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Guidelines for Writing an IANA Considerations Section in RFCs

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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 algorithm for IPSec). To insure 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).

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 insure 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).

In this document, we call the set of possible values for such a field a "name space"; its actual content may be a name, 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 IANA only deals with assignments at the top level.

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. Issues To Consider

The primary 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 insure that the space doesn't become exhausted. If the space is essentially unlimited, on the other hand, it may be perfectly reasonable to hand out new values to anyone that wants one. Even when the space is essentially unlimited, however, it is usually desirable to have a minimal review 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 organizations from obtaining large sets of strings that correspond to the "best" names (e.g., existing company names).

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.

In some cases, the name space is essentially unlimited, and 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 before a request for an assigned number will be considered. Note that the IANA will not define an assignment policy; it should be given a set of guidelines that allow it to make allocation decisions with little subjectivity.

In most cases, some review of prospective allocations is appropriate, and the question becomes who should perform the review and how rigorous the review needs to be. 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 insure community review of prospective assignments is to have the requester submit a document for publication as an RFC. Such an action insures that the IESG and relevant WGs review the

assignment. This is the preferred way of insuring 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 expertise, opinions may vary and discussions may continue for some time without 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 cannot allow general mailing lists to fill the role of providing definitive recommendations regarding a registration question. Instead, the IANA will use a designated subject matter expert. The IANA will rely on a "designated expert" to advise it in assignment matters. That is, the IANA forwards the requests it receives to a specific point-of-contact (one or a small number of individuals) and acts upon the returned recommendation from the designated expert. The designated expert can initiate and coordinate as wide a review of an assignment request as may be necessary to evaluate it properly.

Designated experts are appointed by the relevant Area Director of the IESG. They are typically named at the time a document that creates a new numbering space is published as an RFC, but as experts originally appointed may later become unavailable, the relevant Area Director will appoint replacements if necessary.

Any decisions made by the designated expert can be appealed using the normal IETF appeals process as outlined in Section 6.5 of [IETF-PROCESS]. Since the designated experts are appointed by the IESG, they may be removed by the IESG.

The following are example policies, some of which are in use today:

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 and assignments are not generally useful for interoperability.

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

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

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

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

Expert Review - approval by a Designated Expert is required.

Specification Required - Values and their meaning must be documented in an RFC or other permanent and readily available reference, in sufficient detail so that interoperability between independent implementations is possible.

Examples: SCSP [SCSP]

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

IETF Consensus - New values are assigned through the IETF consensus process. Specifically, new assignments are made via RFCs approved by the IESG. Typically, the IESG will seek input on prospective assignments from appropriate persons (e.g., a relevant Working Group if one exists).

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]

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., Local Use. Dividing the name space up makes it possible to allow some assignments to be made with minimal review, while simultaneously reserving some part of the space for future use.

3. Registration maintenance

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 must clearly state who is responsible for maintaining and updating a registration. It is appropriate to:

- 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 authority as having the right to reassign ownership of a registration. This is mainly to get around the problem when some registration owner cannot be reached in order to make necessary updates.

4. What To Put In Documents

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 some cases, having an "IANA Considerations" section may be appropriate. Specifically, documents that create an 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 document the process through which future assignments are made. Such a section MUST state clearly:

- whether or not an application for an assigned number needs to be reviewed. If review is necessary, the review mechanism MUST be specified. 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.

- 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.

Authors SHOULD attempt to provide guidelines that allow the IANA to assign new values directly without requiring review by a Designated Expert. This can be done easily in many cases by designating a range of values for direct assignment by the IANA while simultaneously reserving a sufficient portion of the name space for future use by requiring that assignments from that space be made only after a more stringent review.

Finally, it is quite acceptable to pick one of the example policies cited above and refer to it by name. For example, a document could say something like:

> Following the policies outlined in [IANA-CONSIDERATIONS], numbers in the range 0-63 are allocated as First Come First Served, numbers between 64-240 are allocated through an IETF Consensus action and values in the range 241-255 are reserved for Private Use.

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

5. Applicability to Past and Future RFCs

For all existing RFCs that either explicitly or implicitly rely on the IANA to evaluate assignments without specifying a precise evaluation policy, the IANA will continue to decide what policy is appropriate. The default policy has been first come, first served. 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.

6. Security Considerations

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

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 mislead 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 given when it would be more accurate to state that "the security issues associated with this type have not been assessed".

7. Acknowledgments

Jon Postel and Joyce K. Reynolds provided a detailed explanation on what the IANA needs in order to manage assignments efficiently, and patiently provided comments on multiple versions of this document. Brian Carpenter provided helpful comments on earlier versions of the document. One paragraph in the Security Considerations section was borrowed from [MIME-REG].

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