draft-ietf-eai-downgrade-01

Downgrading Mechanism for Email Address Internationalization (EAI)

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Changes from Dallas
(draft-yoneya-ima-downgrade-01)

- Followed to current draft and Beijing discussion
  - draft-ietf-eai-framework-01.txt
    - refer to Terminology section
  - draft-ietf-eai-smtpext-00.txt
  - draft-ietf-eai-utf8headers-00.txt
    - followed new header format (it is under discussion now)
      - <non-ascii,ascii>, <non-ascii,atomic>, i-Email: 1.0
  - Received header does not contain Non-ASCII.
- Improved header conversion downgrading method

Overview of Downgrade document

- Downgrading requirements
- SMTP Envelope downgrading
- SMTP Header downgrading
  - Alternative three proposals
    - No header downgrading
    - Downgrading with MIME encapsulation
    - Header conversion
- MDA requirements

Downgrading Overview

- When SMTP session contains Non-ASCII mail addresses
  - SMTP Envelope contains Non-ASCII mail address (described in smtpext doc)
  - Mail header in SMTP data contains Non-ASCII mail address or UTF-8 raw string (described in utf8header doc)
- MUA/MTA decides to downgrade or bounce if SMTP server (next MTA) does not support EAI extension (described in smtpext doc)

- Downgrading is separated to two processes.
  - SMTP Downgrading
  - Mail Header Downgrading

SMTP Downgrading

SMTP Downgrading (1)

- SMTP downgrading is performed for each envelope-from and envelope-to pair
  - Multiple recipient session is separated by SMTP downgrading.
- Condition to downgrade is for each Non-ASCII mail address in the SMTP Envelope,
  - ALT-ADDR with US-ASCII address is specified, or
  - ATOMIC y is specified

SMTP Downgrading (2)

- MTA replaces Non-ASCII mail address with specified or algorithmic generated US-ASCII address

- MTA generates algorithmic US-ASCII address (ALG-ASCII) if no ALT-ADDR option and “ATOMIC y“ is specified

Algorithmic US-ASCII address [ALG-ASCII]

- domain-part: Punycode/IDNA [RFC3490]
- local-part: Encode the local-part string in Punycode[RFC3492] without normalization and prepend the ACE prefix.
  - The prefix MUST be assigned by IANA (which is not "xn--")
  - [STRINGPREP profile should be described]

SMTP Downgrading (3)

- MTA Appends replaced information with

  IMA-Downgraded-From: and

  IMA-Downgraded-To: header to mail header
  - EAI-Downgraded-From: <non-ascii,ascii> <ascii>
  - EAI-Downgraded-From: <non-ascii,atomic> <ascii>
  - EAI-Downgraded-To: <non-ascii,ascii> <ascii>
  - EAI-Downgraded-To: <non-ascii,ascii> <ascii>

- SMTP Downgrading is performed for each envelope from/to pair, only one EAI-Downgraded-To: header is recorded.

Downgrading example

- Red part contains UTF-8.
- Blue part shows changed parts.

- FROM: NON-ASCII with US-ASCII
  - NON-ASCII-FROM, ASCII-FROM
- TO: NON-ASCII with US-ASCII
  - NON-ASCII-TO, ASCII-TO
- CC: NON-ASCII with ATOMIC y
  - NON-ASCII-CC, ALG-ASCII-CC
- Subject: UTF-8
  - UTF-8_SUBJECT

Example (Original EAI session)

MAIL From: <NON-ASCII-FROM> ALT-ADDR <ASCII-FROM>
RCPT TO: <NON-ASCII-TO> ALT-ADDR <ASCII-TO>
RCPT TO: <NON-ASCII-CC> ATOMIC y

i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

Example (after smtp downgrading) session 1

MAIL From: <ASCII-FROM>
RCPT TO: <ASCII-TO>

EAI-Downgraded-From: <NON-ASCII-FROM,ASCII-FROM> <ASCII-FROM>
EAI-Downgraded-To: <NON-ASCII-TO,ASCII-TO> <ASCII-TO>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

Example (after smtp downgrading) session 2

MAIL From: <ASCII-FROM>
RCPT TO: <ALG-ASCII-CC>

EAI-Downgraded-From: <NON-ASCII-FROM,ASCII-FROM> <ASCII-FROM>
EAI-Downgraded-To: <NON-ASCII-CC,atomic> <ALG-ASCII-CC>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

Mail Header Downgrading

Mail Header Downgrading

- Three alternatives
  - No header downgrading
    - Introduced in draft-ietf-eai-downgrade-00
    - This may break existing mail infrastructure.
  - Downgrading with MIME encapsulation
    - Introduced in draft-yoneya-ima-downgrade-01
  - Header conversion
    - Introduced in draft-yoneya-ima-downgrade-00
    - updated in draft-ietf-eai-downgrade-01

MIME encapsulation

- Introduction of new content-type
  - 'Content-Type: Message/EAI‘ is assumed
- Encoding
  - Downgrade whole message (without Received: header) to be MIME encoded and becomes new MIME part (Message/EAI)
  - Copy Date: , Message-ID: , Received: headers
  - Generate From: , To: header from the envelope-from/to.
- Upgrading
  - If mail message contains only one MIME part and its Content-Type is 'Message/EAI', it may be downgraded
  - If mail body’s message-id and MIME part’s message-id are the same, it is downgraded message
  - Treat MIME part as entire mail message
- This method can preserve all headers and easy to implement

Example (Original EAI session)

MAIL From: <NON-ASCII-FROM> ALT-ADDR <ASCII-FROM>
RCPT TO: <NON-ASCII-TO> ALT-ADDR <ASCII-TO>
RCPT TO: <NON-ASCII-CC> ATOMIC y

i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

MIME Encapsulation Example (after smtp downgrading, session 1)

MAIL From: <ASCII-FROM>
RCPT TO: <ASCII-TO>

EAI-Downgraded-From: <NON-ASCII-FROM,ASCII-FROM> <ASCII-FROM>
EAI-Downgraded-To: <NON-ASCII-TO,ASCII-TO> <ASCII-TO>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

MIME encapsulation Example (header)

From:,To: is generated from envelope addresses.
CC: is not generated.

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: <ASCII-FROM>
To: <ASCII-TO>
Date: DATE

MIME encapsulation Example (mail body)

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

EAI-Downgraded-From: <NON-ASCII-FROM,ASCII-FROM> <ASCII-FROM>
EAI-Downgraded-To: <NON-ASCII-TO,ASCII-TO> <ASCII-TO>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

MIME Encapsulation Pros and Cons

- Pros:
  - MTA does not need to decode each header carefully.
  - Whole headers can be submitted AS IS.
- Cons:
  - Non-ASCII From:/To: can not distinguish from downgraded mail headers.
  - EAI incompliant MUA can not treat any downgraded mail (with unknown MIME type error).
    - EAI compliant MUA can display and reply correctly.

MIME encapsulation scenario evaluation (1)

- 2.1, 2.2 Two/Three i18nmail user
  - If downgradable (A,B,C has corresponding ASCII address), both user's MUA decode downgraded message.
  - Can reply correctly.
- 2.3 i18n mailing list
  - If the sender's mail is downgradable,
  - The mailing list upgrades the downgraded mail.
  - I18n user's MUA upgrades the downgraded mail.
- 2.4. One i18mail user sends to one ascii user
  - The sender specifies i18mail address with corresponding ascii mail address. Then the mail is downgradable.
  - EAI capable MUA can display downgraded message and ascii user can reply correctly.
  - EAI incapable MUA cannot display downgraded message and ascii user cannot reply.

MIME encapsulation scenario evaluation (2)

- 2.5 An i18mail user sends to one ascii user and one i18mail user
  - A sends to B and X; both reply
  - If the sender A specifies A and B address with corresponding ASCII address, the mail is downgradable.
    - Message received by B is not downgraded (or B's MUA upgrades downgraded message).
    - B can reply to A and X.
    - Message received by X is downgraded and X's MUA cannot display downgraded message.
    - If X's MUA is EAI compliant, it can upgrade the downgraded message and reply correctly.
- 2.6. An i18mail user sends to a mailing list with a mix of users
  - A sends to L, and L has B and X as subscribers. B and X reply.
  - If the sender A and mailing list L specifies i18mail address with corresponding ASCII address, the mail is downgradable.
    - ASCII user X can not read the downgraded mail with EAI incompliant MUA.
    - Using EAI compliant MUA, ASCII user X can read and reply the downgraded mail.

MIME Encapsulation scenario evaluation(3)

- Scenario evaluation
  - EAI incompliant MUA cannot display entire downgraded mail message.
  - EAI compliant MUA can display and reply correctly.

Header conversion

- This header downgrading method is converting all headers which contains Non-ASCII characters to become ASCII string.
- Added Downgraded header for header preservation.
  - Downgraded: HeaderName: MIME encoded HeaderValue
- Each header has its own downgrading method.

Header Conversion
each header downgrading method

- Address headers which contains sender/recipient mail addresses
  - From:, To:, CC:, Sender:, Reply-To:, Resent-From:, Resent-To:, Resent-CC:
  - Apply address header downgrading method (described in next slide)
- EAI identification header “i-Email”
  - Preserve it in Downgraded header
- ASCII only headers
  - Received:, Date:, Message-ID:, References:, ...
  - preserve as is
- Other headers which may contain UTF-8 string as text data.
  - Subject:, X-*:, List-*:, EAI-Downgraded-From:, EAI-Downgraded-To:, …
  - Encode the header in MIME[RFC2047] with UTF-8 tag

Header conversion: Address header downgrading (1)

- EAI mailbox name field is defined in utf8header document
  - display-name <NON-ASCII>
    - remove this field
  - display-name <NON-ASCII,US-ASCII>
    - encode display-name in MIME if necessary
    - replace the angle-addr to “<US-ASCII>”
  - display-name <NON-ASCII,ATOMIC>
    - encode display-name in MIME if necessary
    - generate algorithmic US-ASCII address [ALG-ASCII]
    - replace the angle-addr to “<ALG-ASCII>
  - display-name <US-ASCII>
    - encode display-name in MIME if necessary

Header conversion: Address header downgrading(2)

- If each address header contains NON-ASCII characters
  - Extract each <mailbox> field and downgrade it.
  - If all header fields are removed, remove the header
  - If From: header is removed, generate new From: header from envelope from.

Header conversion: downgrading

- Preserve ‘i-Email:’ header in ‘Downgraded’ header.
- For all headers, check if they contain UTF-8 characters.
- If each header contains UTF-8 characters,
  - If the header is the address header
    - Preserve it in Downgraded: header, and
    - Downgrade it
  - Another header
    - Encode it by MIME[RFC2047]

Header conversion: upgrading

1. If the mail has Downgraded: header, it is a downgraded EAI mail message.
   – Checking “Downgraded: i-Email: 1.0” header may be required
2. Decode all Downgraded header

   [2.1] If the header is the address header,

   [2.1.1] Apply address header downgrading to the decoded header

   [2.1.2] Remove the header line which is the same to the downgraded line.

   [2.2] Replace the Downgraded header with the corresponding decoded header.
3. If each header has MIME encoded part and its encoding is “UTF-8”, it may be a downgraded header, so decode it.

Header conversion
Example (Original EAI message)

i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

Header Conversion Example (after smtp downgrading, session 1)

MAIL From: <ASCII-FROM>
RCPT TO: <ASCII-TO>

EAI-Downgraded-From: <NON-ASCII-FROM,ASCII-FROM> <ASCII-FROM>
EAI-Downgraded-To: <NON-ASCII-TO,ASCII-TO> <ASCII-TO>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,atomic>
Date: DATE

MAIL_BODY

Header conversion
Example (after header downgrading)

EAI-Downgraded-From: MIME(<NON-ASCII-FROM,ASCII-FROM>) <ASCII-FROM>
EAI-Downgraded-To: MIME(<NON-ASCII-TO,ASCII-TO>) <ASCII-TO>
Downgraded: i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: MIME(UTF-8_SUBJECT)
Downgraded: From: MIME(<NON-ASCII-FROM,ASCII-FROM>)
From: <ASCII-FROM>
Downgraded: To: MIME(<NON-ASCII-TO,ASCII-TO>)
To: <ASCII-TO>
Downgraded: CC: MIME(<NON-ASCII-CC,atomic>)
CC: <ALG-ASCII-CC>
Date: DATE

MAIL_BODY

Header conversion
Example (upgrading 1)

Pick “Downgraded:” headers

1. Downgraded: i-Email: 1.0
2. Downgraded: From: MIME(<NON-ASCII-FROM,ASCII-FROM>)
3. Downgraded: To: MIME(<NON-ASCII-TO,ASCII-TO>)
4. Downgraded: CC: MIME(<NON-ASCII-CC,atomic>)

Decode Downgraded: headers [2] (decoded downgraded headers)

1. i-Email: 1.0
2. From: <NON-ASCII-FROM,ASCII-FROM>
3. To: <NON-ASCII-TO,ASCII-TO>
4. CC: <NON-ASCII-CC,atomic>

2,3,4 is address headers. Apply address header downgrading for decoded address headers [2.1.1] (reproduced downgraded headers)

2. From: <ASCII-FROM>
3. To: <ASCII-TO>
4. CC: <ALG-ASCII-CC>

Header conversion Example (upgrading 2)

Remove the header line which is the same to the reproduced downgraded headers [2.1.2]
Replace Downgraded headers with decoded downgraded headers.[2.2]
As a result, address headers are restored.

EAI-Downgraded-From:
  MIME(<Non-ASCII,DOWNGRADED_FROM>) <DOWNGRADED_FROM>
EAI-Downgraded-To:
  MIME(<Non-ASCII,DOWNGRADED_TO>) <DOWNGRADED_TO>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: MIME(UTF-8_SUBJECT)
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,ASCII-CC>
Date: DATE

MAIL_BODY

Header conversion Example (upgrading 3)

Decode MIME encoded part. [3]
As a result, all headers are restored.

EAI-Downgraded-From: <Non-ASCII,DOWNGRADED_FROM>
    <DOWNGRADED_FROM>
EAI-Downgraded-To:<Non-ASCII,DOWNGRADED_TO>
    <DOWNGRADED_TO>
i-Email: 1.0
Message-Id: MESSAGE_ID
Mime-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: 8bit
Subject: UTF-8_SUBJECT
From: <NON-ASCII-FROM,ASCII-FROM>
To: <NON-ASCII-TO,ASCII-TO>
CC: <NON-ASCII-CC,ASCII-CC>
Date: DATE

MAIL_BODY

Header conversion Pros and Cons

- Pros
  - EAI incompliant MUA displays the downgraded mail body except original Non-ASCII mail addresses.
  - EAI incompliant MUA displays and handles the sender specified or algorithmic address.
  - EAI compliant MUA displays and handles original headers.
  - The address headers are preserved. The other headers may be preserved.
- Cons:
  - Implementation and processing cost is higher than 'Header Encapsulation' because MUA/MTA must parse each header and encode it by defined method.
  - Hard to preserve whole information AS IS. The address headers are preserved but the other headers which is MIME encoded with UTF-8 tag are not distinguished that it is downgraded or it is encoded by sender's MUA. Therefore, to check DKIM requires special consideration.

Header conversion scenario evaluation (1)

- 2.1, 2.2 Two/Three i18nmail user
  - ➢ If downgradable (A,B,C has corresponding ASCII address), both user's MUA decode downgraded message.
  - ◆ Can reply correctly.
- 2.3 i18mail mailing list
  - ➢ Sender's mail is downgradable.
  - ➢ The mailing list upgrades the downgraded mail.
  - ◆ all messages arrive, with i18mail addresses preserved for all 3 users.
- 2.4. One i18mail user sends to one ascii user
  - ➢ The sender specifies i18mail address with corresponding ascii mail address. Then the mail is downgradable.
  - ◆ ascii user cannot read i18mail address, but can read sender's ascii address and can reply to the sender.

Header conversion scenario evaluation (2)

- 2.5 An i18mail user sends to one ascii user and one i18mail user
  - A sends to B and X; both reply
  - If the sender A specifies A and B address with corresponding ASCII address, the mail is downgradable.
    - Message received by B is not downgraded (or B's MUA upgrades downgraded message).
    - B can reply to A and X.
    - Message received by X is downgraded and X's MUA cannot display i18mail address.
    - X can reply to A and B using A and B's ASCII address.
- 2.6. An i18mail user sends to a mailing list with a mix of users
  - A sends to L, and L has B and X as subscribers. B and X reply.
  - If the sender A and mailing list L specifies i18mail address with corresponding ASCII address, the mail is downgradable.
    - ASCII user X can read the ASCII address of A and L and can reply to A and L.
    - I18mail user B can read the i18mail address of A and L and can reply A and L.

Header conversion scenario evaluation (3)

- Header conversion satisfies all cases.
  - If all Non-ASCII mail address is specified with the corresponding ASCII address.

Choose header downgrading method

	MIME Encapsulation	Header Conversion
Header information preservation	perfect	almost
Implementation cost	easy	hard
Display on EAI incompliant MUA	Unreadable Unknown MIME type	Readable US-ASCII address only
Scenario evaluation	EAI compliant MUA satisfies all scenario	Satisfies all scenario

Implementation cost

- Header conversion
  - Need to check, parse and rewrite all headers that have UTF-8 strings.
    - Full RFC 2822 ABNF support is required
    - Replace each <Non-ASCII, …> addr-spec to be US-ASCII
- MIME encapsulation
  - Check i-Email: header existence only.
  - Downgrading and Upgrading are easy MIME manipulation.