                 Extended Facsimile Using Internet Mail

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Abstract

   This document describes extensions to "Simple Mode of Facsimile Using
   Internet Mail" [RFC2305] and describes additional features, including
   transmission of enhanced document characteristics (higher resolution,
   color) and confirmation of delivery and processing.

   These additional features are designed to provide the highest level
   of interoperability with the existing and future standards-compliant
   email infrastructure and mail user agents, while providing a level of
   service that approximates the level currently enjoyed by fax users.

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1. Introduction

   This document notes a number of enhancements to the "Simple Mode of
   Facsimile Using Internet Mail" [RFC2305] that may be combined to
   create an extended mode of facsimile using Internet mail.

   The new features are designed to be interoperable with the existing
   base of mail transfer agents (MTAs) and mail user agents (MUAs), and
   take advantage of existing standards for advanced functionality such
   as positive delivery confirmation and disposition notification. The

enhancements described in this document utilize the messaging
infrastructure, where possible, instead of creating fax-specific
features which are unlikely to be implemented in non-fax messaging
software.

This document standardizes the following two features.

   * Delivery confirmation (Section 2) (required)
   * Additional document features (Section 3) (optional)

These features are fully described in another document titled
"Terminology and Goals for Internet Fax" [RFC2542].

1.1. Definition of Terms

The term "processing" indicates the action of rendering or
transmitting the contents of the message to a printer, display
device, or fax machine.

The term "processing confirmation" is an indication by the recipient
of a message that it is able to process the contents of that message.

The term "recipient" indicates the device which performs the
processing function. For example, a recipient could be implemented
as a traditional Mail User Agent on a PC, a standalone device which
retrieves mail using POP3 or IMAP, an SMTP server which prints
incoming messages (similar to an LPR server).

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
document are to be interpreted as described in [RFC2119].

1.2. GSTN Fax Gateways ("onramp"/"offramp")

The behavior of gateways from GSTN fax to SMTP ("onramps") and from
SMTP to GSTN fax ("offramps") are not described in this document.
However, such gateways SHOULD have the behavior characteristics of
senders and recipients as described in this document.

2. Delivery and Processing Confirmation

In traditional GSTN-based realtime facsimile, the receiving terminal
acknowledges successful receipt and processing of every page [T.30].

In Internet Mail, the operations of Delivery (to the mailbox) and
Disposition (to paper or a screen) may be separated in time (due to
store and forwarding of messages) and location (due to separation of
delivery agent (MTA) and user agent (MUA)). The confirmation of

these two operations are supplied by two different standards-track
mechanisms: Delivery Status Notifications (DSN) [RFC1891, RFC1894]
and Message Disposition Notifications (MDN) [RFC2298], respectively.

This section defines requirements for devices or services that are to
be considered compliant with this document.

2.1. Sender Requirements

Because delivery failure may occur (over disk quota, user no longer
exists, malconfigured mailer), a delivery failure message (in the
format described by [RFC1894] or otherwise) may be sent to the
envelope-from address specified by the sender. Thus, the envelope-
from address supplied by the sender MUST be able to properly handle
such delivery failure messages.

2.1.1. Delivery Confirmation

If the sender desires delivery confirmation, the sender MUST request
Delivery Status Notification by including the the esmtp-keyword
NOTIFY with the esmtp-value SUCCESS (section 5.1 of [RFC1891]).

2.1.2. Processing Confirmation

If the sender desires processing confirmation, the sender MUST
request Message Disposition Notification ([RFC2298] section 2) when
sending the message itself.

Because a recipient may silently ignore a request for an MDN (section
2.1 of [RFC2298]) at any time:

  * MDNs MUST NOT be used for delivery confirmation, but are only
     useful for disposition ("processing") notification.

  * the sender MUST NOT assume the recipient will respond to an MDN
     request in a subsequent message, even if the recipient has done
     so in the past.

The address provided by the sender on the Disposition-Notification-To
field MUST be able to receive Message Disposition Notifications
messages [RFC2298] and SHOULD be able to receive messages that are
not in the Message Disposition Notification format (due to the
existence of legacy systems that generate non-RFC2298-compliant
responses to the Disposition-Notification-To field). The
Disposition-Notification-To address and the envelope-from address
SHOULD match to allow automated responses to MDN requests (section
2.1 of [RFC2298]).

2.2. Recipient Requirements

Recipients SHOULD implement Message Disposition Notifications
[RFC2298] and SHOULD indicate supported media features in DSN and MDN
messages per [RFC2530].

If the recipient is an SMTP server, it behaves as part of the
receiver infrastructure and is therefore subject to the "Receiver
Infrastructure" requirements of this document.

See also "Recipient Recommendations" in section 5.

2.2.1. MDN Recipient Requirements

Recipients MUST be configurable to silently ignore a request for an
MDN (section 2.1 of [RFC2298]).

If the recipient is an automated message processing system which is
not associated with a person, the device MAY be configurable to
always respond to MDN requests, but in all cases MUST be configurable
to never generate MDNs.

A recipient MUST NOT generate an unsolicited MDN to indicate
successful processing. A recipient MAY generate an unsolicited MDN
(sent to the envelope-from (Return-Path:) address) to indicate
processing failure, but subject to the [RFC2298] requirement that it
MUST always be possible for an operator to disable unsolicited MDN
generation.

2.2.2. Recipients Using Mailbox Access Protocols

A recipient using POP3 [RFC1939] or IMAP4 [RFC2060] to retrieve its
mail MUST NOT generate a Delivery Status Notification message
[RFC1894] because such a notification, if it was requested, would
have already been issued by the MTA on delivery to the POP3 or IMAP4
message store.

The recipient MUST NOT use the RFC822 "To:" fields, "Cc:" fields,
"Bcc:" fields, or any other fields containing header recipient
information to determine the ultimate destination mailbox or
addressee, and SHOULD NOT use other RFC822 or MIME fields for making
such determinations.

2.3. Messaging Infrastructure Requirements

This section explains the requirements of the SMTP messaging
infrastructure used by the sender and receiver. This infrastructure
is commonly provided by the ISP or a company's internal mailers but
can actually be provided by another organization with appropriate
service contracts.

2.3.1. Sender Infrastructure

Support for DSN [RFC1891] MUST be provided by the mail submission
server [RFC2476] used by the sender and MUST be provided up to the
mailer responsible for communicating with external (Internet)
mailers.

Also see section 5.1 of this document.

2.3.2. Receiver Infrastructure

Support for DSN [RFC1891] MUST be provided by the external
(Internet-accessible) mailer, and MUST be provided by each mailer
between the external mailer and the recipient. If the recipient is
implemented as an SMTP server it MUST also support DSN [RFC1891].

3. Additional Document Capabilities

Section 4 of "A Simple Mode of Facsimile Using Internet Mail"
[RFC2305] allows sending only the minimum subset of TIFF for
Facsimile "unless the sender has prior knowledge of other TIFF fields
or values supported by the recipient."

A recipient MAY support any or all (or any combination) of the TIFF
profiles defined in RFC 2301, in addition to profile S. A recipient
which supports additional profiles SHOULD indicate this support as
per section 3.2 or 3.3 of this document. As a consequence, a sender
MAY use those additional TIFF profiles when sending to a recipient
with the corresponding capabilities.

A sender SHOULD be able to recognize and process the feature tags as
defined in [RFC2531] when reviewing the capabilities presented by a
potential recipient. The capability matching rules indicated there
(by reference to [RFC2533]) allow for the introduction of new
features that may be unrecognized by older implementations.

A sender MAY send a message containing both the minimum subset of
TIFF for Facsimile (as specified in [RFC2305]) and a higher quality
TIFF using multipart/alternative.

Three methods for the sender to acquire such knowledge are described:

1. Sender manual configuration
2. Capabilities in Directory
3. Capabilities returned in MDN or DSN

Method (3) SHOULD be used.

An implementation may cache capabilities locally and lose
synchronization with the recipient's actual capabilities. A
mechanism SHOULD be provided to allow the sender to override the
locally-stored cache of capabilities. Also note section 4.1 of this
document.

3.1. Sender Manual Configuration

One way a sender can send a document which exceeds the minimum subset
allowed by [RFC2305] is for the user controlling the sender to
manually override the default settings, usually on a per-recipient
basis. For example, during transmission a user could indicate the
recipient is capable of receiving high resolution images or color
images.

While awkward and not automatic, this mechanism reflects the current
state of deployment of configuration for extended capabilities to
ordinary Internet email users.

3.2. Capabilities in Directory

A future direction for enhanced document features is to create a
directory structure of recipient capabilities, deployed, for example,
through LDAP or DNS. The directory would provide a mechanism by which
a sender could determine a recipient's capabilities before message
construction or transmission, using a directory lookup. Such
mechanisms are not defined in this document.

There is active investigation within the IETF to develop a solution
to this problem, which would resolve a wide range of issues with
store-and-forward messaging.

3.3. Capabilities Returned in MDN or DSN

As outlined in section 2 of this document, a sender may request a
positive DSN or an MDN.

If the recipient implements [RFC2530], the DSN or MDN that is
returned can contain information describing the recipient's
capabilities. The sender can use this information for subsequent
communications with that recipient.

The advantage of this approach is that additional infrastructure is
not required (unlike section 3.2), and the information is acquired
automatically (unlike section 3.1).

3.3.1. Restrictions and Recommendations

A sender MUST NOT send a message with no processable content to
attempt to elicit an MDN/DSN capability response. Doing so with a
message with no processable content (such as a message containing
only a request for capabilities or a blank message) will confuse a
recipient not already designed to understand the semantics of such a
message.

A recipient SHOULD indicate the profiles and features supported, even
if the recipient supports only Tiff Profile S (the minimum set for
fax as defined by [RFC2305]) [RFC2531]. This allows a sender to
determine that the recipient is compliant with this Extended
Facsimile Using Internet Mail specification.

4. Security Considerations

As this document is an extension of [RFC2305], the Security
Considerations section of [RFC2305] applies to this document.

The following additional security considerations are introduced by
the new features described in this document.

4.1. Inaccurate Capabilities Information

Inaccurate capability information (section 3) could cause a denial of
service. The capability information could be inaccurate due to many
reasons, including compromised or improperly configured directory
server, improper manual configuration of sender, compromised DNS, or
spoofed MDN. If a sender is using cached capability information,
there SHOULD be a mechanism to allow the cached information to be
ignored or overridden if necessary.

4.2. Forged MDNs or DSNs

Forged DSNs or MDNs, as described in [RFC1892, RFC1894, RFC2298] can
provide incorrect information to a sender.

5. Implementation Notes

This section contains notes to implementors.

5.1. Submit Mailer Does Not Support DSN

In some installations the generally available submit server may not
support DSNs. In such circumstances, it may be useful for the sender
to implement [RFC974] mail routing as well as additional submission
server functions [RFC2476] so that the installation is not
constrained by limitations of the incumbent submission server.

5.2. Recipient Recommendations

To provide a high degree of reliability, it is desirable for the
sender to know that a recipient could not process a message. The
inability to successfully process a message may be detectable by the
recipient's MTA or MUA.

If the recipient's MTA determines the message cannot be processed,
the recipient's MTA is strongly encouraged to reject the message with
a [RFC1893] status code of 5.6.1. This status code may be returned
in response to the end-of-mail-data indicator if the MTA supports
reporting of enhanced error codes [RFC2034], or after message
reception by generating a delivery failure DSN ("bounce").

Note: Providing this functionality in the MTA, via either of the
       two mechanisms described above, is superior to providing the
       function using MDNs because MDNs must generally be requested
       by the sender (and the request may, at any time, be ignored by
       the receiver). Message rejection performed by the MTA can
       always occur without the sender requesting such behavior and
       without the receiver circumventing the behavior.

If the message contains an MDN request and the recipient's MUA
determines the message cannot be processed, the recipient's MUA is
strongly encouraged to repond to an MDN request and indicate that
processing failed with the disposition-type "processed" or
"displayed" and disposition-modifier "error" or "warning" [RFC2298].

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