RFCs & the RFC Editor: A Tutorial
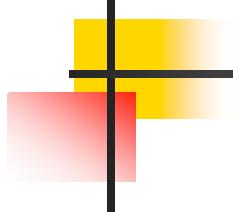
IETF 76

Hiroshima, Japan

8 November 2009

Overview of this Tutorial
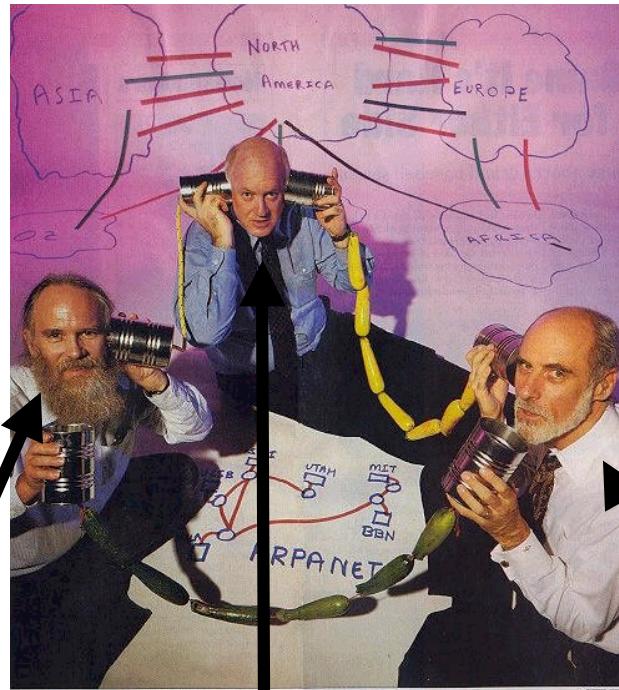
1. What is an RFC?

2. How to Read an RFC

3. The RFC Publication Process

4. How to Write an RFC -- Hints

5. Conclusion

What is an RFC, and Why?

- The "RFC" document series was originally created in 1969 by the research community that developed the ARPAnet and then the Internet.

  - Technical specs, comments, ideas, meeting notes, etc.

  - Cataloged, numbered, and distributed to all participants- informally.

  - Begun by Steve Crocker (RFC 3) and Jon Postel.

  - Called "Request for Comments" or RFCs.

ARPAnet/Internet Pioneers

Jon Postel, Steve Crocker, and Vint Cerf

Newsweek Aug 8, 1994

The RFC Editor

- Jon Postel soon assumed *the* RFC Editor role.
  - 28 years: 1970 until his death in 1998.
  - He established and maintained a consistent style and the editorial quality of the RFC series.
- He was also the IANA for many years
- He had an enormous influence on the Internet.

Jon was a 2-finger typist
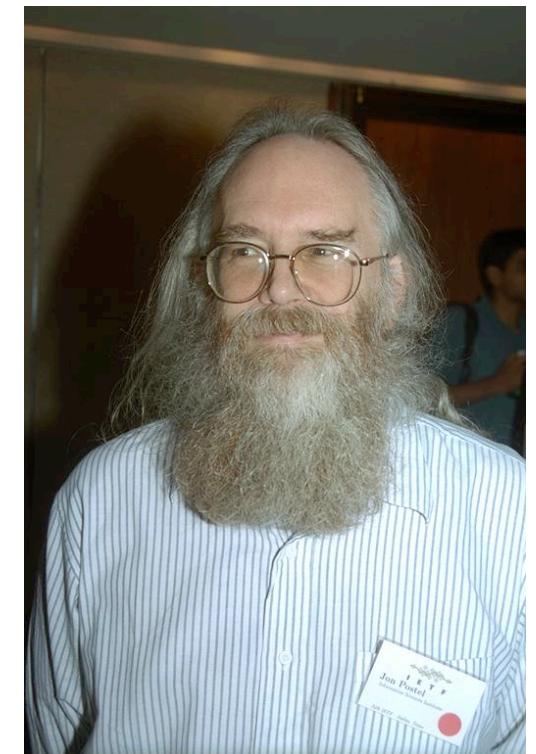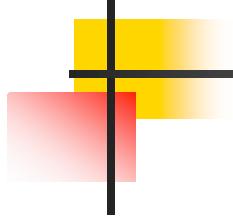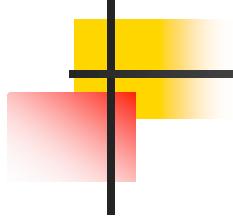
Photo by Peter Lothberg – IETF34 Aug 1995
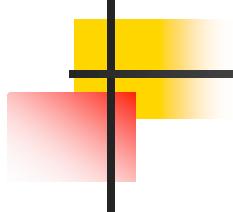
Jon Postel – Protocol Guru

- Postel was always clear and direct.

- He had a remarkable ability to cut to the essentials.

- As RFC Editor, Postel functioned as a "Protocol Czar", discouraging poorly-conceived protocol designs.

- Postel principle for robust interoperability:

> "Be liberal in what you accept, and
> conservative in what you send"

The RFC Series ...

- Once FTP was developed, RFCs became the earliest document series to be published *online*.

- When the IETF was formed ~1985, the RFC series was adopted for IETF documents.

- Today, RFCs form the single series for all Internet protocol standards, recommendations, new ideas, procedures, etc.
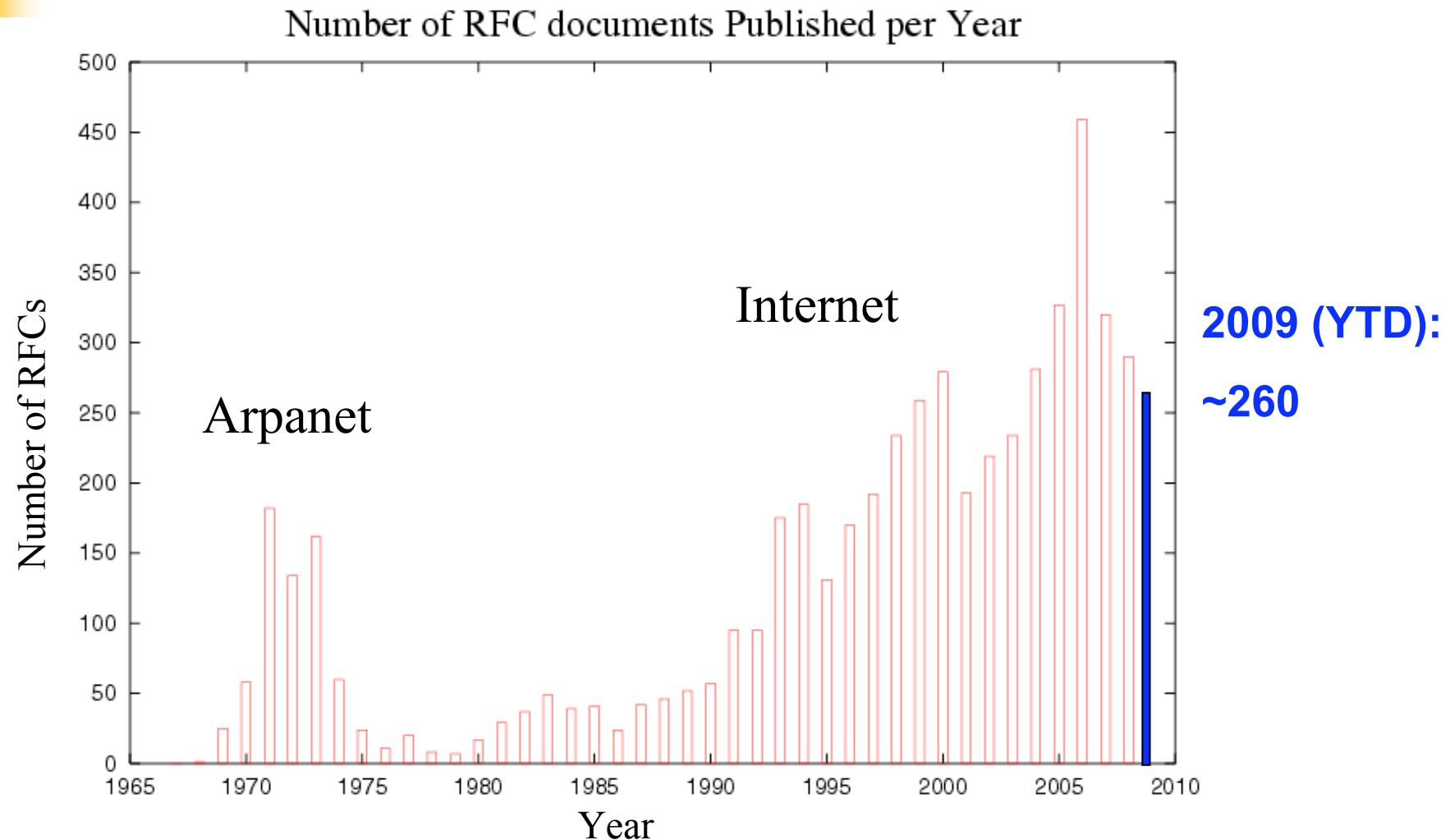
The RFC Series
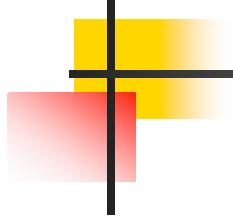
- A 40 year record of Internet technical history

- *RFCs form an ARCHIVAL* series: RFCs are *forever*!

- Once published, an RFC never changes.

- Some, but not all, RFCs define Internet standards.

Timeline 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 83   ~RFC 830
- 1985: IETF created   ~RFC 950
- 1993: Modern IETF organization ~RFC 1400
- 1998: Postel passed away   ~RFC 2430
- Today   ~RFC 5600

RFC Publication Rate

Number of RFC documents Published per Year

Internet

Arpanet

2009 (YTD):

~260

RFC Editor, Yesterday and Today

- ## 1998 was a watershed year for RFCs
  - Until 1998, Jon Postel was **the** RFC Editor.
  - Until 1998: The RFC Editor function was funded by the US government (DARPA).
  - In 1998, Postel died tragically, following heart surgery.
  - Postel's home institution, USC Information Sciences Institute (ISI), continued RFC editing, funded by ISOC.

ISI's RFC Editor Team

Bob Braden   Sandy Ginoza   Alice Hagens
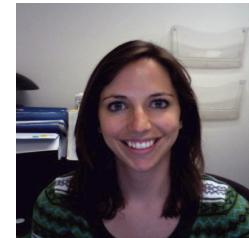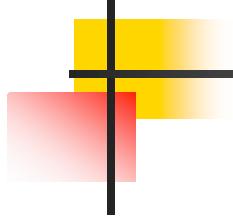
Megan Ferguson   Stacy Burns

2009: New Watershed for RFCs

- Transitioning to new RFC Editor model (RFC 5620)

- "RFC Editor" split into four components:

  - RFC Production House – Edits RFCs

  - RFC Publisher – Publishes RFCs online

  - RFC Series Editor (RSE)

  - Independent Submissions Editor (ISE)

RFC Editor Tomorrow (Jan 1, 2010)

- Production and Publication functions: contracted to AMS (Secretariat)

Sandy Ginoza
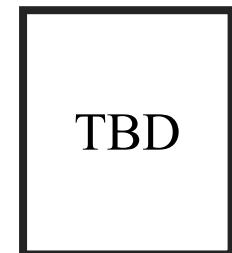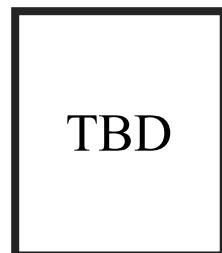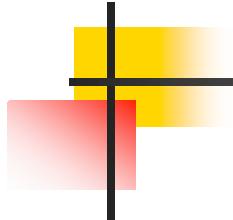
Alice Hagens
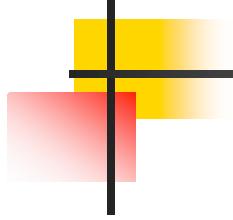
Megan Ferguson

- RFC Series Editor
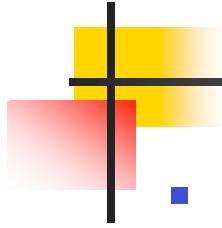
TBD

- Independent Submissions Editor

TBD

Overview of this Tutorial

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5. Conclusion
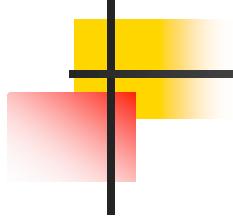
How to Read an RFC

- Even if you never write an RFC, you need to understand what you see when you read one.
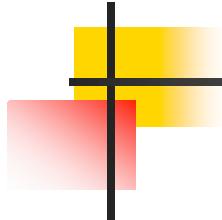
General RFC Rules

- Immutability – once published, never change
- Not all RFCs are standards
- All RFCs in English
  - Language translations are allowed
  - British English is allowed in principle, but there is some preference for American English.
- Consistent Publication Format
  - Normally ASCII text (also .txt.pdf facsimiles)
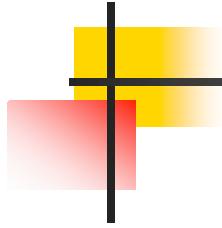
(Primitive) Formatting Rules

- ASCII text, 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.
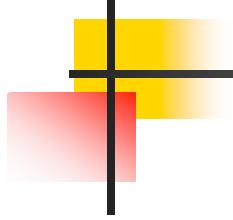
ASCII Text? Perpetual Discussion

- Con:
  - Can't include graphics.
  - Hard to include complex diagrams
  - Old fashioned.
  - Hard to read
- Pro:
  - Every system can read and search plain ASCII text
  - Not proprietary format
  - Proven
  - Concentrates the mind on the contents

ASCII Text -- Workarounds

- Can have .ps/.pdf version that contains graphics, but there must still be an ASCII version that is the official specification. (Not often used)

- Another proposal is under consideration.

- This is an area of likely future change.

- An RFC contains:
  - A Header
  - An Abstract
  - Legal boilerplate
  - An Introduction
  - An IANA Considerations section
  - A Security Considerations section
  - Author(s) names and contact information

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
```
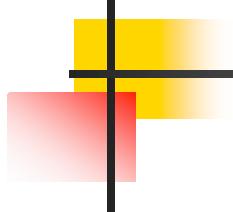
- Notes:
  - "Network Working Group" is historic; will soon change to be stream name (described later)
  - This RFC has STD sub-series number 66
  - Updates, Obsoletes: relation to earlier RFCs.

RFC Categories

- RFC 2026 defines maturity levels for a tech spec:
  - Standards track: Proposed [standard], Draft [standard], Standard.
  - Non-standards track: Experimental, Informational, Historic.
  - "Almost standard": Best Current Practice.

- Shown on RFC header as "Category:"
  - Today, category/maturity level is usually called "status".
    - I will use "status" in the rest of this talk.

Four RFC Publication Streams

IETF submissions

- All standards track RFCs are here.
- Mostly from Working Groups.
- Some are *individual* submissions, outside a WG.
- Approved by IESG and submitted to the RFC Editor.
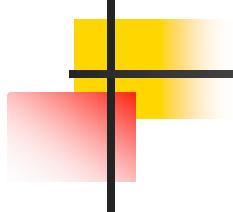
IAB submissions

- Typically Informational

IRTF submissions
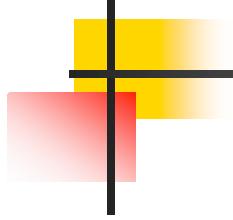
Independent submissions (direct to RFC Editor)

See RFC 4846
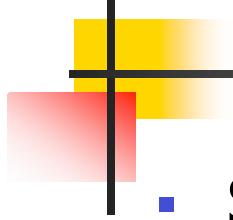
An Aside on Sub-Series

- RFCs are numbered (roughly) sequentially.
- To identify significant subsets of RFCs, Postel invented "sub-series". An RFC may have a sub-series designator.
    - e.g., "RFC 2026, BCP 9"
- Sub-series designations:
    - BCP   Best Current Practice status
    - STD   Standard status
    - FYI   User documentation (Informational)
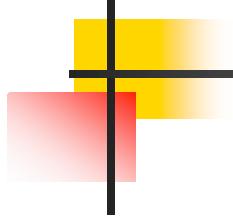
More about the STD Sub-Series

- Originally: all protocol specs were expected to quickly reach (full) Standard status.
  - Then the STD sub-series would include all significant standards documents.
- 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 for the list of current relevant standards-track docs.
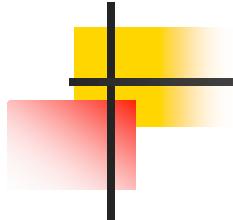
STD Sub-Series …

- STDs are overloaded to represent "complete standards"; one STD # can contain multiple RFCs.

- Examples:

  - STD 5 = "IP", includes RFCs 791, 792, 919, 922, 950, 1112

    NB: When multiple RFCs make up a sub-series doc (for example, www.rfc-editor.org/std/std5.txt) the STD file starts with:

    `"[Note that this file is a concatenation of more than one RFC.]"`

  - STD 13 = "DNS", includes RFCs 1034, 1035
  - STD 12 = "Network Time Protocol", currently no RFCs.
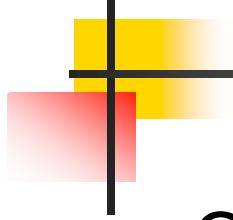
STDs as Protocol Names

- Really, "RFCxxxx" is only a *document name.*
    - But, people often talk about "RFC 821" or "821" when they mean the "SMTP" protocol.
- 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 IETF protocols.
    - A problem for the future…
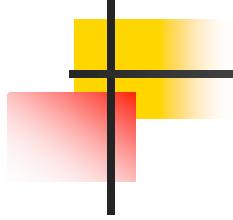
Authors in Header

- Limited to lead authors, document editors.

- There must be very good reason to list more than 5.

- Each author in the header must give approval during final pre-publication review.

- Ideally, Authors' Addresses section provides unambiguous contact information for every author.

- Other names can be included in Contributors and/or Acknowledgments sections.

Copyrights and Patents

- ## Copyright issues
  - Specified in RFC 5378 / BCP 78 "Rights Contributors Provide to the IETF Trust" (which recently obsoleted RFCs 3978 and 4748, and updates RFC 2026). See also http://trustee.ietf.org/license-info.

- ## Patent ("IPR") issues
  - Specified in RFC 3979 / BCP 79 "Intellectual Property Rights in IETF Technology" (which was updated by RFC 4879).

- Generally, you supply the correct boilerplate in the Internet-Draft, and the RFC Editor will supply the correct boilerplate in the RFC.
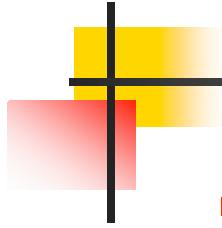
Security Considerations Section

- Security Considerations section required in every RFC.

- See RFC 3552: "Guidelines for Writing RFC Text on Security Considerations"

- Important!

IANA Considerations Section
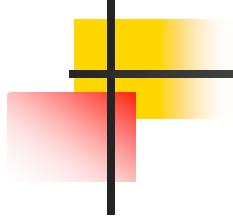
Section is required in Draft

- But a "No IANA Considerations" section will be removed by RFC Editor.

- For IANA: a guide on assignments that are needed (if any)

- For the reader: a summary of assigned numbers and registries

- For authors: forces them to think if any protocol parameters have been missing from the document.

IANA Considerations Section Includes…

- What actions is the document requesting of IANA
- Individual number or name registrations
- New registries (number or name spaces)
- Registration procedures for new registries
- Reference changes to existing registrations

Finding an RFC

http://www.rfc-editor.org

- Search engines for RFCs and for Internet Drafts

- RFC publication queue

- Master indexes of RFCs
  - rfc-editor.org/rfc/rfc-index.txt, .xml
  - "Official Internet Protocols Standards" list

- Instructions for Authors
  - Style Guides
  - Policy changes, news, FAQ, and more
  - Links to preparation tools

- Errata

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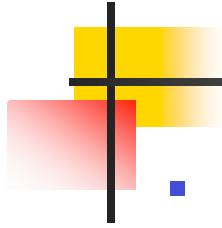
```
Network Working Group                        T. Berners-Lee
Request for Comments: 2396                          MIT/LCS
Updates: 1808, 1738                             R. Fielding
Category: Standards Track                       U. C. Irvine
                                                 L. Masinter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

Corresponding RFC Index entry (search on "2396")
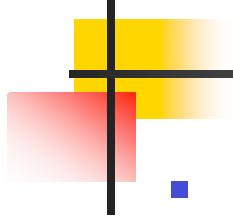
RFC2396	T. Berners-Lee, R. Fielding, L. Masinter	August 1998	ASCII	Obsoleted by RFC3986, Updates RFC1808, RFC1738, Updated by RFC2732 Errata	DRAFT STANDARD

- Red fields were not known when RFC was published
- Note errata notation: hyperlink to errata if any.

RFC Errata - www.rfc-editor.org/errata.php

- Can Search by RFC number (and other criteria) for Technical, Editorial errors that have been reported to the RFC Editor.

- Anyone can submit new erratum using the online form.

- Status indicates whether its accuracy has been reviewed by the relevant party.

  - Reported - not yet reviewed

  - Verified

  - Held for Document Update - held for consideration if there is a bis

  - Rejected
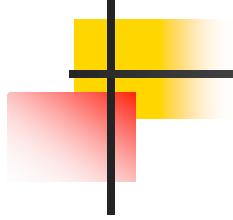
Errata Page - www.rfc-editor.org/errata.php

- See "IESG Processing of RFC Errata for the IETF Stream"

  http://www.ietf.org/iesg/statement/errata-processing.html

- The RFC Editor search engine results contain hyperlinks to errata, when present.

New Feature – Metadata per RFC

- Attaches metadata to RFC, so search engine is not requred.

- Each RFC's boilerplate section will contain a link to a corresponding per-RFC metadata page.

- This page will contain up-to-date information about an RFC.

- URLs: www.rfc-editor.org/info/rfcxxxx

MetaData Page for Example RFC

RFC 2396
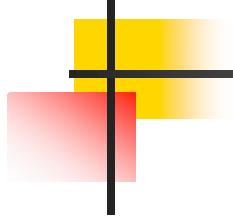
"Uniform Resource Identifiers (URI): Generic Syntax", August 1998

- **Canonical URL:** http://www.rfc-editor.org/rfc/rfc2396.txt
      This document is also available in this non-normative format: TXT.PDF.
- **Status:** DRAFT STANDARD
- **Obsoleted by: RFC 3986**
- **Updates:** RFC 1808, RFC 1738
- **Updated by:** RFC 2732
- **Authors:**
    - T. Berners-Lee
      R. Fielding
      L. Masinter
- **Stream:** [Legacy]
- Please refer here for any **errata** for this document. To submit a new errata report, go to the main errata page.
- **Abstract**
      This document defines a grammar that is a superset of all valid URI, such that an implementation can parse the common components of a URI reference without knowing the scheme-specific requirements of every possible identifier type. [STANDARDS-TRACK]
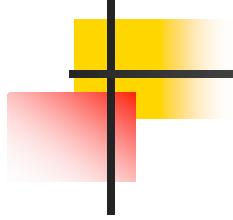
Later info

(Reformatted for slide)
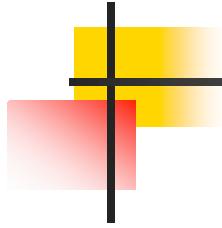
Independent Submissions Stream

- Important to understand distinction:
    Independent Submission stream
    vs. Individual Submission (IETF stream).

    - A Working Group sometimes deflects an out-of-scope contribution to the Independent Stream.

    - The ISE (Independent Submission Editor) sometimes deflects a standards-related submission to an AD for action in a WG or as an individual submission.
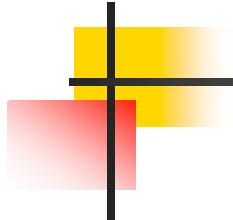
Independent Submission Stream

- Independent Submissions Editor (ISE) finds competent reviewer(s), with advice and aid from an Editorial Board.

- Possible conclusions :
  - Out of scope for RFC series.
  - Incompetent or redundant, not worth publication.
  - Should go through IETF process
  - Serious flaws – report to author, reject for now.
  - Suggest changes to author, then OK to publish.
  - Great! Publish it.

- See www.rfc-editor.org/indsubs.html and RFC 4846

RFC3932(bis) Review

- Once an independent submission has been accepted by the ISE for publication, it is passed to the IESG for review, to ensure that it is not an "end run" around the IETF standards process.

- IESG can request delay (up to 18 months) in publication of independent submission while a related Working Group completes action.

Overview of this Tutorial

1. What is an RFC, and why?

2. How to Read an RFC

3. The RFC Publication Process

4. How to Write an RFC -- Hints

5. Conclusion

A Generic Case: draft-ietf-wg-topic-05

Let's say your document has been approved by the IESG…

IETF Submission

Working group doc, or individual standards track doc

Submit

Concerns

IESG

RFC Editor

"Last Call"

Comments, suggestions

IETF Community Review

Published RFC
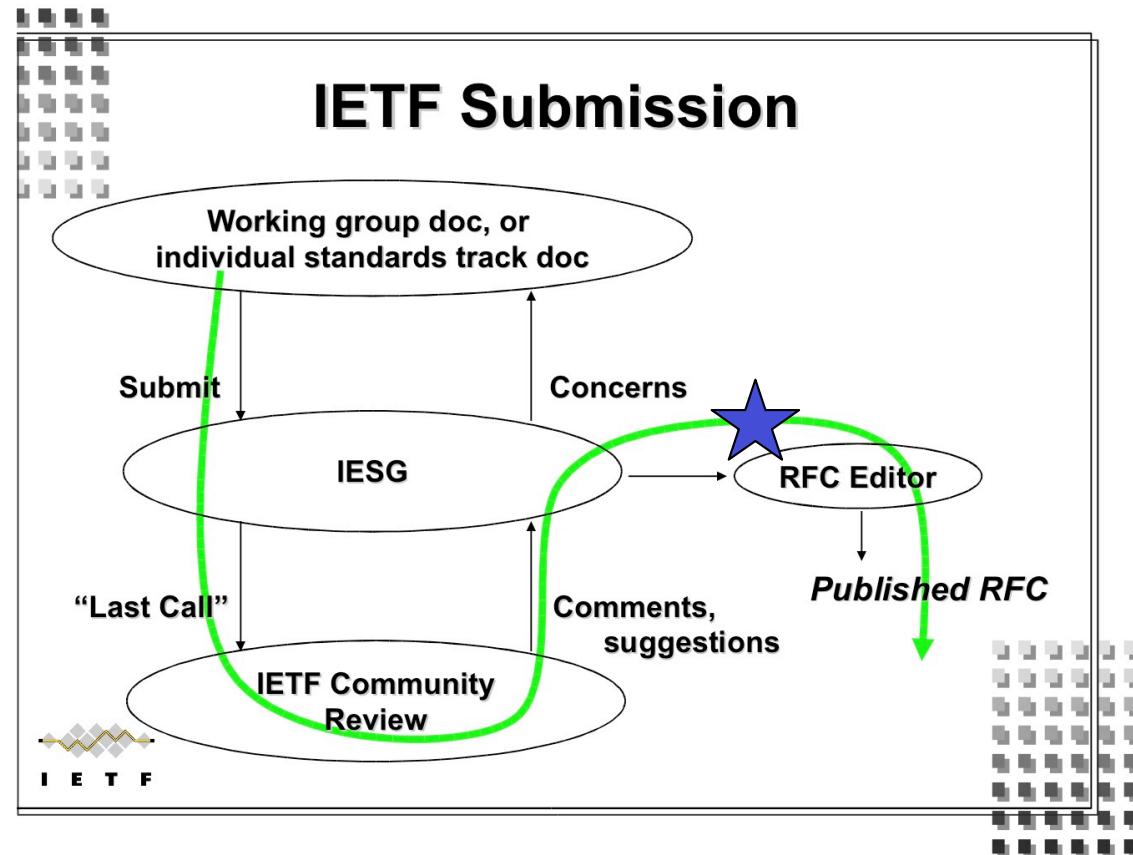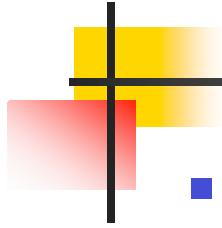
I E T F

Figure from Scott Bradner's Newcomer Presentation

Step 0: Write an Internet-Draft

- A well-formed RFC starts with a well-formed I-D.

  - www.ietf.org/ID-Checklist.html

  - www.ietf.org/ietf/1id-guidelines.txt

- Authoring tools

  - www.rfc-editor.org/formatting.html

  - tools.ietf.org/inventory/author-tools

  - More on this later.

Step 1: Send your source file.
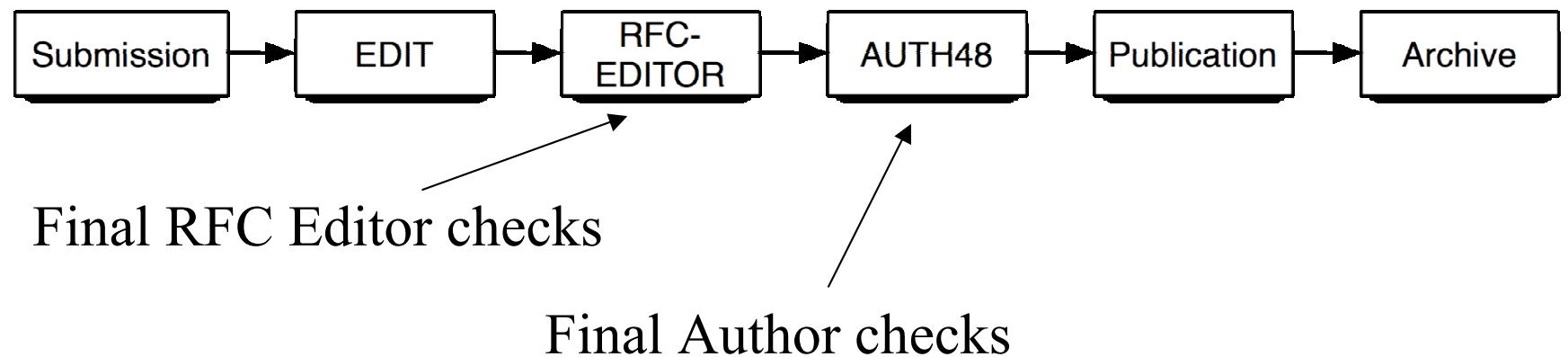
From: rfc-editor@rfc-editor.org

Subject: [RFC State] <draft-ietf-wg-topic-05> has been added to RFC Editor database

- Your document has been added to the queue (www.rfc-editor.org/queue2.html).

- Please send us your nroff or xml source file.

  - Let us know if there are any changes between the version you send and the IESG-approved version.

- If you don't have one, don't worry, we will use the Internet-Draft text to create an nroff file.

Basic Publication Workflow

Submission → EDIT → RFC-EDITOR → AUTH48 → Publication → Archive

Final RFC Editor checks

Final Author checks

Step 2: Answer questions.

From: rfc-editor@rfc-editor.org or *@isi.edu

Subject: draft-ietf-wg-topic-05

- Please reply to questions about your draft. Typically, these questions are about
  - missing citations
    - Ex: [RFC4301] appears as a normative reference, where would you like to cite it in the text?
  - inconsistent terminology
    - Ex: Which form of the term should be used throughout?
      RESTART Flag / Re-Start flag / Restart Flag
 - unclear sentences
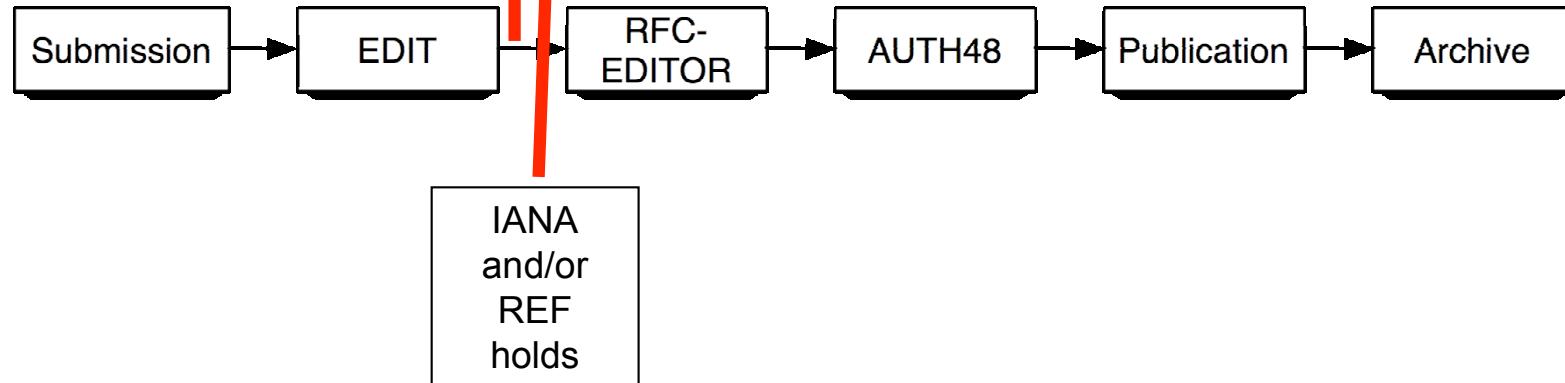
Step 3: See your document progress.

From: rfc-editor@rfc-editor.org

Subject: [RFC State] <draft-ietf-wg-topic-05> has changed state

Basic Process

Submission → EDIT → RFC-EDITOR → AUTH48 → Publication → Archive

IANA and/or REF holds

Also, you can check http://www.rfc-editor.org/queue2.html
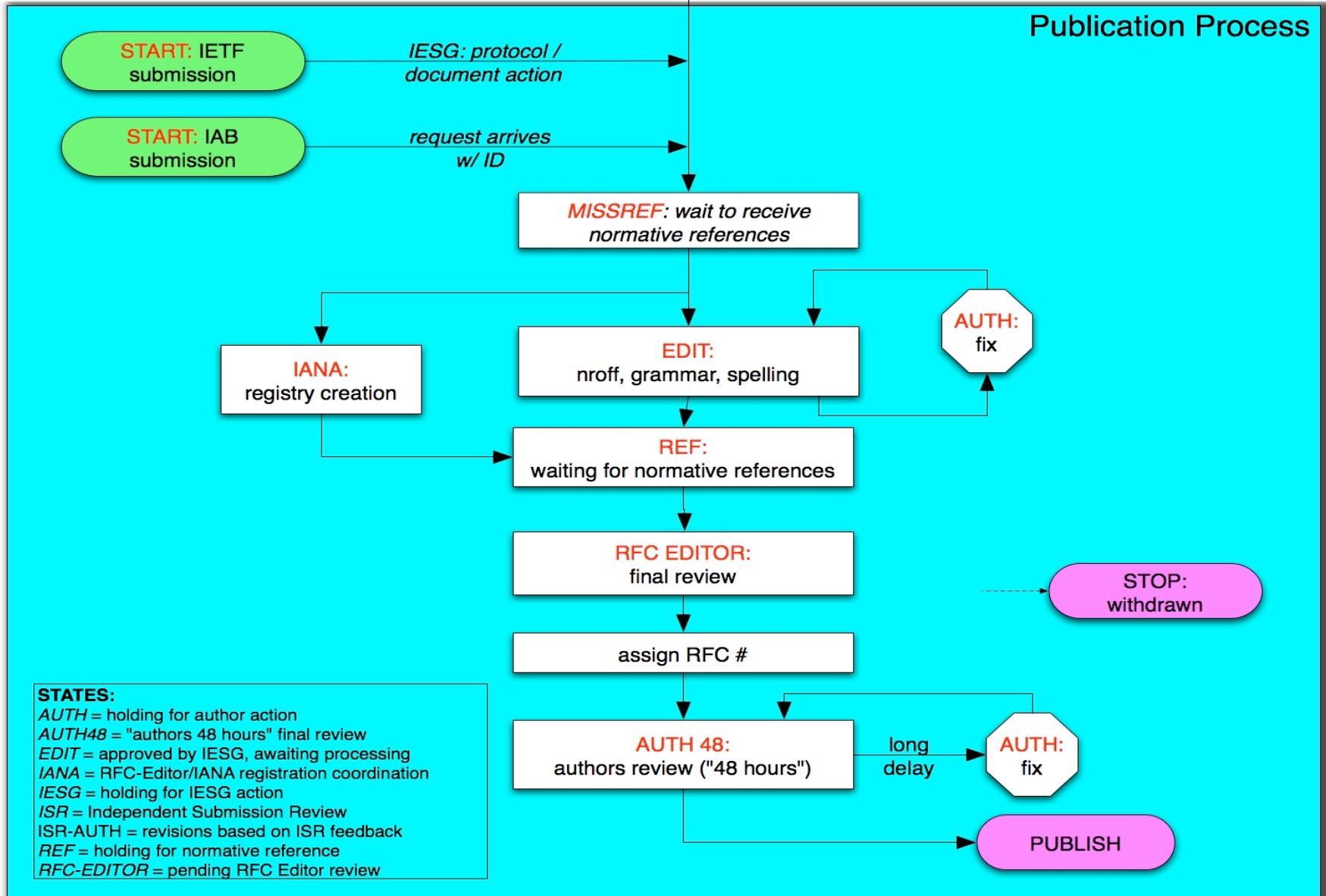
More details on queue states

Document Clusters
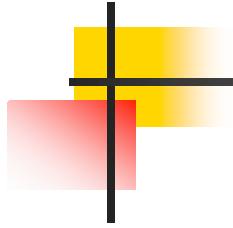
- Set of inter-dependent RFCs that must be published simultaneously.
- Most commonly dependence: Normative references.

RFC Editor and IANA must work closely together

- IANA acts on IANA Considerations section, checks for other missing assignments.
- IANA creates new registries and assigns numbers.
- RFC Editor inserts numbers into documents.

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 #

STATES:
AUTH = holding for author action
AUTH48 = "authors 48 hours" final review
EDIT = approved by IESG, awaiting processing
IANA = RFC-Editor/IANA registration coordination
IESG = holding for IESG action
ISR = Independent Submission Review
ISR-AUTH = revisions based on ISR feedback
REF = holding for normative reference
RFC-EDITOR = pending RFC Editor review

AUTH 48: authors review ("48 hours")

long delay

AUTH: fix

PUBLISH

Aaron Falk November 1, 2005, v.15

Q: Why hasn't my document been published yet?
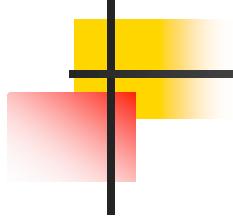
A: You can check the state of your document online at www.rfc-editor.org/queue2.html

- "IANA" indicates waiting on IANA considerations
- "REF" indicates there are normative references
- "AUTH48" indicates each author must send final approval of the document
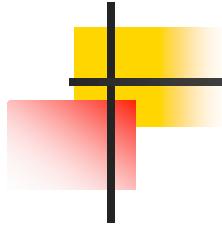
RFC Editing

- Correct syntax, spelling, punctuation: always.
  - Sometimes exposes ambiguities

- Improve clarity and consistency: sometimes.
  - e.g., expand each abbreviation when first used.

- Improve quality of the technical prose: occasionally.

- By general publication standards, we edit lightly.
  - Balance: author preferences against uniformity and accepted standards of technical English.
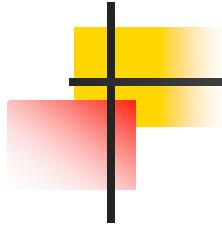
Preserving the Meaning

- A complaint that concerns us very much:
  "You have changed the meaning of what I wrote".

  - Usually, because we misunderstood what you meant.

  - That suggests that your prose is ambiguous.

  - You should recast the sentence/paragraph to make it clear and unambiguous, so even the RFC Editor cannot mistake the meaning. ;-)
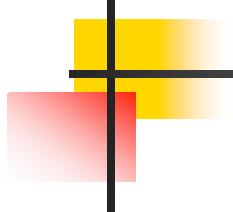
The RFC Editor checks many things

- Header format and content
- Title format
- Abstract length and format
- Table of Contents
- Presence of required sections
- No uncaught IANA actions
- Spelling
- 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
- Page breaks do not create "orphans"
- References split into Normative, Informative
- Boilerplate OK
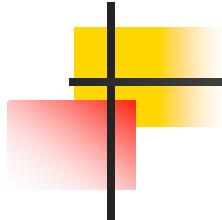
Review of IANA Considerations

- IANA Consideration sections are reviewed before the document is published as an RFC
  - During IESG Last Call
  - During IESG Evaluation
  - IANA will also review your section at any time by request

AUTH48 State: Final Author Review

- Last-minute editorial changes allowed – But should not be substantive or too extensive.
  - Else, must get OK from AD, WG chair.
- This process can involve a fair amount of work & time
  - All listed authors must sign off on final document
  - Authors should take it seriously - review the entire document, not just the diffs.

Q: What if one of the authors cannot be located during AUTH48?

A: You have two options:

An AD can approve the document in place of the unavailable author. See
http://www.ietf.org/iesg/statement/auth48.html

The author can be moved to a Contributors or Acknowledgments section.
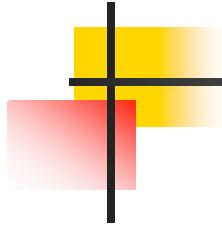
Step 4: Review your document carefully.

From: rfc-editor@rfc-editor.org
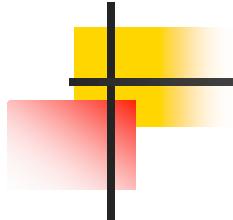
Subject: AUTH48 [SG]: RFC 4999 <draft-ietf-wg-topic-05>

- This is your chance to review the edited version.
- We send pointers to the .txt and diff files
  - (and the XML file when AUTH48 in XML)
- Submit changes by sending OLD/NEW text or indicating global changes.
  - (Insert directly into the XML file when AUTH48 in XML)
- Each author listed on the first page must send their approval before the document is published.

Step 5: Publication!

- Announcement sent to lists:

  ietf-announce@ietf.org and rfc-dist@rfc-editor.org

- Canonical URI:

  http://www.rfc-editor.org/rfc/rfcXXXX.txt

- Also available here:

  ftp://ftp.rfc-editor.org/in-notes/rfcXXXX.txt

- Mirrored at IETF site and other sites.

- NROFF (and XML) source files archived for later revisions.

Overview of this Tutorial

1. What is an RFC, and why?

2. How to Read an RFC

3. The RFC Publication Process

4. How to Write an RFC -- Hints

5. Conclusion

Contents of Internet-Draft/RFC

- Header
- Title
- Abstract

- Status of This Memo
- Copyright Notice
- Table of Contents (not required for short docs)
- Body
  - Introduction
  - ...
  - Security Considerations (see RFC 3552)
  - IANA Considerations (see RFC 5226)
  - References
- Authors' Addresses
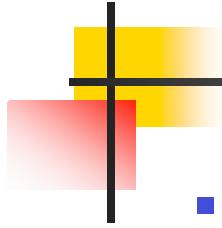
Title

- Should be thoughtfully chosen

- No un-expanded abbreviations, except for very well-known ones (e.g., IP, TCP, HTTP, MIME, MPLS)

- We like short, snappy titles, but sometimes we get titles like:

  - *"An alternative to XML Configuration Access Protocol (XCAP) for manipulating resource lists and authorization lists, Using HTTP extensions for Distributed Authoring and Versioning (DAV)"*

- Choose a good abbreviated title for the running header

    "WebDAV Alternative to XCAP"
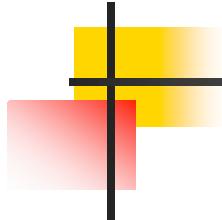
Abstracts

- Carefully written for clarity (*HARD* to write!)

- No un-expanded abbreviations (again, except well-known)

- No citations

    - Use "RFC xxxx", not "[RFCxxxx]" or "[5]" in Abstract

- Less than 20 lines! Shorter is often better.

- Not a substitute for the Introduction; redundancy is OK.

- We recommend starting with "This document…"
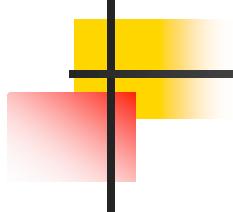
Body of an Internet-Draft

- First section should generally be "1. Introduction".
- Sections that MUST appear:
  - IANA Considerations
  - Security Considerations
  - References (Normative and/or Informative)
- Special sections that may appear:
  - Contributors, Acknowledgments
  - Internationalization Considerations
    - When needed -- see Section 6, RFC 2277/BCP 18.

Need Help on writing IANA Considerations?

- See RFC 5226, "Guidelines for Writing an IANA Considerations Section in RFCs"

- Look at existing registries for examples

- Ask IANA

  - Available at the IANA booth at IETF meetings

  - Send an e-mail [iana@iana.org] or [michelle.cotton@icann.org]
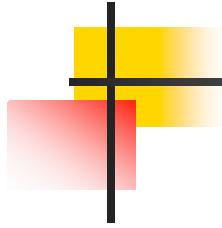
Notes on References

- Citations and references must match.
  - Citations in the text body –
    '... TCP [RFC793] ...' or '...TCP [Post81]...'
  - Reference Section –
    '[RFC793] Postel, J., "Transmission Control Protocol", STD 7, ...'

- Distinguish Normative vs. Informative references
  - Normative refs can hold up publication.

References
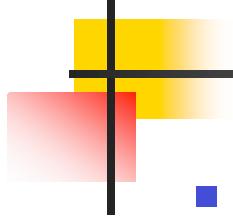
- We STRONGLY recommend against numeric citations (e.g., "[37]") unless you are using XML source file.

- File of references to RFCs, to cut-and-paste:

  - www.rfc-editor.org/rfc/rfc-ref.txt

- There are restrictions on references to Internet Drafts

- Normative ref to I-D holds up publication

Writing RFCs
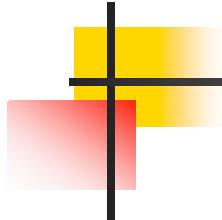
Not *literary* English, but *clarity* would be nice!

- Avoid ambiguity.

- Use consistent terminology and notation.

  - If you choose "4-bit integer", use it throughout (not "four-bit integer" or "4 bit integer").

- Expand every abbreviation at first use.

- Define terms at first use.

- See the abbreviations and terms lists available from www.rfc-editor.org/styleguide.html
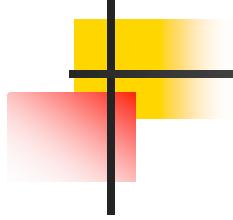
Style

- Primary goal: clear, unambiguous technical prose.
- See the RFC style guide available from http://www.rfc-editor.org/styleguide.html

- The RFC Editor staff generally references:
  - Strunk & White (4th Ed., 2000)
  - *The Chicago Manual of Style Online* (15th Ed.)
  - *A Pocket Style Manual* by Diana Hacker (4th Ed., 2004)
- Internally consistent usage is the objective.
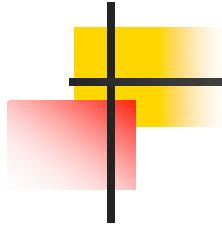
Tech Writing 101…

- **Simple declarative sentences** are good.
  - Goal: Simple descriptions of complex ideas.
  - Flowery, literary language is not good.
- Avoid long, complex sentence structure.
  - Use ";" ", and" ", or" sparingly to glue adjacent sentences together.
- Use parallel syntax for parallel clauses.
  - BAD: "… whether the name should be of fixed length or whether it is variable length".

Grammar Tips

- Avoid passive voice (backwards sentences).

    - BAD: "In this section, the network interface is described."

    - GOOD: "This section describes the network interface."

- Some Protocol Engineers over-capitalize Nouns.

More Grammar Tips
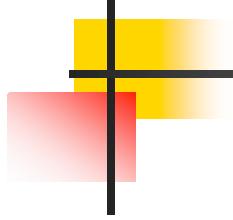
"which" vs. "that" – Examples

> "It should be noted that RST attacks **that** rely on brute-force are relatively easy to detect at the TCP layer."

(*that* is restrictive: only *some* RST attacks rely on brute-force)
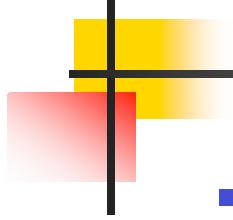
> "It should be noted that RST attacks**,** **which** rely on brute-force**,**are relatively easy to detect at the TCP layer.

(*which* is non-restrictive or parenthetical: all RST attacks rely on brute-force)

RFC Punctuation 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.
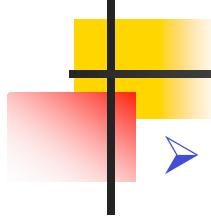
Lean and Mean

- 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?"

    - An English professor has called it the "Lard Factor" (LF)

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

Examples of the Lard Factor

➢ 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 name may have fixed or variable length.
(7 words, LF = .72)

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

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

Example - missing subject

Original:

"All addresses or published in DNS, and hence do not operate a two faced DNS."

- What does not operate a two-faced DNS?
- "or" --> "are"

Suggested:

"All addresses are published in DNS, and hence [?] does not operate a two-faced DNS."

Author Reply:

All addresses are published in DNS, and the site does not operate a two-faced DNS.

Example - repetitive text

Original：

```
A site willing to use ULA address space can have either
  (a) multiple /48 prefixes (e.g. a /44) and wishes to
      use ULAs, or
  (b) has one /48 and wishes to use ULAs or
  (c) a site has a less-than-/48 prefix (e.g. a /56 or /64)
      and wishes to use ULAs.
```

- Does "wish to use ULAs" mean "willing to use ULA address space"?

Suggested:

```
A site that wishes to use ULAs can have
  (a) multiple /48 prefixes (e.g., a /44)
  (b) one /48, or
  (c) a less-than-/48 prefix (e.g., a /56 or /64).
```

Example - unclear reference
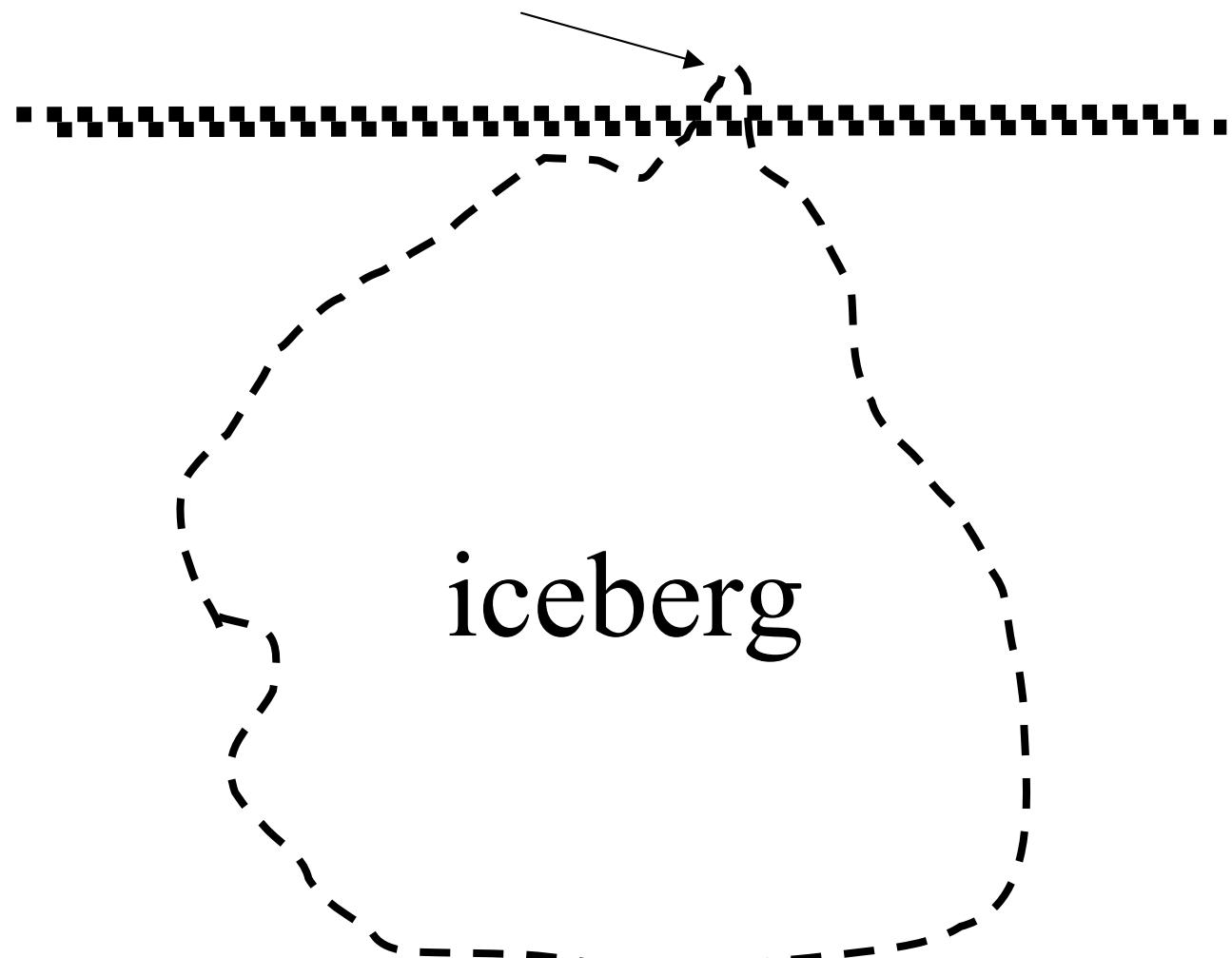
Original:
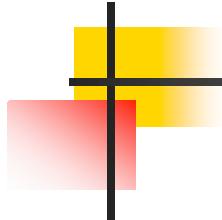
```
The main purpose of IIDs generated based on [RFC4941] is
to provide privacy to the entity using this address.
While there are no particular constraints in the usage of
these addresses as defined in [RFC4941] there are some
implications to be aware of when using privacy addresses
as documented in section 4 of [RFC4941].
```

- What do "this address" and "these addresses" refer to?
  (IPv6 addresses in general, or only those with IIDs?)

Suggested:
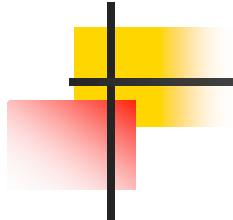
```
The main purpose of IIDs generated based on [RFC4941] is
to provide privacy to the entity using an IPv6 address.
While there are no particular constraints on the usage of
IPv6 addresses with IIDs as defined in [RFC4941], there
are some implications to be aware of when using privacy
addresses as documented in Section 4 of [RFC4941].
```

iceberg
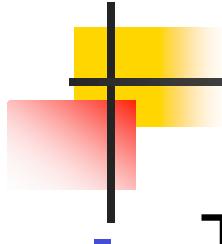
Format for Readability

- 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.
- When using xml2rfc, try the PI subcompact="no" to get a blank line between list items.

Text Formatting Tools

- Author tools: www.rfc-editor.org/formatting.html
  - xml2rfc
  - nroff
  - Microsoft word template
  - LaTeX template

- RFC Editor does final RFC formatting using venerable Unix tool nroff –ms.

xml2rfc (http://xml.resource.org)
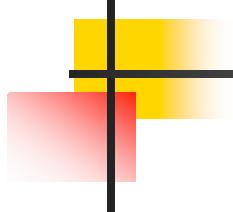
- The xml2rfc tool converts an XML source file to text, HTML, or nroff. RFC 2629 and its unofficial successor define the format.

- xml2rfc FAQ: xml.resource.org/xml2rfcFAQ.html

- XML templates are available from

  tools.ietf.org/tools/templates:

  1. For a generic I-D (e.g., draft-davies-template-bare.xml)
  2. For an I-D containing a MIB (e.g., mib-doc-template-xml.txt)
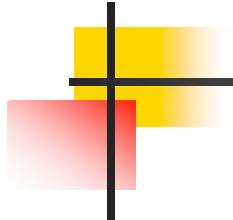
nroff, groff

- Nroffedit (aaa-sec.com/nroffedit/) is an application for editing nroff with wysiwyg display.

- Handy templates for authors using nroff:

  - ftp.rfc-editor.org/in-notes/rfc-editor/3-nroff.template

    - Published in 1991 by J. Postel. Updated October 2006.

    - 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.
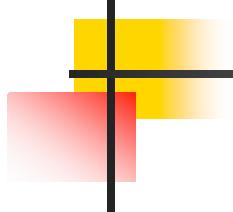
Use of Formal Languages

- 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. See

  http://www.ietf.org/iesg/statement/pseudocode-guidelines.html

- Formal Languages (e.g., ABNF, XML, MIBs)

  - Requires a normative reference to language specification

  - RFC Editor will run verifier program.

MIB RFCs: A 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: See RFC 4181, BCP 111: "Guidelines for Authors and Reviewers of MIB Documents"
- Tools
  - www.ops.ietf.org/mib-review-tools.html
  - smilint at www.ibr.cs.tu-bs.de/projects/libsmi/
  - SMICng at www.snmpinfo.com/
- MIB boilerplate
  - The Internet-Standard Management Framework:
    www.ops.ietf.org/mib-boilerplate.html
  - Security Considerations: www.ops.ietf.org/mib-security.html
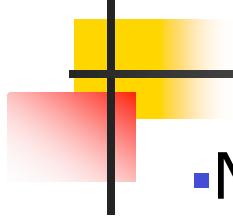
Overview of this Tutorial

1. What is an RFC, and why?

2. How to Read an RFC

3. The RFC Publication Process

4. How to Write an RFC -- Hints

5. Conclusion
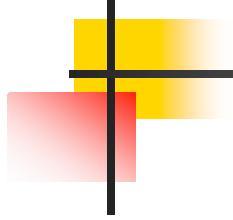
5. Important Hints to Authors

- Read your I-D carefully before submission, as you would read the final document in AUTH48!

- Respond promptly to all messages from RFC Ed.

- If your I-D is in the queue, and you see typos or have a new email address, send us an email.

- DON'T use numeric citations (unless you submit an XML file).

- Avoid gratuitous use of requirement words (MUST, etc.)

- Craft title and abstract carefully.

- Remember that your document should be understandable by people who are not deep experts in the subject matter.
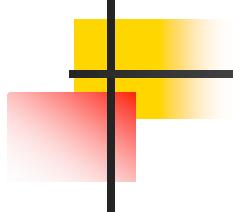
Ongoing Issues

- Normative references

  - Practical effect: can hold up publication

- MUST/MAY/SHOULD/… requirement words

  - Do they belong in Informational documents at all?

  - Tend to be overused or used inconsistently.

- URLs in RFCs

  - Some are more stable than others…

- Citing Internet Drafts in RFCs

- Deciding who gets their names on the header

More Issues

- Providing for complex diagrams/graphics/images in RFCs

- IS there consensus for abandoning ASCII text?

- Will the RFC series continue another 40 years?
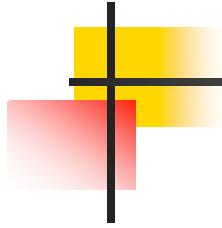
A Last Aside...

- "April 1" RFCs: Satire
  - 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 publications are chosen for cleverness, humor, and topical relation to IETF themes.
  - Avian Carriers is famous [RFC1149]
  - Evil Bit is a favorite [RFC3514]

Authoritative References

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

- RFC Style Guide: www.rfc-editor.org/styleguide.html
  - "RFC Document Style" - A comprehensive summary of the style conventions and editorial policies of the RFC series.
  - "Instructions to RFC Authors" - a.k.a. RFC 2223bis.
  - RFC Editorial Policies - A collection of policies on RFC editorial issues.
  - Abbreviations List - Expansions of abbreviations that appear in RFCs
  - Terms List - Table of decisions on consistent usage in RFCs
  - RFC Bibliographic Entries - Listing of all RFCs, formatted for direct insertion into the References section of an RFC. Also notes when the referenced RFC has been obsoleted.

The IETF Web Site & IETF Tools

www.ietf.org

- Working Group charters, mailing lists
- Meeting agendas and proceedings
- I-D Submission and I-D Tracker
- IESG actions

tools.ietf.org

- Tools for preparing drafts, viewing drafts, communicating, following IETF meetings

Thank you

Questions? Comments?

- Ask us now!
- IETF 76: Stop by the RFC Editor or IANA Desks.
- RFC Editor Interest List: rfc-interest@rfc-editor.org
- Email: rfc-editor@rfc-editor.org