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The Tao of IETF: A Novice's Guide to
the Internet Engineering Task Force

Status of This Memo

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Abstract

This document describes the inner workings of IETF meetings and Working Groups, discusses organizations related to the IETF, and introduces the standards process. It is not a formal IETF process document but instead an informational overview.

Table of Contents

1. Introduction	4
2. Acknowledgements	5
3. What Is the IETF?	5
3.1. Humble Beginnings	6
3.2. The Hierarchy	7
3.2.1. ISOC (Internet Society)	7
3.2.2. IESG (Internet Engineering Steering Group)	8
3.2.3. IAB (Internet Architecture Board)	10
3.2.4. IANA (Internet Assigned Numbers Authority)	11
3.2.5. RFC Editor	11
3.2.6. IETF Secretariat	12
3.3. IETF Mailing Lists	12
4. IETF Meetings	13
4.1. Registration	14
4.2. Take the Plunge and Stay All Week!	15
4.3. Newcomer Training	16
4.4. Dress Code	16
4.5. Seeing Spots Before Your Eyes	16
4.6. Terminal Room	17
4.7. Meals and Other Delights	17
4.8. Social Event	18
4.9. Agenda	18
4.10. EDU to the Rescue	19
4.11. Where Do I Fit In?	19
4.11.1. IS Managers	19
4.11.2. Network Operators and ISPs	19
4.11.3. Networking Hardware and Software Vendors	20
4.11.4. Academics	20
4.11.5. Computer Trade Press	20
4.12. Proceedings	21
4.13. Other General Things	21
5. Working Groups	22
5.1. Working Group Chairs	23
5.2. Getting Things Done in a Working Group	24
5.3. Preparing for Working Group Meetings	25
5.4. Working Group Mailing Lists	26
5.5. Interim Working Group Meetings	27
6. BOFs	27
7. New to the IETF and Coming to a Meeting? STOP HERE! (Temporarily)	28
8. RFCs and Internet Drafts	29
8.1. Getting an RFC Published	29
8.2. Letting Go Gracefully	30
8.3. Internet Drafts	31
8.3.1. Recommended Reading for Writers	32
8.3.2. Filenames and Other Matters	33

8.4. Standards-Track RFCs	34
8.4.1. Telling It Like It Is -- Using MUST and SHOULD and MAY	35
8.4.2. Normative References in Standards	36
8.4.3. IANA Considerations	37
8.4.4. Security Considerations	37
8.4.5. Patents in IETF Standards	37
8.5. Informational and Experimental RFCs	38
9. How to Contribute to the IETF	39
9.1. What You Can Do	39
9.2. What Your Company Can Do	40
10. IETF and the Outside World	40
10.1. IETF and Other Standards Groups	40
10.2. Press Coverage of the IETF	41
11. Security Considerations	42
Appendix A. Related Information	43
A.1. Why "the Tao"?	43
A.2. Useful Email Addresses	43
A.3. Useful Documents and Files	44
A.4. Acronyms and Abbreviations Used in the Tao	44
Appendix B. IETF Guiding Principles	45
B.1. General	45
B.2. Management and Leadership	45
B.3. Process	46
B.4. Working Groups	46
B.5. Documents	47
Informative References	48

After the first edition of a draft, the number in the filename is incremented; for instance, the second edition of the S/MIME draft named above would be "draft-ietf-smime-keying-01.txt". Note that there are cases where the filename changes after one or more versions, such as when a personal effort is pulled into a Working Group; when a draft has its filename changed, the number reverts to -00. Be sure to let the Internet Drafts administrator know the previous name of the draft when such a name change occurs so that the databases can be kept accurate.

8.4. Standards-Track RFCs

The procedure for creating and advancing a standard is described in [BCP9]. After an Internet Draft has been sufficiently discussed and there is rough consensus that what it says would be a useful standard, it is presented to the IESG for consideration. If the draft is an official WG draft, the WG chair sends it to the appropriate Area Director after it has gone through Working Group last call. If the draft is an individual submission, the draft's author or editor submits it to the appropriate Area Director. BCP 9 also describes the appeals process for people who feel that a Working Group chair, an AD, or the IESG has made the wrong decision in considering the creation or advancement of a standard.

After the I-D is submitted to the IESG, the IESG announces an IETF-wide last call. This helps get the attention of people who weren't following the progress of the draft, and it can sometimes cause further changes to the draft. It is also a time when people in the WG who feel that they weren't heard can make their comments to everyone. The IETF last call is two weeks for drafts coming from WGs and four weeks for individual submissions.

If the IESG approves the draft to become an Internet standard, they ask the RFC Editor to publish it as a Proposed standard. After it has been a Proposed standard for at least six months, the RFC's author (or the appropriate WG chair) can ask for it to become a Draft standard. Before that happens, however, someone needs to convince the appropriate Area Director that there are at least two independent, interoperable implementations of each part of the standard. This is a good test of the usefulness of the standard as a whole, as well as an excellent way to check if the standard was really readable.

A few things typically happen at this point. First, it's common to find that some of the specifications in the standard need to be reworded because one implementor thought they meant one thing whereas another implementor thought they meant something else. Another common occurrence is that none of the implementations actually tried

to implement a few of the features of the standard; these features get removed not just because no one tested them but also because they weren't needed.

Don't be surprised if a particular standard doesn't progress from Proposed to Draft. In fact, most of the standards in common use are Proposed standards and never move forward. This may be because no one took the time to try to get them to Draft, or some of the normative references in the standard are still at Proposed standard, or it may be that everyone found more important things to do.

A few years after a document has been a Draft standard, it can become an Internet standard, also known as "full standard" (it can happen in as little as four months, but this is rare). This doesn't happen often, and it is usually reserved for protocols that are absolutely required for the Internet to function. The IESG goes over the document with a fine-tooth comb and looks for evidence of widespread deployment before making a Draft standard an Internet standard.

8.4.1. Telling It Like It Is -- Using MUST and SHOULD and MAY

Writing specifications that get implemented the way you want is a bit of an art. You can keep the specification very short, with just a list of requirements, but that tends to cause implementors to take too much leeway. If you instead make the specification very wordy with lots of suggestions, implementors tend to miss the requirements (and often disagree with your suggestions anyway). An optimal specification is somewhere in between.

One way to make it more likely that developers will create interoperable implementations of standards is to be clear about what's being mandated in a specification. Early RFCs used all kinds of expressions to explain what was needed, so implementors didn't always know which parts were suggestions and which were requirements. As a result, standards writers in the IETF generally agreed to limit their wording to a few specific words with a few specific meanings.

[STD3], "Requirements for Internet Hosts -- Application and Support", written way back in 1989, had a short list of words that had appeared to be useful, namely, "must", "should", and "may". These definitions were updated and further refined in [BCP14], "Key words for use in RFCs to Indicate Requirement Levels", which is widely referenced in current Internet standards. BCP 14 also specifically defines "must not" and "should not", and it lists a few synonyms for the words defined.

In a standard, in order to make it clear that you're using the definitions from BCP 14, you should do two things. First, refer to BCP 14 (although most people refer to it as RFC 2119, because that's what BCP 14 tells you to do), so that the reader knows how you're defining your words. Second, you should point out which instances of the words you are using come from BCP 14. The accepted practice for this is to capitalize the words. That is why you see "MUST" and "SHOULD" capitalized in IETF standards.

BCP 14 is a short document, and it should be read by everyone who is reading or writing IETF standards. Although the definitions of "must" and "must not" are fairly clear, the definitions of "should" and "should not" cause a great deal of discussion in many WGs. When reviewing an Internet Draft, the question is often raised, "Should that sentence have a MUST or a SHOULD in it?" This is, indeed, a very good question, because specifications shouldn't have gratuitous MUSTs, but also should not have SHOULDs where a MUST is needed for interoperability. This goes to the crux of the question of over-specifying and under-specifying requirements in standards.

8.4.2. Normative References in Standards

One aspect of writing IETF standards that trips up many novices (and quite a few long-time IETF folks) is the rule about how to make "normative references" to non-IETF documents or to other RFCs in a standard. A normative reference is a reference to a document that must be followed in order to implement the standard. A non-normative reference (sometimes called an "informative reference") is one that is helpful to an implementor but is not needed.

An IETF standard may make a normative reference to any other standards-track RFC that is at the same standards level or higher, or to any "open standard" that has been developed outside the IETF. The "same level or higher" rule means that before a standard can move from Proposed to Draft, all of the RFCs for which there is a normative reference must also be at Draft or Internet standard. This rule gives implementors assurance that everything in a Draft standard or Internet standard is quite stable, even the things referenced outside the standard. This can also delay the publication of the Draft or Internet standard by many months (sometimes even years) while the other documents catch up.

There is no hard-and-fast rule about what is an "open standard", but generally this means a stable standard that anyone can get a copy of (although they might have to pay for it) and that was made by a generally recognized standards group. If the external standard changes, you have to reference the particular instantiation of that standard in your specification, as with a designation of the date of