

INTERNET-DRAFT

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Guidelines for Writing an IANA Considerations Section in RFCs

<[draft-narten-iana-considerations-rfc2434bis-04.txt](#)>

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Abstract

Many protocols make use of identifiers consisting of constants and other well-known values. Even after a protocol has been defined and deployment has begun, new values may need to be assigned (e.g., for a new option type in DHCP, or a new encryption or authentication transform for IPsec). To ensure that such quantities have consistent values and interpretations in different implementations, their assignment must be administered by a central authority. For IETF protocols, that role is provided by the Internet Assigned Numbers Authority (IANA).

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In order for the IANA to manage a given name space prudently, it needs guidelines describing the conditions under which new values can be assigned. If the IANA is expected to play a role in the management of a name space, the IANA must be given clear and concise instructions describing that role. This document discusses issues that should be considered in formulating a policy for assigning values to a name space and provides guidelines to document authors on the specific text that must be included in documents that place demands on the IANA.

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[1.](#) Introduction

Many protocols make use of fields that contain constants and other well-known values (e.g., the Protocol field in the IP header [[IP](#)] or MIME types in mail messages [[MIME-REG](#)]). Even after a protocol has been defined and deployment has begun, new values may need to be assigned (e.g., a new option type in DHCP [[DHCP](#)] or a new encryption or authentication algorithm for IPsec [[IPSEC](#)]). To ensure that such fields have consistent values and interpretations in different implementations, their assignment must be administered by a central authority. For IETF protocols, that role is provided by the Internet Assigned Numbers Authority (IANA) [[IANA-MOU](#)].

In this document, we call the set of possible values for such a field a "name space"; its actual value may be a text string, a number or another kind of value. The assignment of a specific value to a name space is called an assigned number (or assigned value). Each assignment of a number in a name space is called a registration.

In order for the IANA to manage a given name space prudently, it needs guidelines describing the conditions under which new values should be assigned. This document provides guidelines to authors on what sort of text should be added to their documents, and reviews issues that should be considered in formulating an appropriate policy for assigning numbers to name spaces.

Not all name spaces require centralized administration. In some cases, it is possible to delegate a name space in such a way that further assignments can be made independently and with no further

(central) coordination. In the Domain Name System, for example, the IANA only deals with assignments at the higher-levels, while subdomains are administered by the organization to which the space has been delegated. As another example, Object Identifiers (OIDs) as defined by the ITU are also delegated [[ASSIGNED](#)]. When a name space can be delegated, the scope of IANA is limited to the parts of the namespace where IANA has authority.

This document uses the terms 'MUST', 'SHOULD' and 'MAY', and their negatives, in the way described in [RFC 2119](#) [[KEYWORDS](#)]. In this case, "the specification" as used by [RFC 2119](#) refers to the processing of protocols being submitted to the IETF standards process.

[2.](#) Why Management of a Name Space May be Necessary

One issue to consider in managing a name space is its size. If the space is small and limited in size, assignments must be made carefully to prevent exhaustion of the space. If the space is

essentially unlimited, on the other hand, potential exhaustion will probably not be a practical concern at all. Even when the space is essentially unlimited, however, it is usually desirable to have at least a minimal review prior to assignment in order to:

- prevent the hoarding of or unnecessary wasting of a space. For example, if the space consists of text strings, it may be desirable to prevent entities from obtaining large sets of strings that correspond to the "best" names (e.g., existing company names).
- provide a sanity check that the request actually makes sense and is necessary. Experience has shown that some level of minimal review from a subject matter expert is useful to prevent assignments in cases where the request is malformed or not actually needed (i.e., an existing assignment for an essentially equivalent service already exists).

A second consideration is whether it makes sense to delegate the name space in some manner. This route should be pursued when appropriate, as it lessens the burden on the IANA for dealing with assignments.

A third, and perhaps most important consideration, concerns potential impact on interoperability of unreviewed extensions. Proposed protocol extensions generally benefit from community review; indeed, review is often essential to prevent future interoperability problems. [[VENDOR-EXT](#)] discusses this topic in considerable detail.

In some cases, the name space is essentially unlimited and there are no potential interoperability issues; in such cases assigned numbers can safely be given out to anyone. When no subjective review is needed, the IANA can make assignments directly, provided that the IANA is given specific instructions on what types of requests it should grant, and what information must be provided as part of the request for an assigned number.

It should be noted that the IANA does not create or define assignment policy itself; rather, it carries out policies that have been defined by others, i.e., in RFCs. IANA must be given a set of guidelines that allow it to make allocation decisions with minimal subjectivity and without requiring any technical expertise with respect to the protocols that make use of a registry.

[3.](#) Designated Experts

[3.1.](#) The Motivation For Designated Experts

In most cases, some review of prospective allocations is appropriate, and the question becomes who should perform the review and what is the purpose of the review. In many cases, one might think that an IETF Working Group (WG) familiar with the name space at hand should be consulted. In practice, however, WGs eventually disband, so they cannot be considered a permanent evaluator. It is also possible for name spaces to be created through individual submission documents, for which no WG is ever formed.

One way to ensure community review of prospective assignments is to have the requester submit a document for publication as an RFC. Such an action helps ensure that the specification is publicly and permanently available, and allows some review of the specification

prior to publication and assignment of the requested code points. This is the preferred way of ensuring review, and is particularly important if any potential interoperability issues can arise. For example, many assignments are not just assignments, but also involve an element of protocol specification. A new option may define fields that need to be parsed and acted on, which (if specified poorly) may not fit cleanly with the architecture of other options or the base protocols on which they are built.

In some cases, however, the burden of publishing an RFC in order to get an assignment is excessive. However, it is generally still useful (and sometimes necessary) to discuss proposed additions on a mailing list dedicated to the purpose (e.g., the ietf-types@iana.org for media types) or on a more general mailing list (e.g., that of a current or former IETF WG). Such a mailing list provides a way for new registrations to be publicly reviewed prior to getting assigned, or to give advice for persons who want help in understanding what a proper registration should contain.

While discussion on a mailing list can provide valuable technical feedback, opinions may vary and discussions may continue for some time without clear resolution. In addition, the IANA cannot participate in all of these mailing lists and cannot determine if or when such discussions reach consensus. Therefore, the IANA relies on a "designated expert" to advise it in assignment matters. The designated expert is a single individual who is responsible for carrying out an appropriate evaluation and returning a recommendation to IANA.

It should be noted that a key motivation for having designated experts is for the IETF to provide IANA with a single-person subject matter expert to which it can delegate the evaluation process to, with that person informing IANA whether the assignment is to be made.

IANA effectively delegates evaluating the request to the IETF's designated expert.

[3.2.](#) The Role of the Designated Expert

The designated expert is responsible for initiating and coordinating as wide a review of an assignment request as appropriate to evaluate

it properly. This may involve consultation with a set of technology experts, discussion on a public mailing list, or consultation with a working group (or its mailing list if the working group has disbanded), etc. Ideally, the designated expert follows specific review criteria as documented in a related document that describes management of the namespace. (See the IANA Considerations sections of [RFC3748,[RFC3575](#),XXX] for examples that have been done for specific name spaces).

Designated experts are expected to be able to defend their decisions to the IETF community and the evaluation process is not intended to be secretive or bestow unquestioned power on the expert. Experts are expected to apply any documented review or vetting procedures that may apply, or in the absence of documented criteria, follow generally-accepted norms, e.g., those in [section 3.3](#).

[Section 5.2](#) discusses disputes and appeals in more detail.

Designated experts are appointed by the IESG (e.g., upon recommendation by the relevant Area Director). They are typically named at the time a document that creates a new numbering space is approved by the IESG, but as experts originally appointed may later become unavailable, the IESG will appoint replacements if necessary.

Since the designated experts are appointed by the IESG, they may be removed by the IESG.

[3.3](#). Designated Expert Reviews

In the seven years since [RFC 2434](#) was published and has been put to use, experience has led to the following observations:

- a designated expert must respond in a timely fashion, normally within a week for simple requests to a few weeks for more complex ones. Unreasonable delays can cause significant problems, such as when products need code points to ship. This is not to say that all reviews can be completed under a firm deadline, but they must be started, and the requester and IANA should have some transparency into the process if an answer cannot be given

- if a designated expert does not respond to IANA's requests within a reasonable period of time, either with a response, or to explain that the requests are particularly complex, and if this is a recurring event, the IANA must raise the issue with the IESG. Because of the problems caused by delayed evaluations and assignments, the IESG should take appropriate actions, such as ensuring that the expert understands their responsibilities, or appointing a new expert.
- The designated expert is not required to personally bear the burden of evaluating and deciding all requests, but acts as a sort of shepherd for the request, enlisting the help of others as appropriate. In the case that a request is denied, and rejecting the request is likely to be controversial, the expert should have the support of other subject matter experts for a particular decision. That is, the expert must be able to defend a decision to the community as a whole.

In the case where a designated expert is used, but there are no specific documented criteria for performing an evaluation, the presumption should be that a code point should be granted, unless there is a compelling reason not to. Possible reasons include:

- scarcity of codepoints, where the finite remaining codepoints should be prudently managed, or when a request for a large number of codepoints is made, when a single codepoint is the norm.
- documentation is not of sufficient clarity to evaluate or ensure interoperability
- the code point is needed for a protocol extension, but the extension is not consistent with the documented (or generally understood) architecture of the base protocol being extended, and would be harmful to the protocol if widely deployed. It is not the intent that "inconsistencies" refer to minor differences "of a personal preference nature;" instead, they refer to significant differences such as inconsistencies with the underlying security model, implying a change to the semantics of an existing message type or operation, requiring unwarranted changes in deployed systems (compared with alternate ways of achieving a similar result), etc.
- the extension would cause problems with existing deployed systems.
- the extension would conflict with one under active development by the IETF, and having both would harm rather than foster

interoperability.

[4.](#) Creating A Registry

Creating a registry involves describing the name spaces to be created together with an initial set of assignments (if appropriate) and guidelines on how future assignments are to be made.

[4.1.](#) Well-Known IANA Policy Definitions

The following are some defined policies, some of which are in use today. These cover a range of typical policies that have been used to date to describe the procedure for assigning new values in a name space. It is not required that documents use these terms; the actual requirement is that the instructions to IANA are clear and unambiguous. However, it is preferable to use these terms where possible, since their meaning is widely understood.

Private Use - For private or local use only, with the type and purpose defined by the local site. No attempt is made to prevent multiple sites from using the same value in different (and incompatible) ways. There is no need for IANA to review such assignments (since IANA does not record them) and assignments are not generally useful for broad interoperability.

Examples: Site-specific options in DHCP [DHCP] have significance only within a single site. "X-foo:" header lines in email messages.

Experimental Use - Similar to private or local use only, with the purpose being to facilitate experimentation. See [[EXPERIMENTATION](#)] for details.

Hierarchical allocation - Delegated managers can assign values provided they have been given control over that part of the name space. IANA controls the higher levels of the namespace according to one of the other policies.

Examples: DNS names, Object Identifiers, IP addresses

First Come First Served - Anyone can obtain an assigned number, so long as they provide a point of contact and a brief description of what the value would be used for together

with any other required information that is specifically required to be provided by the name space in question. For

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numbers, the exact value is generally assigned by the IANA; with names, specific text strings are usually requested.

Examples: vnd. (vendor assigned) MIME types [[MIME-REG](#)], TCP and UDP port numbers.

Expert Review (or Designated Expert) - approval by a Designated Expert is required. The required documentation and review criteria to be used by the Designated Expert should be provided when defining the registry.

Specification required - Values and their meaning must be documented in an RFC or other permanent and readily available public specification, in sufficient detail so that interoperability between independent implementations is possible. When used, Specification Required also implies useage of a Designated Expert, who will review the public specification and evaluate whether it is sufficiently clear to allow interoperable implementations.

Examples: SCSP [[SCSP](#)]

RFC Required - RFC publication (either as IETF Submission or as an RFC Editor submission [[RFC3932](#)]) suffices.

IETF Review - (Formerly called "IETF Consensus" in [IANA-CONSIDERATIONS]) New values are assigned only through RFCs that have been shepherded through the IESG as AD-Sponsored IETF Documents [[RFC3932](#),[RFC3978](#)]. The intention is that the document and proposed assignment will be reviewed by the IESG and appropriate IETF WGs (or experts, if suitable working groups no longer exist) to ensure that the proposed assignment will not negatively impact interoperability or otherwise extend IETF protocols in an inappropriate or damaging manner.

To ensure adequate community review, such documents are shepherded through the IESG as AD-sponsored documents with an IETF Last Call.

Examples: SMTP extensions [[SMTP-EXT](#)], BGP Subsequent Address Family Identifiers [[BGP4-EXT](#)].

Standards Action - Values are assigned only for Standards Track RFCs approved by the IESG.

Examples: MIME top level types [[MIME-REG](#)]

IESG Approval - New assignments may be approved by the IESG. Although there is no requirement that the request be documented in an RFC, the IESG has discretion to request documents or other supporting materials on a case-by-case basis.

IESG Approval is not intended to be used often or as a "common case;" indeed, it has seldom been used in practice during the period [RFC 2434](#) was in effect. Rather, it is intended to be available in conjunction with other policies as a fall-back mechanism in the case where one of the other allowable approval mechanisms cannot be employed in a timely fashion or for some other compelling reason. IESG Approval is not intended to circumvent the public review processes implied by other policies that could have been employed for a particular assignment.

The following guidelines are suggested for any evaluation under IESG Approval:

- The IESG can (and should) reject a request if another path is available that is more appropriate and allows broader community review
- before approving a request, the community should be consulted, via a "call for comments" that provides as much information as is reasonably possible about the request.

It should be noted that it often makes sense to partition a name space into several categories, with assignments out of each category handled differently. For example, the DHCP option space [DHCP] is

split into two parts. Option numbers in the range of 1-127 are globally unique and assigned according to the Specification Required policy described above, while options number 128-254 are "site specific", i.e., Private Use. Dividing the name space up makes it possible to have different policies in place for different ranges.

[4.2.](#) What To Put In Documents That Create A Registry

The previous sections presented some issues that should be considered in formulating a policy for assigning well-known numbers and other protocol constants. It is the Working Group and/or document author's job to formulate an appropriate policy and specify it in the appropriate document. In almost all cases, having an explicit "IANA Considerations" section is appropriate. The following subsections define what is needed for the different types of IANA actions.

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Documents that create a new name space (or modify the definition of an existing space) and that expect the IANA to play a role in maintaining that space (e.g., serving as a repository for registered values) MUST provide clear instructions on details of the name space. In particular, instructions MUST include:

- 1) The name of the registry being created and/or maintained. The name will appear on the IANA web page and will be referred to in future documents that need to allocate a value from the new space. The full name (and abbreviation, if appropriate) should be provided. Ideally, the chosen name will not be easily confusable with the name of another registry.
- 2) What information must be provided as part of a request in order to assign a new value.
- 3) The review process that will apply to all future requests for a value from the namespace.

Note: When a Designated Expert is used, documents MUST NOT name the Designated Expert in the document itself; instead, the name should be relayed to the appropriate IESG Area Director at the time the document is sent to the IESG for approval.

If the request should also be reviewed on a specific public

mailing list (such as the ietf-types@iana.org for media types), that mailing address should be specified. Note, however, that use of a Designated Expert MUST also be specified (see [Section 3](#)).

If the IANA is expected to make assignments without requiring an outside review, sufficient guidance MUST be provided so that the requests can be evaluated with minimal subjectivity.

When specifying the process for making future assignments, it is quite acceptable to pick one of the example policies listed in [Section 4.1](#) and refer to it by name. Indeed, this is the preferred mechanism in those cases where the sample policies provide the desired level of review. It is also acceptable to cite one of the above policies and include additional guidelines for what kind of considerations should be taken into account by the review process. For example, RADIUS [[RFC3575](#)] specifies the use of a Designated Expert, but includes specific additional criteria the Designated Expert should follow.

For example, a document could say something like:

This document defines a new DHCP option, entitled "FooBar" (see

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Section y), assigned a value of TBD1 from the DHCP Option space [RFCXXX]. The FooBar option also contains an 8-bit FooType field, for which IANA is to create and maintain a registry entitled "FooType values". Initial values for the FooType registry are given below; future assignments are to be made through Expert Review [[IANA-CONSIDERATIONS](#)]. Assignments consist of a name and the value.

Name	Value	Definition
----	-----	-----
Frobnitz	1	See Section y.1
NitzFrob	2	See Section y.2

For examples of documents that provide good and detailed guidance to the IANA on the issue of assigning numbers, consult [MIME-REG, MIME-LANG, [RFC3757](#), [RFC3749](#), [RFC3575](#)].

[4.3.](#) Updating Guidelines In Existing Registries

Updating the registration process for an existing name space is similar to that used when creating a new namespace. That is, a document is produced that makes reference to the existing namespace and then provides detailed management guidelines for each individual name space. Such documents are normally processed as BCPs [IETF-PROCESS].

Example documents that updated the guidelines for managing (then) pre-existing registries include: [RFC2929,[RFC3228](#),RFC3575].

[5.](#) Registering Values In An Existing Registry

[5.1.](#) What to Put In Documents When Registering Values

Often, a document requests the assignment of a code point from an already existing name space (i.e., one created by a previously-published RFC). In such cases documents should make clear:

- From what name space is a value is being requested? List the exact name space listed on the IANA web page (and RFC), and cite the RFC where the name space is defined. (Note: There is no need to mention what the allocation policy for new assignments is, as that should be clear from the references.)
- For each value being requested, give it a unique name. When the value is numeric, use the notation: TBD1, TBD2, etc. Throughout

the document where an actual IANA-assigned value should be filled in, use the "TBDx" notation. This helps ensure that the final RFC has the correct assigned value inserted in in all of the relevant places where the value is expected to be listed in the final document. For values that are text strings, a specific name can be suggested: IANA will assign the name, unless it conflicts with a name already in use.

- Normally, the values to be used are chosen by IANA; documents shouldn't pick values themselves. However, in some cases a value may have been used for testing or in early implementations. In

such cases, it is acceptable to include text suggesting what specific value should be used (together with the reason for the choice). For example, one might include the text "the value XXX is suggested as it is used in implementations". However, it should be noted that suggested values are just that; IANA will attempt to assign them, but may find that impossible, if the proposed number has already been assigned for some other use.

For many registries, IANA also has a long-standing policy prohibiting assignment of names or codes on a vanity or organization name basis, e.g., codes are always assigned sequentially unless there is a strong reason for making an exception. Nothing in this document is intended to change those policies or prevent their future application.

- The IANA Considerations section should summarize all of the IANA actions, with pointers to the relevant sections elsewhere in the document as appropriate. When multiple values are requested, it is generally helpful to include a summary table. It is also often useful for this table to be in the format of the registry data in the IANA site

As an example, the following text could be used to request assignment of a DHCPv6 option number:

IANA has assigned an option code value of TBD1 to the DNS Recursive Name Server option and an option code value of TBD2 to the Domain Search List option from the DHCP option code space defined in [section 24.3 of RFC 3315](#).

[5.2](#). Maintaining Registrations

Registrations are a request for an assigned number, including the related information needed to evaluate and document the request. Even after a number has been assigned, some types of registrations contain

additional information that may need to be updated over time. For example, MIME types, character sets, language tags, etc. typically include more information than just the registered value itself. Example information can include point of contact information,

security issues, pointers to updates, literature references, etc. In such cases, the document defining the namespace must clearly state who is responsible for maintaining and updating a registration. In different cases, it may be appropriate to specify one or more of the following:

- Let the author update the registration, subject to the same constraints and review as with new registrations.
- Allow some mechanism to attach comments to the registration, for cases where others have significant objections to claims in a registration, but the author does not agree to change the registration.
- Designate the IESG or another entity as having the right to change the registrant associated with a registration and any requirements or conditions on doing so. This is mainly to get around the problem when a registrant cannot be reached in order to make necessary updates.

5.3. Overriding Registration Procedures

Since [RFC 2434](#) was published, experience has shown that the documented IANA considerations for individual protocols do not always adequately cover the reality on the ground. For example, many older routing protocols do not have documented, detailed IANA considerations. In addition, documented IANA considerations are sometimes found to be too stringent to allow even working group documents (for which there is strong consensus) to obtain code points from IANA in advance of actual RFC publication. In other cases, the documented procedures are unclear or neglected to cover all the cases. In order to allow assignments in individual cases where there is strong IETF consensus that an allocation should go forward, but the documented procedures do not support such an assignment, the IESG is granted authority to approve assignments in such cases. The intention is not to overrule properly documented procedures, or to obviate the need for protocols to properly document their IANA Considerations. Instead, the intention is to permit assignments in individual cases where it is obvious that the assignment should just be made, but updating the IANA process just to assign a particular code point is viewed as too heavy a burden. In general, the IETF would like to see deficient IANA registration procedures for a namespace revised through the IETF standards process, but not at the

cost of unreasonable delay for needed assignments.

[6.](#) Miscellaneous Issues

[6.1.](#) When There Are No IANA Actions

Before an Internet-Draft can be published as an RFC, IANA needs to know what actions (if any) it needs to perform. Experience has shown that it is not always immediately obvious whether a document has no IANA actions, without reviewing a document in some detail. In order to make it clear to IANA that it has no actions to perform (and that the author has consciously made such a determination!), such documents should include an IANA Considerations section that states:

This document has no IANA Actions.

This statement, or an equivalent form of words, must only be inserted after the WG or individual submitter has carefully verified it to be true.

In some cases, the absence of IANA-assigned values may be considered valuable information for future readers; in other cases it may be considered of no value once the document has been approved, and may be removed before archival publication. This choice should be made clear in the draft, for example by including a sentence such as

[RFC Editor: please remove this section prior to publication.]

or

[RFC Editor: please do not remove this section.]

[6.2.](#) Appeals

Appeals on registration decisions made by the IANA can be appealed using the normal IETF appeals process as described in Section 6.5 of [\[IETF-PROCESS\]](#). Specifically, appeals should be directed to the IESG, followed (if necessary) by an appeal to the IAB, etc.

[6.3.](#) Namespaces Lacking Documented Guidance

For all existing RFCs that either explicitly or implicitly rely on

the IANA to evaluate assignments without specifying a precise

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evaluation policy, the IANA (in consultation with the IESG) will continue to decide what policy is appropriate. Changes to existing policies can always be initiated through the normal IETF consensus process.

All future RFCs that either explicitly or implicitly rely on the IANA to register or otherwise manage assignments **MUST** provide guidelines for managing the name space.

7. Security Considerations

Information that creates or updates a registration needs to be authenticated and authorized.

Information concerning possible security vulnerabilities of a protocol may change over time. Likewise, security vulnerabilities related to how an assigned number is used (e.g., if it identifies a protocol) may change as well. As new vulnerabilities are discovered, information about such vulnerabilities may need to be attached to existing registrations, so that users are not misled as to the true security issues surrounding the use of a registered number.

An analysis of security issues is required for all parameters (data types, operation codes, keywords, etc.) used in IETF protocols or registered by the IANA. All descriptions of security issues must be as accurate as possible regardless of level of registration. In particular, a statement that there are "no security issues associated with this type" must not be given when it would be more accurate to state that "the security issues associated with this type have not been assessed".

8. Open Issues

- It has been suggested that mailing lists associated with public reviews (e.g., ietf-types) should be hosted by IETF servers and should have public archives available. To what degree should we have requirements? Should we have a policy, and should it be

documented here?

- Added text to "Specification Required" stating that an Expert will be used to evaluate a spec for adequate "implementability". Is this reasonable? [IANA can't do the evaluation, as they lack the necessary time/expertise. So someone has to do it...]
- It would be good to get feedback on whether the examples of "good

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IANA Considerations" that are cited are actually good, or whether better ones are available.

9. Changes Relative to [RFC 2434](#)

Changes include:

- Major reordering of text to group the "creation of registries" text in same section, etc.
- Numerous editorial changes to improve readability.
- Change "IETF Consensus" term to "IETF Review" and added more clarifications.
- Added "RFC Required" to list of defined policies.
- Much more explicit directions and examples of "what to put in RFCs".
- "Specification Required" now implies use of Designated Expert to evaluate specs for sufficient clarity.
- no doubt other things...

9.1. Changes Relative to -00

- Revised [Section 5.3](#) to try and make it even more clear.

[9.2.](#) Changes Relative to -02

- Significantly changed the wording in [Section 3](#). Main purpose is to make clear the Expert Reviewers are accountable to the community, and to provide some guidance for review criteria in the default case.
- removed wording: "By virtue of the IAB's role as overseer of IANA administration [[RFC 1602](#)], the IAB's decision is final [[IETF-PROCESS](#)]." This document now makes no changes to existing appeal mechanisms relative to [RFC 2026](#).

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[10.](#) IANA Considerations

This document is all about IANA Considerations.

[11.](#) Acknowledgments

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