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Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures

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Abstract

STD 11, RFC 822, defines a message representation protocol specifying considerable detail about US-ASCII message headers, and leaves the message content, or message body, as flat US-ASCII text. This set of documents, collectively called the Multipurpose Internet Mail Extensions, or MIME, redefines the format of messages to allow for

(1) textual message bodies in character sets other than US-ASCII,

(2) an extensible set of different formats for non-textual message bodies,

(3) multi-part message bodies, and

(4) textual header information in character sets other than US-ASCII.

These documents are based on earlier work documented in RFC 934, STD 11, and RFC 1049, but extends and revises them. Because RFC 822 said so little about message bodies, these documents are largely orthogonal to (rather than a revision of) RFC 822.

This fourth document, RFC 2048, specifies various IANA registration procedures for the following MIME facilities:

(1) media types,

(2) external body access types,

(3) content-transfer-encodings.

Registration of character sets for use in MIME is covered elsewhere and is no longer addressed by this document.

These documents are revisions of RFCs 1521 and 1522, which themselves were revisions of RFCs 1341 and 1342. An appendix in RFC 2049 describes differences and changes from previous versions.

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1. Introduction

Recent Internet protocols have been carefully designed to be easily extensible in certain areas. In particular, MIME [RFC 2045] is an open-ended framework and can accommodate additional object types, character sets, and access methods without any changes to the basic protocol. A registration process is needed, however, to ensure that the set of such values is developed in an orderly, well-specified, and public manner.

This document defines registration procedures which use the Internet Assigned Numbers Authority (IANA) as a central registry for such values.

Historical Note: The registration process for media types was initially defined in the context of the asynchronous Internet mail environment. In this mail environment there is a need to limit the number of possible media types to increase the likelihood of interoperability when the capabilities of the remote mail system are not known. As media types are used in new environments, where the proliferation of media types is not a hindrance to interoperability, the original procedure was excessively restrictive and had to be generalized.

2. Media Type Registration

Registration of a new media type or types starts with the construction of a registration proposal. Registration may occur in several different registration trees, which have different requirements as discussed below. In general, the new registration proposal is circulated and reviewed in a fashion appropriate to the tree involved. The media type is then registered if the proposal is acceptable. The following sections describe the requirements and procedures used for each of the different registration trees.

2.1. Registration Trees and Subtype Names

In order to increase the efficiency and flexibility of the registration process, different structures of subtype names may be registered to accomodate the different natural requirements for, e.g., a subtype that will be recommended for wide support and implementation by the Internet Community or a subtype that is used to move files associated with proprietary software. The following subsections define registration "trees", distinguished by the use of faceted names (e.g., names of the form "tree.subtree...type"). Note that some media types defined prior to this document do not conform to the naming conventions described below. See Appendix A for a discussion of them.

2.1.1. IETF Tree

The IETF tree is intended for types of general interest to the Internet Community. Registration in the IETF tree requires approval by the IESG and publication of the media type registration as some form of RFC.

Media types in the IETF tree are normally denoted by names that are not explicitly faceted, i.e., do not contain period (".", full stop) characters.

The "owner" of a media type registration in the IETF tree is assumed to be the IETF itself. Modification or alteration of the specification requires the same level of processing (e.g. standards track) required for the initial registration.

2.1.2. Vendor Tree

The vendor tree is used for media types associated with commercially available products. "Vendor" or "producer" are construed as equivalent and very broadly in this context.

A registration may be placed in the vendor tree by anyone who has need to interchange files associated with the particular product. However, the registration formally belongs to the vendor or organization producing the software or file format. Changes to the specification will be made at their request, as discussed in subsequent sections.

Registrations in the vendor tree will be distinguished by the leading facet "vnd.". That may be followed, at the discretion of the registration, by either a media type name from a well-known producer (e.g., "vnd.mudpie") or by an IANA-approved designation of the producer's name which is then followed by a media type or product designation (e.g., vnd.bigcompany.funnypictures).

While public exposure and review of media types to be registered in the vendor tree is not required, using the ietf-types list for review is strongly encouraged to improve the quality of those specifications. Registrations in the vendor tree may be submitted directly to the IANA.

2.1.3. Personal or Vanity Tree

Registrations for media types created experimentally or as part of products that are not distributed commercially may be registered in the personal or vanity tree. The registrations are distinguished by the leading facet "prs.".

The owner of "personal" registrations and associated specifications is the person or entity making the registration, or one to whom responsibility has been transferred as described below.

While public exposure and review of media types to be registered in the personal tree is not required, using the ietf-types list for review is strongly encouraged to improve the quality of those specifications. Registrations in the personl tree may be submitted directly to the IANA.

2.1.4. Special 'x.' Tree

For convenience and symmetry with this registration scheme, media type names with "x." as the first facet may be used for the same purposes for which names starting in "x-" are normally used. These types are unregistered, experimental, and should be used only with the active agreement of the parties exchanging them.

However, with the simplified registration procedures described above for vendor and personal trees, it should rarely, if ever, be necessary to use unregistered experimental types, and as such use of both "x-" and "x." forms is discouraged.

2.1.5. Additional Registration Trees

From time to time and as required by the community, the IANA may, with the advice and consent of the IESG, create new top-level registration trees. It is explicitly assumed that these trees may be created for external registration and management by well-known permanent bodies, such as scientific societies for media types specific to the sciences they cover. In general, the quality of review of specifications for one of these additional registration trees is expected to be equivalent to that which IETF would give to registrations in its own tree. Establishment of these new trees will be announced through RFC publication approved by the IESG.

2.2. Registration Requirements

Media type registration proposals are all expected to conform to various requirements laid out in the following sections. Note that requirement specifics sometimes vary depending on the registration tree, again as detailed in the following sections.

2.2.1. Functionality Requirement

Media types must function as an actual media format: Registration of things that are better thought of as a transfer encoding, as a character set, or as a collection of separate entities of another type, is not allowed. For example, although applications exist to decode the base64 transfer encoding [RFC 2045], base64 cannot be registered as a media type.

This requirement applies regardless of the registration tree involved.

2.2.2. Naming Requirements

All registered media types must be assigned MIME type and subtype names. The combination of these names then serves to uniquely identify the media type and the format of the subtype name identifies the registration tree.

The choice of top-level type name must take the nature of media type involved into account. For example, media normally used for representing still images should be a subtype of the image content type, whereas media capable of representing audio information belongs

under the audio content type. See RFC 2046 for additional information on the basic set of top-level types and their characteristics.

New subtypes of top-level types must conform to the restrictions of the top-level type, if any. For example, all subtypes of the multipart content type must use the same encapsulation syntax.

In some cases a new media type may not "fit" under any currently defined top-level content type. Such cases are expected to be quite rare. However, if such a case arises a new top-level type can be defined to accommodate it. Such a definition must be done via standards-track RFC; no other mechanism can be used to define additional top-level content types.

These requirements apply regardless of the registration tree involved.

2.2.3. Parameter Requirements

Media types may elect to use one or more MIME content type parameters, or some parameters may be automatically made available to the media type by virtue of being a subtype of a content type that defines a set of parameters applicable to any of its subtypes. In either case, the names, values, and meanings of any parameters must be fully specified when a media type is registered in the IETF tree, and should be specified as completely as possible when media types are registered in the vendor or personal trees.

New parameters must not be defined as a way to introduce new functionality in types registered in the IETF tree, although new parameters may be added to convey additional information that does not otherwise change existing functionality. An example of this would be a "revision" parameter to indicate a revision level of an external specification such as JPEG. Similar behavior is encouraged for media types registered in the vendor or personal trees but is not required.

2.2.4. Canonicalization and Format Requirements

All registered media types must employ a single, canonical data format, regardless of registration tree.

A precise and openly available specification of the format of each media type is required for all types registered in the IETF tree and must at a minimum be referenced by, if it isn't actually included in, the media type registration proposal itself.

The specifications of format and processing particulars may or may not be publically available for media types registered in the vendor tree, and such registration proposals are explicitly permitted to include only a specification of which software and version produce or process such media types. References to or inclusion of format specifications in registration proposals is encouraged but not required.

Format specifications are still required for registration in the personal tree, but may be either published as RFCs or otherwise deposited with IANA. The deposited specifications will meet the same criteria as those required to register a well-known TCP port and, in particular, need not be made public.

Some media types involve the use of patented technology. The registration of media types involving patented technology is specifically permitted. However, the restrictions set forth in RFC 1602 on the use of patented technology in standards-track protocols must be respected when the specification of a media type is part of a standards-track protocol.

2.2.5. Interchange Recommendations

Media types should, whenever possible, interoperate across as many systems and applications as possible. However, some media types will inevitably have problems interoperating across different platforms. Problems with different versions, byte ordering, and specifics of gateway handling can and will arise.

Universal interoperability of media types is not required, but known interoperability issues should be identified whenever possible. Publication of a media type does not require an exhaustive review of interoperability, and the interoperability considerations section is subject to continuing evaluation.

These recommendations apply regardless of the registration tree involved.

2.2.6. Security Requirements

An analysis of security issues is required for for all types registered in the IETF Tree. (This is in accordance with the basic requirements for all IETF protocols.) A similar analysis for media types registered in the vendor or personal trees is encouraged but not required. However, regardless of what security analysis has or has not been done, all descriptions of security issues must be as accurate as possible regardless of registration tree. In particular, a statement that there are "no security issues associated with this

type" must not be confused with "the security issues associates with this type have not been assessed".

There is absolutely no requirement that media types registered in any tree be secure or completely free from risks. Nevertheless, all known security risks must be identified in the registration of a media type, again regardless of registration tree.

The security considerations section of all registrations is subject to continuing evaluation and modification, and in particular may be extended by use of the "comments on media types" mechanism described in subsequent sections.

Some of the issues that should be looked at in a security analysis of a media type are:

(1) Complex media types may include provisions for directives that institute actions on a recipient's files or other resources. In many cases provision is made for originators to specify arbitrary actions in an unrestricted fashion which may then have devastating effects. See the registration of the application/postscript media type in RFC 2046 for an example of such directives and how to handle them.

(2) Complex media types may include provisions for directives that institute actions which, while not directly harmful to the recipient, may result in disclosure of information that either facilitates a subsequent attack or else violates a recipient's privacy in some way. Again, the registration of the application/postscript media type illustrates how such directives can be handled.

(3) A media type might be targeted for applications that require some sort of security assurance but not provide the necessary security mechanisms themselves. For example, a media type could be defined for storage of confidential medical information which in turn requires an external confidentiality service.

2.2.7. Usage and Implementation Non-requirements

In the asynchronous mail environment, where information on the capabilities of the remote mail agent is frequently not available to the sender, maximum interoperability is attained by restricting the number of media types used to those "common" formats expected to be widely implemented. This was asserted in the past as a reason to

limit the number of possible media types and resulted in a registration process with a significant hurdle and delay for those registering media types.

However, the need for "common" media types does not require limiting the registration of new media types. If a limited set of media types is recommended for a particular application, that should be asserted by a separate applicability statement specific for the application and/or environment.

As such, universal support and implementation of a media type is NOT a requirement for registration. If, however, a media type is explicitly intended for limited use, this should be noted in its registration.

2.2.8. Publication Requirements

Proposals for media types registered in the IETF tree must be published as RFCs. RFC publication of vendor and personal media type proposals is encouraged but not required. In all cases IANA will retain copies of all media type proposals and "publish" them as part of the media types registration tree itself.

Other than in the IETF tree, the registration of a data type does not imply endorsement, approval, or recommendation by IANA or IETF or even certification that the specification is adequate. To become Internet Standards, protocol, data objects, or whatever must go through the IETF standards process. This is too difficult and too lengthy a process for the convenient registration of media types.

The IETF tree exists for media types that do require require a substantive review and approval process with the vendor and personal trees exist for those that do not. It is expected that applicability statements for particular applications will be published from time to time that recommend implementation of, and support for, media types that have proven particularly useful in those contexts.

As discussed above, registration of a top-level type requires standards-track processing and, hence, RFC publication.

2.2.9. Additional Information

Various sorts of optional information may be included in the specification of a media type if it is available:

(1) Magic number(s) (length, octet values). Magic numbers are byte sequences that are always present and thus can be used to identify entities as being of a given media

type.

(2) File extension(s) commonly used on one or more platforms to indicate that some file containing a given type of media.

(3) Macintosh File Type code(s) (4 octets) used to label files containing a given type of media.

Such information is often quite useful to implementors and if available should be provided.

2.3. Registration Procedure

The following procedure has been implemented by the IANA for review and approval of new media types. This is not a formal standards process, but rather an administrative procedure intended to allow community comment and sanity checking without excessive time delay. For registration in the IETF tree, the normal IETF processes should be followed, treating posting of an internet-draft and announcement on the ietf-types list (as described in the next subsection) as a first step. For registrations in the vendor or personal tree, the initial review step described below may be omitted and the type registered directly by submitting the template and an explanation directly to IANA (at iana@iana.org). However, authors of vendor or personal media type specifications are encouraged to seek community review and comment whenever that is feasible.

2.3.1. Present the Media Type to the Community for Review

Send a proposed media type registration to the "ietf-types@iana.org" mailing list for a two week review period. This mailing list has been established for the purpose of reviewing proposed media and access types. Proposed media types are not formally registered and must not be used; the "x-" prefix specified in RFC 2045 can be used until registration is complete.

The intent of the public posting is to solicit comments and feedback on the choice of type/subtype name, the unambiguity of the references with respect to versions and external profiling information, and a review of any interoperability or security considerations. The submitter may submit a revised registration, or withdraw the registration completely, at any time.

2.3.2. IESG Approval

Media types registered in the IETF tree must be submitted to the IESG for approval.

2.3.3. IANA Registration

Provided that the media type meets the requirements for media types and has obtained approval that is necessary, the author may submit the registration request to the IANA, which will register the media type and make the media type registration available to the community.

2.4. Comments on Media Type Registrations

Comments on registered media types may be submitted by members of the community to IANA. These comments will be passed on to the "owner" of the media type if possible. Submitters of comments may request that their comment be attached to the media type registration itself, and if IANA approves of this the comment will be made accessible in conjunction with the type registration itself.

2.5. Location of Registered Media Type List

Media type registrations will be posted in the anonymous FTP directory "ftp://ftp.isi.edu/in-notes/iana/assignments/media-types/" and all registered media types will be listed in the periodically issued "Assigned Numbers" RFC [currently STD 2, RFC 1700]. The media type description and other supporting material may also be published as an Informational RFC by sending it to "rfc-editor@isi.edu" (please follow the instructions to RFC authors [RFC-1543]).

2.6. IANA Procedures for Registering Media Types

The IANA will only register media types in the IETF tree in response to a communication from the IESG stating that a given registration has been approved. Vendor and personal types will be registered by the IANA automatically and without any formal review as long as the following minimal conditions are met:

(1) Media types must function as an actual media format. In particular, character sets and transfer encodings may not be registered as media types.

(2) All media types must have properly formed type and subtype names. All type names must be defined by a standards-track RFC. All subtype names must be unique, must conform to the MIME grammar for such names, and must contain the proper tree prefix.

(3) Types registered in the personal tree must either provide a format specification or a pointer to one.

(4) Any security considerations given must not be obviously bogus. (It is neither possible nor necessary for the IANA to conduct a comprehensive security review of media type registrations. Nevertheless, IANA has the authority to identify obviously incompetent material and exclude it.)

2.7. Change Control

Once a media type has been published by IANA, the author may request a change to its definition. The descriptions of the different registration trees above designate the "owners" of each type of registration. The change request follows the same procedure as the registration request:

(1) Publish the revised template on the ietf-types list.

(2) Leave at least two weeks for comments.

(3) Publish using IANA after formal review if required.

Changes should be requested only when there are serious omission or errors in the published specification. When review is required, a change request may be denied if it renders entities that were valid under the previous definition invalid under the new definition.

The owner of a content type may pass responsibility for the content type to another person or agency by informing IANA and the ietf-types list; this can be done without discussion or review.

The IESG may reassign responsibility for a media type. The most common case of this will be to enable changes to be made to types where the author of the registration has died, moved out of contact or is otherwise unable to make changes that are important to the community.

Media type registrations may not be deleted; media types which are no longer believed appropriate for use can be declared OBSOLETE by a change to their "intended use" field; such media types will be clearly marked in the lists published by IANA.

2.8. Registration Template

```
To: ietf-types@iana.org
Subject: Registration of MIME media type XXX/YYY

MIME media type name:

MIME subtype name:

Required parameters:

Optional parameters:

Encoding considerations:

Security considerations:

Interoperability considerations:

Published specification:

Applications which use this media type:

Additional information:

  Magic number(s):
  File extension(s):
  Macintosh File Type Code(s):

Person & email address to contact for further information:

Intended usage:

(One of COMMON, LIMITED USE or OBSOLETE)

Author/Change controller:

(Any other information that the author deems interesting may be
added below this line.)
```

3. External Body Access Types

RFC 2046 defines the message/external-body media type, whereby a MIME entity can act as pointer to the actual body data in lieu of including the data directly in the entity body. Each message/external-body reference specifies an access type, which determines the mechanism used to retrieve the actual body data. RFC 2046 defines an initial set of access types, but allows for the

registration of additional access types to accommodate new retrieval mechanisms.

3.1. Registration Requirements

New access type specifications must conform to a number of requirements as described below.

3.1.1. Naming Requirements

Each access type must have a unique name. This name appears in the access-type parameter in the message/external-body content-type header field, and must conform to MIME content type parameter syntax.

3.1.2. Mechanism Specification Requirements

All of the protocols, transports, and procedures used by a given access type must be described, either in the specification of the access type itself or in some other publicly available specification, in sufficient detail for the access type to be implemented by any competent implementor. Use of secret and/or proprietary methods in access types are expressly prohibited. The restrictions imposed by RFC 1602 on the standardization of patented algorithms must be respected as well.

3.1.3. Publication Requirements

All access types must be described by an RFC. The RFC may be informational rather than standards-track, although standard-track review and approval are encouraged for all access types.

3.1.4. Security Requirements

Any known security issues that arise from the use of the access type must be completely and fully described. It is not required that the access type be secure or that it be free from risks, but that the known risks be identified. Publication of a new access type does not require an exhaustive security review, and the security considerations section is subject to continuing evaluation. Additional security considerations should be addressed by publishing revised versions of the access type specification.

3.2. Registration Procedure

Registration of a new access type starts with the construction of a draft of an RFC.

3.2.1. Present the Access Type to the Community

Send a proposed access type specification to the "ietf-types@iana.org" mailing list for a two week review period. This mailing list has been established for the purpose of reviewing proposed access and media types. Proposed access types are not formally registered and must not be used.

The intent of the public posting is to solicit comments and feedback on the access type specification and a review of any security considerations.

3.2.2. Access Type Reviewer

When the two week period has passed, the access type reviewer, who is appointed by the IETF Applications Area Director, either forwards the request to iana@isi.edu, or rejects it because of significant objections raised on the list.

Decisions made by the reviewer must be posted to the ietf-types mailing list within 14 days. Decisions made by the reviewer may be appealed to the IESG.

3.2.3. IANA Registration

Provided that the access type has either passed review or has been successfully appealed to the IESG, the IANA will register the access type and make the registration available to the community. The specification of the access type must also be published as an RFC. Informational RFCs are published by sending them to "rfc-editor@isi.edu" (please follow the instructions to RFC authors [RFC-1543]).

3.3. Location of Registered Access Type List

Access type registrations will be posted in the anonymous FTP directory "ftp://ftp.isi.edu/in-notes/iana/assignments/access-types/" and all registered access types will be listed in the periodically issued "Assigned Numbers" RFC [currently RFC-1700].

3.4. IANA Procedures for Registering Access Types

The identity of the access type reviewer is communicated to the IANA by the IESG. The IANA then only acts in response to access type definitions that either are approved by the access type reviewer and forwarded by the reviewer to the IANA for registration, or in response to a communication from the IESG that an access type definition appeal has overturned the access type reviewer’s ruling.

4. Transfer Encodings

Transfer encodings are tranformations applied to MIME media types after conversion to the media type's canonical form. Transfer encodings are used for several purposes:

(1) Many transports, especially message transports, can only handle data consisting of relatively short lines of text. There can also be severe restrictions on what characters can be used in these lines of text -- some transports are restricted to a small subset of US-ASCII and others cannot handle certain character sequences. Transfer encodings are used to transform binary data into textual form that can survive such transports. Examples of this sort of transfer encoding include the base64 and quoted-printable transfer encodings defined in RFC 2045.

(2) Image, audio, video, and even application entities are sometimes quite large. Compression algorithms are often quite effective in reducing the size of large entities. Transfer encodings can be used to apply general-purpose non-lossy compression algorithms to MIME entities.

(3) Transport encodings can be defined as a means of representing existing encoding formats in a MIME context.

IMPORTANT: The standardization of a large numbers of different transfer encodings is seen as a significant barrier to widespread interoperability and is expressely discouraged. Nevertheless, the following procedure has been defined to provide a means of defining additional transfer encodings, should standardization actually be justified.

4.1. Transfer Encoding Requirements

Transfer encoding specifications must conform to a number of requirements as described below.

4.1.1. Naming Requirements

Each transfer encoding must have a unique name. This name appears in the Content-Transfer-Encoding header field and must conform to the syntax of that field.

4.1.2. Algorithm Specification Requirements

All of the algorithms used in a transfer encoding (e.g. conversion to printable form, compression) must be described in their entirety in the transfer encoding specification. Use of secret and/or proprietary algorithms in standardized transfer encodings are expressly prohibited. The restrictions imposed by RFC 1602 on the standardization of patented algorithms must be respected as well.

4.1.3. Input Domain Requirements

All transfer encodings must be applicable to an arbitrary sequence of octets of any length. Dependence on particular input forms is not allowed.

It should be noted that the 7bit and 8bit encodings do not conform to this requirement. Aside from the undesireability of having specialized encodings, the intent here is to forbid the addition of additional encodings along the lines of 7bit and 8bit.

4.1.4. Output Range Requirements

There is no requirement that a particular tranfer encoding produce a particular form of encoded output. However, the output format for each transfer encoding must be fully and completely documented. In particular, each specification must clearly state whether the output format always lies within the confines of 7bit data, 8bit data, or is simply pure binary data.

4.1.5. Data Integrity and Generality Requirements

All transfer encodings must be fully invertible on any platform; it must be possible for anyone to recover the original data by performing the corresponding decoding operation. Note that this requirement effectively excludes all forms of lossy compression as well as all forms of encryption from use as a transfer encoding.

4.1.6. New Functionality Requirements

All transfer encodings must provide some sort of new functionality. Some degree of functionality overlap with previously defined transfer encodings is acceptable, but any new transfer encoding must also offer something no other transfer encoding provides.

4.2. Transfer Encoding Definition Procedure

Definition of a new transfer encoding starts with the construction of a draft of a standards-track RFC. The RFC must define the transfer encoding precisely and completely, and must also provide substantial justification for defining and standardizing a new transfer encoding. This specification must then be presented to the IESG for consideration. The IESG can

(1) reject the specification outright as being inappropriate for standardization,

(2) approve the formation of an IETF working group to work on the specification in accordance with IETF procedures, or,

(3) accept the specification as-is and put it directly on the standards track.

Transfer encoding specifications on the standards track follow normal IETF rules for standards track documents. A transfer encoding is considered to be defined and available for use once it is on the standards track.

4.3. IANA Procedures for Transfer Encoding Registration

There is no need for a special procedure for registering Transfer Encodings with the IANA. All legitimate transfer encoding registrations must appear as a standards-track RFC, so it is the IESG's responsibility to notify the IANA when a new transfer encoding has been approved.

4.4. Location of Registered Transfer Encodings List

Transfer encoding registrations will be posted in the anonymous FTP directory "ftp://ftp.isi.edu/in-notes/iana/assignments/transfer-encodings/" and all registered transfer encodings will be listed in the periodically issued "Assigned Numbers" RFC [currently RFC-1700].

5. Authors' Addresses

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Appendix A -- Grandfathered Media Types

A number of media types, registered prior to 1996, would, if registered under the guidelines in this document, be placed into either the vendor or personal trees. Reregistration of those types to reflect the appropriate trees is encouraged, but not required. Ownership and change control principles outlined in this document apply to those types as if they had been registered in the trees described above.