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        Downgrading mechanism for Internationalized eMail Address (IMA)
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Abstract

   Traditional mail system handles only US-ASCII characters in SMTP
   envelope and mail headers. The Internationalized eMail Address (IMA)
   is implemented by allowing UTF-8 characters in SMTP envelope and mail
   headers. To deliver IMA through IMA incompliant environment, some
   sort of converting mechanism (i.e. downgrading) is required. This
   document describes requirements for downgrading, SMTP session
   downgrade, header downgrade and implementation consideration.

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1. Introduction

Traditional mail system which is defined by [RFC2821] and [RFC2822]
allows US-ASCII characters in SMTP envelop and mail headers. IMA
proposal [IMA-Framework],[IMA-UTF8], [IMA-SMTPext] allows UTF-8
characters in SMTP envelop and mail headers.

Carrying IMA from sender to recipients requires all components on the
mail delivery route are IMA compliant. Otherwise IMA can't be
delivered. To solve the problem, this document describes downgrade
mechanism that enables delivering IMA by converting it to
corresponding US-ASCII representation on current mail delivery
system. Not only SMTP envelope, but also UTF-8 in mail headers MUST
be converted to US-ASCII.

Converting IMA to US-ASCII SHOULD base on algorithmic method which is
proposed by [IMA-SMTPext].

Downgrading in IMA consists from following two parts:
o SMTP session downgrade
o header downgrade

In this document, requirements for downgrading is described in
section Section 3, SMTP session downgrade is described in Section 4,
and header downgrade is described in Section 5.

2. Terminology

This document assumes a reasonable understanding of the protocols and
terminology of the core email standards as documented in [RFC2821]
and [RFC2822].

Much of the description in this document depends on the abstractions
of "Mail Transfer Agent" ("MTA") and "Mail User Agent" ("MUA").
However, it is important to understand that those terms and the
underlying concepts postdate the design of the Internet's email
architecture and the "protocols on the wire" principle. That email
architecture, as it has evolved, and the "wire" principle have
prevented any strong and standardized distinctions about how MTAs and
MUAs interact on a given origin or destination host (or even whether
they are separate).

The final ("delivery") MTA stores Mail messages in a "message store"
or resends messages where the receiver has assigned. In this
document, this function is called Mail Delivery Agent(MDA).

In this document, an address is "all-ASCII" if every character in the

address is in the ASCII character repertoire [ASCII]; an address is
"non-ASCII" if any character is not in the ASCII character
repertoire. The term "all-ASCII" is also applied to other protocol
elements when the distinction is important, with "non-ASCII" or
"internationalized" as its opposite.

The key words "MUST", "SHALL", "REQUIRED", "SHOULD", "RECOMMENDED",
and "MAY" in this document are to be interpreted as described in RFC
2119 [RFC2119].

3. Downgrade Requirements

3.1. Timing and conditions of downgrading

This section describes timing and conditions of downgrading.
o Timing: SMTP client detects SMTP server doesn't support "IEmail"
   option at EHLO. [IMA-SMTPext]
o Conditions: SMTP client detects UTF-8 is included in SMTP envelope
   or mail headers.

Note that SMTP client SHOULD check headers in outgoing SMTP DATA
whether they include 8bit (UTF-8) data.

3.2. Mail Header Downgrading

Target of downgrading elements in mail headers (SMTP data) are below:

Originator address(es): IMA in From, Reply-To and Sender and their
   Resent- headers MUST be target of downgrading.
Destination address(es): IMA in To and Cc and their Recent- headers
   MUST be target of downgrading.
IDs: IDs such as Message-ID, In-Reply-To and Referenece MUST NOT be
   target of downgrading.
other headers: UTF-8 in other headers such as Subject and Received
   SHOULD be target of downgrading.

3.3. Requirements

1. Downgrading MUST be performed only once.
2. Upgrading MUST be performed at minimized place such as final
    destination like receipient MUA.
3. Downgrading and upgrading MUST be automated.
4. Downgrading and upgrading MUST be easy and lightweight as it is
    possible to do with MTA like 8BITMIME encapsulation.
5. Downgrade and upgrade method MUST be defined clearly.

   6. Downgrading and upgrading MUST preserve all header information.
   7. Downgrading MUST support sender authentication header checking
       such as SPF and DomainKeys/DKIM.
   8. Downgrading occurrence MUST be recorded.

[4](). **SMTP Downgrading**

   Downgrading MUST be performed in each SMTP session. Target of
   downgrading elements in SMTP envelope are below:

   o MAIL FROM:
   o RCPT TO:

   Downgrading in SMTP envelope uses ALT-ADDR and ATOMIC option proposed
   in [IMA-SMTPext].

   MUA of mail sender MUST append ALT-ADDR or ATOMIC option to all
   envelope from (MAIL FROM) and envelope to (RCPT TO) to denote
   alternative US-ASCII address when sending mail.

   When MUA/MTA is transfering mail and finds its envelope is IMA, it
   MUST decide to bounce or downgrade if receiving MTA is IMA
   incompliant.

   Further, even if no downgrading is performed for envelope from/to,
   MUA/MTA SHOULD downgrade headers including UTF-8. This is described
   in next session.

   MTA MAY downgrade messages that envelope from/to of IMA have ALT-ADDR
   with alternative US-ASCII address or ATOMIC is "y".

   MTA generates alternative US-ASCII address when ALT-ADDR option is
   not specified and ATOMIC is "y".

   Alternative US-ASCII address generation algorithms are below:
   domain-part: Punycode/IDNA
   local-part: Punycode without normalization. Prefix MUST be assigned
      by IANA (which is not "xn--").

   MTA replaces IMA with specified or generated alternative US-ASCII
   address. Then appends replaced information with IMA-Downgraded-From
   and IMA-Downgraded-To header in mail header (outgoing SMTP DATA).
      IMA-Downgraded-From: <IMA> <US-ASCII>
      IMA-Downgraded-To: <IMA> <US-ASCII>

   Note that when downgrading, not to disclose whole recipient address,
   MUA/MTA SHOULD make SMTP connection per each receeipient address.

   Also note that by appending IMA-Downgraded-From/To headers, MUA/MTA
   MUST perform SMTP/Header downgrading. This is described in next
   section.

   Downgraded envelope to is parsed only in MDA and delived to final
   mailbox.

   Case study: SPF check

   SPF checks envelope from's domainname and smtp connection IP address.
   If ALT-ADDR's domainname is Punycode/IDNA of IMA domainname, it is
   equal to SPF/IMA (need to define). In this case, SPF check will be
   performed correctly. Otherwise, more detailed consideration is
   required.

5. **SMTP DATA/Header downgrading**

   In this section, two methods for SMTP DATA/Header downgrading is
   proposed. One is to encapsulate whole data, and other is to
   translate header by header.

5.1. **Downgrading with MIME encapsulation**

   This downgrade method requires new MIME 'Content-Type:' which express
   EAI(Email Address Internationalization). This document assumes
   'Content-Type: Message/EAI' existence.

   Downgrade/Encoding
      * If mail header contains UTF-8 data, downgrade whole message to
         be MIME encoded. Whole message becomes new MIME part (Message/
         EAI).
      * Originator Addresses (From, Sender, etc.), Destination
         Addresses (To, CC, etc.), IDs (Message-ID, etc.), Subject, Date
         headers are copied from original header.
      * If From header contains IMA, it is replaced with downgraded
         Envelope-from.
      * If To or CC headers contain IMA, they are replaced with single
         downgraded envelope-to as To header.
      * If Subject header contains UTF-8, it is rewrited to a certain
         message or encoded by RFC2047.
      * Message-ID, Date headers are preserved.
      As a result, new body contains one MIME part (Message/EAI).

    Encoding example

```
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: Multipart/Mixed;
    boundary="--Next_Part(unique_string)--"
Content-Transfer-Encoding: 8bit
Subject: DOWNGRADED_SUBJECT
From: DOWNGRADED_FROM
To: DOWNGRADED_TO
Date: DATE

----Next_Part(unique_string)--
Content-Type: Message/EAI
Content-Transfer-Encoding: 8bit
Content-Disposition: inline

ENTIRE_ORIGINAL_MAIL
IMA-Downgraded-From: <IMA> <DOWNGRADED_FROM>
IMA-Downgraded-To: <IMA> <DOWNGRADED_TO>
Received: ...
Received: ...
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Subject: UTF-8_SUBJECT
From: IMA
To: IMA
Date: DATE

MAIL_BODY

----Next_Part(unique_string)----
```

    Figure 1

Upgrade/Decode
    * If mail message contains only one MIME part and its Content-
       Type is 'Message/EAI', it may be downgraded. To check if
       downgraded, compare mail body's message-id and MIME part's
       message-id. If message-ids are same, it is downgraded message.
       Then, treat MIME part as entire mail message.
    * When checking trace field, checker SHOULD check Received header
       both in wrapping headers and headers in encapsulated part.

Case study: DomainKeys/DKIM

DomainKeys/DKIM checker performs upgrade/decode downgraded message
first.

Pros:
     * MTA does not need to decode each headers carefully.
     * Whole headers can be submitted AS IS.
Cons:
     * IMA from/to can not distinguish from encoded mail headers.
     * IMA incompliant MUA can not treat encoded message.

5.2. Header conversion

Define conversion method to US-ASCII for all headers which contains
IMA.

Each header has its own downgrading method. Basically, MIME encoding
of RFC 2047. Receipient/Sender addresses and Received headers which
may contain IMA need special processing.

Downgrading mail addresses in mail header: Extract every addr-spec
     [RFC2822] of mailboxes from mail headers including UTF-8. For
     each addr-spec, if it includes UTF-8, convert it into ACE with the
     same method described in Section 4. Original IMA SHOULD remain as
     a comment encoded by base64 of MIME with UTF-8 tag. Note that
     some special characters in addr-spec MUST be escaped. If mailbox
     elements except for addr-spec include UTF-8, those MUST be encoded
     by base64 with UTF-8 tag.
Downgrading other data: Encode UTF-8 part of headers by base64 of
     MIME with UTF-8 tag.

Pros:
     * IMA incompliant MUA can display mail body except for original
        IMA from/to.
Cons:
     * Implementation is difficult because MUA/MTA must parse each
        header and encode it by defined method.
     * Hard to preserve whole information AS IS. Therefore, to check
        DomainKeys/DKIM requires special consideration.

6. Implementation consideration

6.1. MUA

IMA compliant MUA MUST implement downgrade mechanism for sending.

MUA MAY encode UTF-8 in Subject header with the same encoding of body
part while downgrading.

IMA compliant MUA MUST decode downgraded mail and MUST show IMA on
display.

6.2. MDA Requirements

   This section describes downgrading in MDA.
   1. MDA MUST NOT convert downgraded header to UTF-8.
   2. Record Return-Path header in ACE form.
   3. Perform downgrading for each Storage/Back-end-Process. If and
       only if MDA knows MUA is IMA compliant, then no downgrading is
       performed.
   4. If MDA detects that SMTP recipient address is downgraded IMA,
       then MDA MUST decode IMA and perform the same processing as if it
       were IMA. MDA MAY normalize or canonicalize local-part before
       processing it.

7. Security considerations

   See the extended security considerations discussion in [IMA-
   Framework]

8. IANA Considerations

   To distinguish downgraded IMA in ACE form, it MUST have ACE-Prefix.
   The ACE-Prefix MUST be differ from IDNA ACE-Prefix to avoid possible
   confusion. IANA will assign IMA ACE-Prefix when RFC is published.

9. Acknowledgements

   John Klensin, Harald Alvestrand, Yangwoo Ko, YAO Jiankang, Jeff Yeh,
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