which the platform is operated, managed and configured that might signal this event."*
  - "Consequently, BGP security is secondarily dependent on the security of the platform's operation, management, and configuration protocols that might signal this event", OR
  - "Consequently, BGP security is secondarily dependent on the security of the operation, management, and configuration protocols of the platform that might signal this event" ??


iceberg

Format for Readabilty

- Careful use of indentation and line spacing can greatly improve readability.
  - Goes a long way to compensate for single font.
  - Bullets often help.
  - High density on a page may be the enemy of clarity and readability.
- The RFC Editor will format your document according to these guidelines, but it is helpful if you can do it in the I-D.

Hard to read

3.1 RSVP Message Formats

3.1.1 Common Header

The fields in the common header are as follows:

Flags: 4 bits

0x01-0x08: Reserved

No flag bits are defined yet.

Send_TTL: 8 bits

The IP TTL value with which the message is sent. See Section 3.8.

Formatted for Easier Reading

3.1 Message Formats

3.1.1 Common Header

The fields in the common header are as follows:

Flags: 4 bits

0x01-0x08: Reserved

No flag bits are defined yet.

Send_TTL: 8 bits

The IP TTL value with which the message is sent. See Section 3.8.

Internet Drafts

- A well-formed RFC starts with a well-formed I-D
- Surviving IESG review:
  - http://www.ietf.org/ID-Checklist.html
  - http://www.ietf.org/ietf/1id-guidelines.txt

Text Formatting Tools

- Author tools: www.rfc-editor.org/formatting.html
  - xml2rfc
  - nroff
  - Microsoft word templates
  - LaTeX
- RFC Editor does final RFC formatting using venerable Unix tool nroff –ms.

xml2rfc

- Read RFC2629.txt - Marshall Rose
  - Writing I-Ds and RFCs using XML
  - Explains use of DTD for RFC production
- Engine to convert `.xml` to `.txt` or to `.nroff` available online at: http://xml.resource.org/
  - If you use xml2rfc, give the .xml file to the RFC Editor. It may save us work on your document.
- Xml2rfc resources at: http://xml.resource.org/

nroff, groff

- Handy templates for authors using nroff:
  - ftp.rfc-editor.org/in-notes/rfc-editor/2-nroff.template
    - Published in 1991 - J. Postel
    - Gives instructions on using macros for creating RFCs
  - www.1-4-5.net/~dmm/generic_draft.tar.gz
    - Updated nroff template maintained by David Meyer.
- If you use nroff –ms (without a private `make` file), give the .nroff source to the RFC Editor.

MIB RFCs – Important special case

- MIB references
  - O&M Web Site at www.ops.ietf.org/
  - MIB doctors at www.ops.ietf.org/mib-doctors.html
  - MIB Review: draft-ietf-ops-mib-review-guidelines
- Tools
  - http://www.ops.ietf.org/mib-review-tools.html
  - smilint at www.ibr.cs.tu-bs.de/projects/libsmi/
  - SMICng at www.snmpinfo.com/

Use of Formal Languages

- Formal languages and pseudo-code can be useful as an aid in explanations, although English remains the primary method of describing protocols.
- Pseudo-code judged on the basis of clarity.
- Formal Languages (e.g., ABNF, XML, ASN.1 (MIBs))
  - Requires a normative reference to language specification
  - RFC Editor will run verifier program.
- www.ietf.org/IESG/STATEMENTS/pseudo-code-in-specs.txt
- ftp.rfc-editor.org/in-notes/rfc-editor/UsingPseudoCode.txt

Persistent Editorial Issues

- Normative references
  - Practical effect: can hold up publication
  - Some disagreement on what should be Normative
- MUST/MAY/SHOULD/… applicability words
  - Do they belong in Informative documents at all?
  - Tend to overuse – makes it sound important.
  - Worse, often inconsistent use
- URLs in RFCs
  - Some are more stable than others…

Persistent Editorial Issues

- Author contact information
  - Seems important, but hard to keep it current
  - RFC Editor gets many queries from newbies.
  - Ideal: maintain database of current email addresses; daunting job.
- *Updates* and *Obsoletes* relationships
  - Some disagreement on what they mean
  - At best, only high-order bit of complex relationship
  - RFC Editor hopes ISD (Internet Standard Document) [Newtrk] will be more systematic and complete.

Persistent Issues

- *"What are the current Internet standards?"*
  - See STD 1: "Official Internet Protocol Standards"
  - Latest: *www.rfc-editor.org/rfcxx00.html*
- In practice, reality is so complex that this is probably not even a valid question.
  - Roadmaps are desirable
  - ISDs might be better
- What is meaning of Historic category?
  - "Really Bad", or just "well, not very current…"?

Errata Page

- www.rfc-editor.org/errata.html
  - A list of *technical and editorial* errors that have been reported to the RFC Editor.
  - Verified by the authors and/or the IESG.
  - The RFC Editor search engine results contain hyperlinks to errata, when present.

Authoritative references

- Overview of RFC publication: www.rfc-editor.org/howtopub.html

- "Instructions to Request for Comments (RFC) Authors". Draft-rfc-editor-rfc2223bis-08.txt aka ftp.rfc-editor.org/in-notes/rfceditor/instructions2authors.txt

Thank you

Questions? Comments?

mailto:rfc-editor@rfc-editor.org

mailto: rfc-interest@rfc-editor.org