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Mapping between X.400 and RFC-822 Message Bodies

Status of this Memo

This RFC specifies an IAB standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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1. Introduction

The Internet community is a large collection of networks under autonomous administration, but sharing a core set of protocols. These are known as the Internet suite of protocols (or simply "TCP/IP").

Use of electronic-mail in the Internet is defined primarily by one

document, STD-11, RFC-822 [1], which defines the standard format for the exchange of messages. RFC-822 has proven immensely popular; in fact, the 822-connected Internet, is larger than the scope of the IP-connected Internet.

The framework provided by RFC-822 allows for memo-based textual messages. Each message consists of two parts: the headers and the body. The headers are analogous to the structured fields found in an inter-office memo, whilst the body is free-form. Both parts are encoded using ASCII.

Recently, the Internet Engineering Task Force (IETF) has developed an document called,

Multipurpose Internet Mail Extensions

or MIME RFC-1341. The title is actually misleading. MIME defines structure for Internet message bodies. It is not an extension to RFC-822.

Independently of this, the International standards community developed a different framework in 1984 (some say that's the problem). This framework is known as the OSI Message Handling System (MHS) or sometimes X.400.

Since the introduction of X.400(84), there has been work ongoing for defining mappings between MHS and RFC-822. The most recent work in this area is RFC-1327 [3], which focuses primarily on translation of envelope and headers. This document is complimentary to RFC-1327 as it focuses on translation of the message body. The mappings defined are largely symmetrical with respect to MIME and MHS structuring semantics, although the MIME semantics are somewhat richer. In order to provide for reversible transformations, MHS heading extensions are used to carry the additional MIME semantics.

Please send comments to the MIME-MHS mailing list:
<mime-mhs@surfnet.nl>.

2. Approach

The mappings have been specifically designed to provide optimal behavior for three different scenarios:

- (1) Allow a MIME user and an MHS user to exchange an arbitrary binary content;
- (2) Allow MIME content-types to "tunnel" through an MHS relay that is, two MIME users can exchange content-types without loss

through an MHS relay); and,

- (3) Allow MHS body parts to "tunnel" through a MIME relay that is, two MHS users can exchange body parts without loss through a MIME relay).

Other, related, scenarios can also be easily accommodated.

To facilitate the mapping process, the Internet Assigned Numbers Authority (IANA) maintains a table termed the "IANA MHS/MIME Equivalence Table". Once an enterprise has registered an OID to describe an MHS body part, it should complete a corresponding registry with the IANA for a MIME content-type/subtype. In practice, the corresponding content-type will be "application", with an appropriate choice of sub-type and possible parameters. If a new MIME content-type/subtype is registered with the IANA without a corresponding entry in the Equivalence Table, the IANA will assign it an OID, from the arc defined in this memo. See [4], section 5 for details.

The companion document, "Equivalences between 1988 X.400 and RFC-822 Message Bodies"[4], defines the initial configuration of this table. The mappings described in both this document and the companion document use the notational conventions of RFC-1327.

3. Mapping between X.400 and RFC-822 Message Bodies

MHS messages are comprised of an IPMS.heading and an IPMS.body. The IPMS.Body is a sequence of IPMS.BodyParts. An IPMS.BodyPart may be a nested message (IPMS.MessageBodyPart).

A MIME message consists of headers and a content. For the purpose of discussion, the content may be structured (multipart or message), or atomic (otherwise). An element of a structured content may be a message or a content. Both message and structured content have subtypes which do not have direct analogies in MHS.

The mapping between X.400 and RFC-822 message bodies which this document defines is symmetrical for the following cases:

- (1) any atomic body part
- (2) multipart: digest and mixed subtypes
- (3) message/rfc822

RFC-1327 specifies the mappings for headers. Section 4 describes how those mappings are modified by this document. When mapping between

an MHS body and a MIME content, the following algorithm is used:

3.1. Mapping from X.400 to RFC-822

This section replaces the text in RFC-1327 starting at the bottom of page 84,

The IPMS.Body is mapped into the RFC-822 message body. Each IPMS.BodyPart is converted to ASCII as follows:

and continuing up to and including page 86 of Section 5.3.4 of RFC-1327.

If the IPMS.Body

Body ::=
SEQUENCE OF
BodyPart

consists of a single body part, then the RFC-822 message body is constructed as the MIME content corresponding to that body part.

If the body part is an IPMS.MessageBodyPart (forwarded IPM), the mapping is applied recursively. Otherwise, to map a specific MHS body part to a MIME content-type, the IANA MHS/MIME Equivalence table is consulted. If the MHS body part is not identified in this table, then the body-part is mapped onto an "application/x400-bp" content, as specified in [4].

If the IPMS.Body consists of more than one body part, then the RFC-822 message body is constructed as a

multipart/mixed

content-type, unless all of the body parts are messages, in which case it is mapped to a

multipart/digest

content-type. Each component of the multipart content-type corresponds to a IPMS.BodyPart, preserving the ordering of the body parts in the IPMS.Body.

There is one case which gets special treatment. If the IPMS.Body consists solely of a single IA5Text body part, then the RFC822 message body is NOT marked as a MIME content. This prevents RFC822 mailers from invoking MIME function unnecessarily.

3.2. Mapping from RFC-822 to X.400

First, replace the first paragraph of Section 5.1.3 on page 72 of RFC-1327 to read as:

The IPM (IPMS Service Request) is generated according to the rules of this section. The IPMS.body usually consists of one IPMS.BodyPart of type

IPMS.IA5TextBodyPart

with

IPMS.IA5TextBodyPart.parameters.repertoire

set to the default (ia5), which contains the body of the RFC-822 message. However, if the 822.MIME-Version header field is present, a special algorithm is used to generate the IPMS.body.

Second, replace the "Comments:" paragraph on page 74 to reads as:

Comments:

If an 822.MIME-Version header field is not present,
generate an IPMS.Bodypart of type

IPMS.IA5TextBodyPart

with

IPMS.IA5TextBodyPart.parameters.repertoire

set to the default (ia5), containing the value of
the fields, preceded by the string "Comments: ".
This body part shall precede the other one.

Third, add the remainder of this section to the end of Section 5.1.3 of RFC-1327.

If the 822.MIME-Version header field is present, the following mapping rules are used to generate the IPMS.body.

If the MIME content-type is one of:

- (1) any atomic body part
- (2) multipart: digest and mixed subtypes

(3) message/rfc822

then the symmetric mapping applies as described in Section 6.1. Note that the multipart content-types should be marked with the IPMS HeadingExtension described below.

Otherwise, three cases remain, which are discussed in turn.

3.2.1. Asymmetric Mappings

3.2.1.1. Message/External-Body

This is mapped into a mime-body-part, as specified in [4].

3.2.1.2. Message/Partial

This is mapped onto a message, and the following heading extension is used. The extension is derived from the message/partial parameters:

```
partial-message  HEADING-EXTENSION
                  VALUE PartialMessage
                  ::= id-hex-partial-message

PartialMessage ::=
  SEQUENCE {
    number  INTEGER,
    total   INTEGER,
    id      IA5String
  }
```

If this heading is present when mapping from MHS to MIME, then a message/partial should be generated.

3.2.1.3. Nested Multipart Content-types

In MIME, a multipart content refers to a set of content-types, not a message with a set of content-types. However, a nested multipart content will always be mapped to an IPMS.MessageBodyPart, with an IPMS.BodyPart for each contained content-type.

The only mandatory field in the heading is the IPMS.this-IPM, which must always be generated (by the gateway). A IPMS.subject field should also be generated where there is no "real" heading. This will present useful information to the non-MIME capable X.400(88) and to all X.400(84) UAs.

The IPM.subject fields for the various types are:

```
mixed:      "Multipart Message"
alternative: "Alternate Body Parts containing the same information"
digest:     "Message Digest"
parallel:    "Body Parts to be interpreted in parallel"
```

3.2.2. Multipart IPMS Heading Extension

The following IPMS.HeadingExtension should be generated for all multipart content-types, with the enumerated value set according to the subtype:

```
multipart-message HEADING-EXTENSION
  VALUE MultipartType
  ::= id-hex-multipart-message

MultipartType ::=
  ENUMERATED {
    mixed(1),
    alternative(2),
    digest(3),
    parallel(4)
  }
```

If this heading is present when mapping from MHS to MIME, then the appropriate multipart content-type should be generated.

4. Mapping between X.400 and RFC-822 Message Headers

Replace the first paragraph of Section 3.3.4 on page 26 of RFC-1327 to read as:

In cases where T.61 strings are used only for conveying human-interpreted information, the aim of this mapping is to render the characters appropriately in the remote character set, rather than to maximize reversibility. For these cases, the following steps are followed to find an appropriate encoding:

- 1) If all the characters in the string are contained within the ASCII repertoire, the string is simply copied.
- 2) If all the characters in the string are from an IANA-registered character set, then the appropriate encoded-word(s) according to [5] are generated instead.
- 3) If the characters in the string are from a character set which is not registered with the IANA, then the mappings to IA5 defined in CCITT Recommendation X.408 (1988) shall be used

[CCITT/ISO88a]. These will then be encoded in ASCII.

This approach will only be used for human-readable information (Subject and FreeForm Name).

When mapping from an RFC-822 header, when an encoded-word (as defined in [5]) is encountered:

- 1) If all the characters contained therein are mappable to T.61, the string content shall be converted into T.61.
- 2) Otherwise, the encoded-word shall be copied directly into the T.61 string.

Modify procedure "2a" on page 56 of RFC-1327 to read as:

If the IPMS.ORDescriptor.free-form-name is present, convert it to ASCII or T.61 (Section 3.3.4), and use this as the 822.phrase component of the 822.mailbox construct.

Modify the final paragraph of procedure "2" on page 55 of RFC-1327 to read as:

The string is then encoded into T.61 or ASCII using a human-oriented mapping (as described in Section 3.3.4). If the string is not null, it is assigned to IPMS.ORDescriptor.free-form.name.

Modify the second paragraph of procedure "3" on page 55 of RFC-1327 to read as:

If the 822.group construct is present, any included 822.mailbox is encoded as above to generate a separate IPMS.ORDescriptor. The 822.group is mapped to T.61 or ASCII (as described in Section 3.3.4), and an IPMS.ORDescriptor with only a free-form-name component is built from it.

Modify procedure "822.Subject" on page 62 of RFC-1327 to read as:

Mapped to IPMS.Heading.subject. The field-body uses the human-oriented mapping referenced in Section 3.3.4.

Modify procedure "IPMS.Heading.subject" on page 71 of RFC-1327 to read as:

Mapped to "Subject:". The contents are converted to ASCII or T.61 (Section 3.3.4). Any CRLF are not mapped, but are used as points at which the subject field must be folded.

5. OID Assignments

MIME-MHS DEFINITIONS ::= BEGIN

mail OBJECT IDENTIFIER ::= { internet 7 }

mime-mhs OBJECT IDENTIFIER ::= { mail 1 }

mime-mhs-headings OBJECT IDENTIFIER ::= { mime-mhs 1 }

id-hex-partial-message OBJECT IDENTIFIER ::=
{ mime-mhs-headings 1 }

id-hex-multipart-message OBJECT IDENTIFIER ::=
{ mime-mhs-headings 2 }

mime-mhs-bodies OBJECT IDENTIFIER ::= { mime-mhs 2 }

END

6. Security Considerations

There are no explicit security provisions in this document. However, a warning is in order. This document maps two mechanisms between RFC822 and X.400 that could cause problems. The first is the transfer of binary files. The inherent risks are well known and won't be reiterated here. The second is the propagation of strong content typing. The typing can be used to automatically "launch" or initiate applications against those contents. Any such launching leaves the invoker vulnerable to application-specific viruses; for example, a spreadsheet macro or Postscript command that deletes files. See [2], Section 7.4.2 for a Postscript-specific discussion of this issue.

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- [2] Borenstein, N., and N. Freed, "MIME: Mechanisms for Specifying and Describing the Format of Internet Message Bodies", RFC 1341, Bellcore, Innosoft, June 1992.
- [3] Hardcastle-Kille, S., "Mapping between X.400(1988) / ISO 10021 and RFC-822", RFC 1327, University College London, May 1992.
- [4] Alvestrand, H., and S. Thompson, "Equivalences between 1988 X.400 and RFC-822 Message Bodies", RFC 1494, SINTEF DELAB, Soft*Switch, Inc., August 1993.
- [5] Moore, K., "Representation of Non-ASCII Text in Internet Message Headers Message Bodies", RFC 1342, University of Tennessee, June 1992.