Extended Facsimile Using Internet Mail

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Abstract

This document describes extensions to ‘Simple Mode of Facsimile Using
Internet Mail’ [RFC2305] to provide 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.
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 describes a protocol suite that satisfies all of the required and highly desirable features identified in [GOALS]:

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

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].

1.1. Definition of terms

The term ‘processing’ indicates the ability to successfully render or successfully transmit the contents of the message to a printer, on a display device, or to a fax machine.

The term ‘recipient’ indicates the device which processes the content of the mail message and renders it to the user by transmitting it to a remote fax machine, printer, displaying it on a terminal. 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).

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 documents: 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 the delivery and processing confirmation section of this memo.

2.1. Sender Requirements

The envelope-from address provided by the sender MUST be able to receive all types of Delivery Status Notifications [RFC1894] and be able to receive delivery failure or delayed delivery messages that are not in the Delivery Status Notification format [RFC1894]. Note that a DSN or delivery failure message may be sent to the envelope-from address even if the sender doesn’t request a DSN.

2.1.1. Delivery Confirmation

Following the terminology of [SUBMIT], a sender MUST use a mail submission server (which may be resident on the same device as the sender). To request delivery confirmation, the sender MUST request Delivery Status Notification by including the the esmtp-value SUCCESS with the esmtp-keyword NOTIFY using the method described in section 5.1 of [RFC1891].

2.1.2. Processing Confirmation

To request processing confirmation, the sender MUST request Message Disposition Notification using the method described in section 2 of [RFC2298].

Because a recipient can always silently ignore a request for an MDN [section 2.1 of RFC2298]:
* 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 always responded to MDNs 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 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).

2.2. Recipient Requirements

Recipients in compliance with this document SHOULD implement MDN [RFC2298], and SHOULD implement Offramp Gateway Extensions for DSN and MDN [REPORT-EXTENSIONS].

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, but a recipient MAY generate an unsolicited MDN (sent to the envelope-from (Return-Path:) address) to indicate processing failure following the rules in the above paragraph.

2.2.3. Recipients using Mailbox Access Protocols

A recipient using [POP3] or [IMAP4] to retrieve its mail is not allowed to generate a Delivery Status Notification message [RFC1894].

The recipient MUST NOT use anything but the POP/IMAP username to map to a single destination. For example, using any RFC822 field or information within the message body or MIME parts to make a decision about the destination is not permitted.

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 [SUBMIT] used by the sender, and MUST be provided up to the mailer responsible for communicating with external (Internet) mailers.

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 [RFC2305] only allows sending 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 SHOULD indicate which features and values from among those available in [FAX-SCHEMA] are supported using one of the mechanisms defined below.

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

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

In any implementation it possible for a locally-stored cache of capabilities to 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 [REPORTING-EXTENSIONS], 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).

### 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, it SHOULD be manually confirmed by a user
before it is automatically used.

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 [SUBMIT] 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.--???????--. This status code may be
returned in response to the end-of-mail-data indicator if the MTA
supports [RFC2034], or after message reception by generating a
delivery failure DSN ("bounce").

Note: Because DSN bounces are not requested by the sender and are
not ‘approved’ by the receiver, DSNs can provide a more robust
mechanism than performing this function in the MUA using MDNs.

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 respond 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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7. References


[SCHEMA] Internet Draft, Work in Progress.


8. Authors’ Addresses

Larry Masinter
Xerox Palo Alto Research Center
3333 Coyote Hill Road
Palo Alto, CA 94304  USA

Fax:    +1 415 812 4333
EMail: masinter@parc.xerox.com

Dan Wing
Cisco Systems, Inc.
101 Cooper Street
Santa Cruz, CA 95060 USA

Phone: +1 831 457 5200
Fax: +1 831 457 5208
EMail: dwing@cisco.com

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