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L. Masinter
Xerox Corporation
D. Wing
Cisco Systems

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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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8. Authors' Addresses

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

Fax: +1 650 812 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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