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Message Disposition Notification

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This memo defines a MIME content-type that may be used by a mail user agent (MUA) or electronic mail gateway to report the disposition of a message after it has been successfully delivered to a recipient. This content-type is intended to be machine-processable. Additional message headers are also defined to permit Message Disposition Notifications (MDNs) to be requested by the sender of a message. The purpose is to extend Internet Mail to support functionality often found in other messaging systems, such as X.400 and the proprietary "LAN-based" systems, and often referred to as "read receipts," "acknowledgements", or "receipt notifications." The intention is to do this while respecting privacy concerns, which have often been expressed when such functions have been discussed in the past.

Because many messages are sent between the Internet and other messaging systems (such as X.400 or the proprietary "LAN-based" systems), the MDN protocol is designed to be useful in a multi-protocol messaging environment. To this end, the protocol described in this memo provides for the carriage of "foreign" addresses, in addition to those normally used in Internet Mail. Additional attributes may also be defined to support "tunneling" of foreign notifications through Internet Mail.

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1. Introduction

This memo defines a [RFC-MIME-MEDIA] content-type for message disposition notifications (MDNs). An MDN can be used to notify the sender of a message of any of several conditions that may occur after successful delivery, such as display of the message contents, printing of the message, deletion (without display) of the message, or the recipient's refusal to provide MDNs. The "message/disposition-notification" content-type defined herein is intended for use within the framework of the "multipart/report" content type defined in [RFC-REPORT].

This memo defines the format of the notifications and the [RFC-MSGFMT] headers used to request them.

1.1. Purposes

The MDNs defined in this memo are expected to serve several purposes:

- (a) Inform human beings of the disposition of messages after successful delivery, in a manner that is largely independent of human language;
- (b) Allow mail user agents to keep track of the disposition of messages sent, by associating returned MDNs with earlier message transmissions;
- (c) Convey disposition notification requests and disposition notifications between Internet Mail and "foreign" mail systems via a gateway;
- (d) Allow "foreign" notifications to be tunneled through a MIME-capable message system and back into the original messaging system that issued the original notification, or even to a third messaging system;
- (e) Allow language-independent, yet reasonably precise, indications of the disposition of a message to be delivered.

1.2. Requirements

These purposes place the following constraints on the notification protocol:

- (a) It must be readable by humans, and must be machine-parsable.

- (b) It must provide enough information to allow message senders (or their user agents) to unambiguously associate an MDN with the message that was sent and the original recipient address for which the MDN was issued (if such information is available), even if the message was forwarded to another recipient address.
- (c) It must also be able to describe the disposition of a message independent of any particular human language or of the terminology of any particular mail system.
- (d) The specification must be extensible in order to accommodate future requirements.

1.3. Terminology

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 [RFC-KEYWORDS].

All syntax descriptions use the ABNF specified by [RFC-MSGFMT], in which the lexical tokens (used below) are defined: "atom", "CRLF", "mailbox", "msg-id", and "text". The following lexical tokens are defined in the definition of the Content-Type header in [RFC-MIME-BODY]: "attribute" and "value".

2. Requesting Message Disposition Notifications

Message disposition notifications are requested by including a Disposition-Notification-To header in the message. Further information to be used by the recipient's MUA in generating the MDN may be provided by also including Original-Recipient and/or Disposition-Notification-Options headers in the message.

2.1. The Disposition-Notification-To Header

A request for the receiving user agent to issue message disposition notifications is made by placing a Disposition-Notification-To header into the message. The syntax of the header is

```
mdn-request-header = "Disposition-Notification-To" ":"  
                    mailbox *(", " mailbox)
```

The presence of a Disposition-Notification-To header in a message is merely a request for an MDN. The recipients' user agents are always free to silently ignore such a request. Alternatively, an explicit denial of the request for information about the disposition of the message may be sent using the "denied" disposition in an MDN.

An MDN MUST NOT itself have a Disposition-Notification-To header. An MDN MUST NOT be generated in response to an MDN.

A user agent MUST NOT issue more than one MDN on behalf of each particular recipient. That is, once an MDN has been issued on behalf of a recipient, no further MDNs may be issued on behalf of that recipient, even if another disposition is performed on the message. However, if a message is forwarded, an MDN may have been issued for the recipient doing the forwarding and the recipient of the forwarded message may also cause an MDN to be generated.

While Internet standards normally do not specify the behavior of user interfaces, it is strongly recommended that the user agent obtain the user's consent before sending an MDN. This consent could be obtained for each message through some sort of prompt or dialog box, or globally through the user's setting of a preference. The user might also indicate globally that MDNs are to never be sent or that a "denied" MDN is always sent in response to a request for an MDN.

MDNs SHOULD NOT be sent automatically if the address in the Disposition-Notification-To header differs from the address in the Return-Path header (see [RFC-MSGFMT]). In this case, confirmation from the user SHOULD be obtained, if possible. If obtaining consent is not possible (e.g., because the user is not online at the time), then an MDN SHOULD NOT be sent.

Confirmation from the user SHOULD be obtained (or no MDN sent) if there is no Return-Path header in the message, or if there is more than one distinct address in the Disposition-Notification-To header.

The comparison of the addresses should be done using only the addr-spec (local-part "@" domain) portion, excluding any phrase and route. The comparison MUST be case-sensitive for the local-part and case-insensitive for the domain part.

If the message contains more than one Return-Path header, the implementation may pick one to use for the comparison, or treat the situation as a failure of the comparison.

The reason for not automatically sending an MDN if the comparison fails or more than one address is specified is to reduce the possibility of mail loops and of MDNs being used for mail bombing.

A message that contains a Disposition-Notification-To header SHOULD also contain a Message-ID header as specified in [RFC-MSGFMT]. This will permit automatic correlation of MDNs with their original messages by user agents.

If the request for message disposition notifications for some recipients and not others is desired, two copies of the message should be sent, one with a Disposition-Notification-To header and one without. Many of the other headers of the message (e.g., To, Cc) will be the same in both copies. The recipients in the respective message envelopes determine for whom message disposition notifications are requested and for whom they are not. If desired, the Message-ID header may be the same in both copies of the message. Note that there are other situations (e.g., Bcc) in which it is necessary to send multiple copies of a message with slightly different headers. The combination of such situations and the need to request MDNs for a subset of all recipients may result in more than two copies of a message being sent, some with a Disposition-Notification-To header and some without.

Messages posted to newsgroups SHOULD NOT have a Disposition-Notification-To header.

2.2. The Disposition-Notification-Options Header

Future extensions to this specification may require that information be supplied to the recipient's MUA for additional control over how and what MDNs are generated. The Disposition-Notification-Options header provides an extensible mechanism for such information. The syntax of this header is as follows:

```
Disposition-Notification-Options =
    "Disposition-Notification-Options" ":"
        disposition-notification-parameters

disposition-notification-parameters = parameter *("; " parameter)

parameter = attribute "=" importance "," value *("," value)

importance = "required" / "optional"
```

An importance of "required" indicates that interpretation of the parameter is necessary for proper generation of an MDN in response to this request. If an MUA does not understand the meaning of the parameter, it MUST NOT generate an MDN with any disposition type other than "failed" in response to the request. An importance of "optional" indicates that an MUA that does not understand the meaning of this parameter MAY generate an MDN in response anyway, ignoring the value of the parameter.

No parameters are defined in this specification. Parameters may be defined in the future by later revisions or extensions to this specification. Parameter attribute names beginning with "X-" will

never be defined as standard names; such names are reserved for experimental use. MDN parameter names not beginning with "X-" MUST be registered with the Internet Assigned Numbers Authority (IANA) and described in a standards-track RFC or an experimental RFC approved by the IESG. (See Section 10 for a registration form.)

If a required parameter is not understood or contains some sort of error, the receiving MUA SHOULD issue an MDN with a disposition type of "failed" (see Section 3.2.6), and include a Failure field (see Section 3.2.7) that further describes the problem. MDNs with the disposition type of "failed" and a "Failure" field MAY also be generated when other types of errors are detected in the parameters of the Disposition-Notification-Options header.

However, an MDN with a disposition type of "failed" MUST NOT be generated if the user has indicated a preference that MDNs are not to be sent. If user consent would be required for an MDN of some other disposition type to be sent, user consent SHOULD also be obtained before sending an MDN with a disposition type of "failed".

2.3. The Original-Recipient Header

Since electronic mail addresses may be rewritten while the message is in transit, it is useful for the original recipient address to be made available by the delivering MTA. The delivering MTA may be able to obtain this information from the ORCPT parameter of the SMTP RCPT TO command, as defined in [RFC-SMTP] and [RFC-DSN-SMTP].

[RFC-DSN-SMTP] is amended as follows: If the ORCPT information is available, the delivering MTA SHOULD insert an Original-Recipient header at the beginning of the message (along with the Return-Path header). The delivering MTA MAY delete any other Original-Recipient headers that occur in the message. The syntax of this header is as follows:

```
original-recipient-header =  
    "Original-Recipient" ":" address-type ";" generic-address
```

The address-type and generic-address token are as specified in the description of the Original-Recipient field in section 3.2.3.

The purpose of carrying the original recipient information and returning it in the MDN is to permit automatic correlation of MDNs with the original message on a per-recipient basis.

2.4. Use with the Message/Partial Content Type

The use of the headers `Disposition-Notification-To`, `Disposition-Notification-Options`, and `Original-Recipient` with the MIME message/partial content type ([RFC-MIME-MEDIA]) requires further definition.

When a message is segmented into two or more message/partial fragments, the three headers mentioned in the above paragraph SHOULD be placed in the "inner" or "enclosed" message (using the terms of [RFC-MIME-MEDIA]). These headers SHOULD NOT be used in the headers of any of the fragments themselves.

When the multiple message/partial fragments are reassembled, the following applies. If these headers occur along with the other headers of a message/partial fragment message, they pertain to an MDN that will be generated for the fragment. If these headers occur in the headers of the "inner" or "enclosed" message (using the terms of [RFC-MIME-MEDIA]), they pertain to an MDN that will be generated for the reassembled message. Section 5.2.2.1 of [RFC-MIME-MEDIA] is amended to specify that, in addition to the headers specified there, the three headers described in this specification are to be appended, in order, to the headers of the reassembled message. Any occurrences of the three headers defined here in the headers of the initial enclosing message must not be copied to the reassembled message.

3. Format of a Message Disposition Notification

A message disposition notification is a MIME message with a top-level content-type of `multipart/report` (defined in [RFC-REPORT]). When `multipart/report` content is used to transmit an MDN:

- (a) The `report-type` parameter of the `multipart/report` content is "disposition-notification".
- (b) The first component of the `multipart/report` contains a human-readable explanation of the MDN, as described in [RFC-REPORT].
- (c) The second component of the `multipart/report` is of content-type `message/disposition-notification`, described in section 3.1 of this document.
- (d) If the original message or a portion of the message is to be returned to the sender, it appears as the third component of the `multipart/report`. The decision of whether or not to return the message or part of the message is up to the MUA generating the

MDN. However, in the case of encrypted messages requesting MDNs, encrypted message text MUST be returned, if it is returned at all, only in its original encrypted form.

NOTE: For message disposition notifications gatewayed from foreign systems, the headers of the original message may not be available. In this case, the third component of the MDN may be omitted, or it may contain "simulated" [RFC-MSGFMT] headers that contain equivalent information. In particular, it is very desirable to preserve the subject and date fields from the original message.

The MDN MUST be addressed (in both the message header and the transport envelope) to the address(es) from the Disposition-Notification-To header from the original message for which the MDN is being generated.

The From field of the message header of the MDN MUST contain the address of the person for whom the message disposition notification is being issued.

The envelope sender address (i.e., SMTP MAIL FROM) of the MDN MUST be null (<>), specifying that no Delivery Status Notification messages or other messages indicating successful or unsuccessful delivery are to be sent in response to an MDN.

A message disposition notification MUST NOT itself request an MDN. That is, it MUST NOT contain a Disposition-Notification-To header.

The Message-ID header (if present) for an MDN MUST be different from the Message-ID of the message for which the MDN is being issued.

A particular MDN describes the disposition of exactly one message for exactly one recipient. Multiple MDNs may be generated as a result of one message submission, one per recipient. However, due to the circumstances described in Section 2.1, MDNs may not be generated for some recipients for which MDNs were requested.

3.1. The message/disposition-notification content-type

The message/disposition-notification content-type is defined as follows:

MIME type name: message

MIME subtype name: disposition-notification

Optional parameters: none

Encoding considerations: "7bit" encoding is sufficient and MUST be used to maintain readability when viewed by non-MIME mail readers.

Security considerations: discussed in section 6 of this memo.

The message/disposition-notification report type for use in the multipart/report is "disposition-notification".

The body of a message/disposition-notification consists of one or more "fields" formatted according to the ABNF of [RFC-MSGFMT] header "fields". The syntax of the message/disposition-notification content is as follows:

```
disposition-notification-content = [ reporting-ua-field CRLF ]
  [ mdn-gateway-field CRLF ]
  [ original-recipient-field CRLF ]
  final-recipient-field CRLF
  [ original-message-id-field CRLF ]
  disposition-field CRLF
  *( failure-field CRLF )
  *( error-field CRLF )
  *( warning-field CRLF )
  *( extension-field CRLF )
```

3.1.1. General conventions for fields

Since these fields are defined according to the rules of [RFC-MSGFMT], the same conventions for continuation lines and comments apply. Notification fields may be continued onto multiple lines by beginning each additional line with a SPACE or HTAB. Text that appears in parentheses is considered a comment and not part of the contents of that notification field. Field names are case-insensitive, so the names of notification fields may be spelled in any combination of upper and lower case letters. Comments in notification fields may use the "encoded-word" construct defined in [RFC-MIME-HEADER].

3.1.2. "-type" subfields

Several fields consist of a "-type" subfield, followed by a semi-colon, followed by "*text". For these fields, the keyword used in the address-type or MTA-type subfield indicates the expected format of the address or MTA-name that follows.

The "-type" subfields are defined as follows:

- (a) An "address-type" specifies the format of a mailbox address. For example, Internet Mail addresses use the "rfc822" address-type.

address-type = atom

- (b) An "MTA-name-type" specifies the format of a mail transfer agent name. For example, for an SMTP server on an Internet host, the MTA name is the domain name of that host, and the "dns" MTA-name-type is used.

mta-name-type = atom

Values for address-type and mta-name-type are case-insensitive. Thus, address-type values of "RFC822" and "rfc822" are equivalent.

The Internet Assigned Numbers Authority (IANA) maintains a registry of address-type and mta-name-type values, along with descriptions of the meanings of each, or a reference to one or more specifications that provide such descriptions. (The "rfc822" address-type is defined in [RFC-DSN-SMTP].) Registration forms for address-type and mta-name-type appear in [RFC-DSN-FORMAT].

3.2. Message/disposition-notification Fields

3.2.1. The Reporting-UA field

```
reporting-ua-field = "Reporting-UA" ":" ua-name  
                    [ ";" ua-product ]
```

ua-name = *text

ua-product = *text

The Reporting-UA field is defined as follows:

An MDN describes the disposition of a message after it has been delivered to a recipient. In all cases, the Reporting-UA is the MUA that performed the disposition described in the MDN. This field is optional, but recommended. For Internet Mail user agents, it is recommended that this field contain both: the DNS name of the particular instance of the MUA that generated the MDN, and the name of the product. For example,

```
Reporting-UA: pc.example.com; Foomail 97.1
```

If the reporting MUA consists of more than one component (e.g., a base program and plug-ins), this may be indicated by including a list of product names.

3.2.2. The MDN-Gateway field

The MDN-Gateway field indicates the name of the gateway or MTA that translated a foreign (non-Internet) message disposition notification into this MDN. This field **MUST** appear in any MDN that was translated by a gateway from a foreign system into MDN format, and **MUST NOT** appear otherwise.

```
mdn-gateway-field = "MDN-Gateway" ":" mta-name-type ";" mta-name
mta-name = *text
```

For gateways into Internet Mail, the MTA-name-type will normally be "smtp", and the mta-name will be the Internet domain name of the gateway.

3.2.3. Original-Recipient field

The Original-Recipient field indicates the original recipient address as specified by the sender of the message for which the MDN is being issued. For Internet Mail messages, the value of the Original-Recipient field is obtained from the Original-Recipient header from the message for which the MDN is being generated. If there is no Original-Recipient header in the message, then the Original-Recipient field **MUST** be omitted, unless the same information is reliably available some other way. If there is an Original-Recipient header in the original message (or original recipient information is reliably available some other way), then the Original-Recipient field must be supplied. If there is more than one Original-Recipient header in the message, the MUA may choose the one to use, or act as if no Original-Recipient header is present.

```
original-recipient-field =
    "Original-Recipient" ":" address-type ";"
    generic-address
generic-address = *text
```

The address-type field indicates the type of the original recipient address. If the message originated within the Internet, the address-type field will normally be "rfc822", and the address will be according to the syntax specified in [RFC-MSGFMT]. The value "unknown" should be used if the Reporting MUA cannot determine the type of the original recipient address from the message envelope.

This address is the same as that provided by the sender and can be used to automatically correlate MDN reports with original messages on a per recipient basis.

3.2.4. Final-Recipient field

The Final-Recipient field indicates the recipient for which the MDN is being issued. This field **MUST** be present.

The syntax of the field is as follows:

```
final-recipient-field =  
    "Final-Recipient" ":" address-type ";" generic-address
```

The generic-address subfield of the Final-Recipient field **MUST** contain the mailbox address of the recipient (from the From header of the MDN) as it was when the MDN was generated by the MUA.

The Final-Recipient address may differ from the address originally provided by the sender, because it may have been transformed during forwarding and gatewaying into a totally unrecognizable mess. However, in the absence of the optional Original-Recipient field, the Final-Recipient field and any returned content may be the only information available with which to correlate the MDN with a particular message recipient.

The address-type subfield indicates the type of address expected by the reporting MTA in that context. Recipient addresses obtained via SMTP will normally be of address-type "rfc822".

Since mailbox addresses (including those used in the Internet) may be case sensitive, the case of alphabetic characters in the address **MUST** be preserved.

3.2.5. Original-Message-ID field

The Original-Message-ID field indicates the message-ID of the message for which the MDN is being issued. It is obtained from the Message-ID header of the message for which the MDN is issued. This field **MUST** be present if the original message contained a Message-ID header. The syntax of the field is as follows:

```
original-message-id-field =  
    "Original-Message-ID" ":" msg-id
```

The msg-id token is as specified in [RFC-MSGFMT].

3.2.6. Disposition field

The Disposition field indicates the action performed by the Reporting-MUA on behalf of the user. This field MUST be present.

The syntax for the Disposition field is:

```
disposition-field =
    "Disposition" ":" disposition-mode ";"
    disposition-type
    [ "/" disposition-modifier
    *( "," disposition-modifier ) ]

disposition-mode = action-mode "/" sending-mode

action-mode = "manual-action" / "automatic-action"

sending-mode = "MDN-sent-manually" / "MDN-sent-automatically"

disposition-type = "displayed"
    / "deleted"

disposition-modifier = "error"
    / disposition-modifier-extension

disposition-modifier-extension = atom
```

The disposition-mode, disposition-type, and disposition-modifier may be spelled in any combination of upper and lower case characters.

3.2.6.1. Disposition modes

The following disposition modes are defined:

"manual-action"	The disposition described by the disposition type was a result of an explicit instruction by the user rather than some sort of automatically performed action.
"automatic-action"	The disposition described by the disposition type was a result of an automatic action, rather than an explicit instruction by the user for this message.

"Manual-action" and "automatic-action" are mutually exclusive. One or the other MUST be specified.

"MDN-sent-manually" The user explicitly gave permission for this particular MDN to be sent.

"MDN-sent-automatically"
The MDN was sent because the MUA had previously been configured to do so automatically.

"MDN-sent-manually" and "MDN-sent-automatically" are mutually exclusive. One or the other MUST be specified.

3.2.6.2. Disposition types

The following disposition-types are defined:

"displayed" The message has been displayed by the MUA to someone reading the recipient's mailbox. There is no guarantee that the content has been read or understood.

"deleted" The message has been deleted. The recipient may or may not have seen the message. The recipient might "undelete" the message at a later time and read the message.

3.2.6.3. Disposition modifiers

Only the extension disposition modifiers is defined:

disposition-modifier-extension
Disposition modifiers may be defined in the future by later revisions or extensions to this specification. Disposition value names beginning with "X-" will never be defined as standard values; such names are reserved for experimental use. MDN disposition value names NOT beginning with "X-" MUST be registered with the Internet Assigned Numbers Authority (IANA) and described in a standards-track RFC or an experimental RFC approved by the IESG. (See Section 10 for a registration form.) MDNs with disposition modifier names not understood by the receiving MUA MAY be silently ignored or placed in the

user's mailbox without special interpretation. They MUST not cause any error message to be sent to the sender of the MDN.

If an MUA developer does not wish to register the meanings of such disposition modifier extensions, "X-" modifiers may be used for this purpose. To avoid name collisions, the name of the MUA implementation should follow the "X-", (e.g., "X-Foomail-").

It is not required that an MUA be able to generate all of the possible values of the Disposition field.

A user agent MUST NOT issue more than one MDN on behalf of each particular recipient. That is, once an MDN has been issued on behalf of a recipient, no further MDNs may be issued on behalf of that recipient, even if another disposition is performed on the message. However, if a message is forwarded, a "dispatched" MDN may be issued for the recipient doing the forwarding and the recipient of the forwarded message may also cause an MDN to be generated.

3.2.7. Failure, Error, and Warning fields

The Failure, Error, and Warning fields are used to supply additional information in the form of text messages when the "failure" disposition type, "error" disposition modifier, and/or the "warning" disposition modifier appear. The syntax is as follows:

```
failure-field = "Failure" ":" *text
```

```
error-field = "Error" ":" *text
```

```
warning-field = "Warning" ":" *text
```

3.3. Extension-fields

Additional MDN fields may be defined in the future by later revisions or extensions to this specification. Extension-field names beginning with "X-" will never be defined as standard fields; such names are reserved for experimental use. MDN field names NOT beginning with "X-" MUST be registered with the Internet Assigned Numbers Authority (IANA) and described in a standards-track RFC or an experimental RFC approved by the IESG. (See Section 10 for a registration form.)

MDN Extension-fields may be defined for the following reasons:

- (a) To allow additional information from foreign disposition reports to be tunneled through Internet MDNs. The names of such MDN fields should begin with an indication of the foreign environment name (e.g., X400-Physical-Forwarding-Address).
- (b) To allow transmission of diagnostic information that is specific to a particular mail user agent (MUA). The names of such MDN fields should begin with an indication of the MUA implementation that produced the MDN (e.g., Foomail-information).

If an application developer does not wish to register the meanings of such extension fields, "X-" fields may be used for this purpose. To avoid name collisions, the name of the application implementation should follow the "X-", (e.g., "X-Foomail-Log-ID" or "X-Foomail-EDI-info").

4. Timeline of events

The following timeline shows when various events in the processing of a message and generation of MDNs take place:

- User composes message
- User tells MUA to send message
- MUA passes message to MTA (original recipient information passed along)
- MTA sends message to next MTA
- Final MTA receives message
- Final MTA delivers message to MUA (possibly generating a DSN)
- MUA performs automatic processing and generates corresponding MDNs ("dispatched", "processed", "deleted", "denied", or "failed" disposition type with "automatic-action" and "MDN-sent-automatically" disposition modes)
- MUA displays list of messages to user
- User selects a message and requests that some action be performed on it.

- MUA performs requested action and, with user's permission, sends an appropriate MDN ("displayed", "dispatched", "processed", "deleted", "denied", or "failed" disposition type, with "manual-action" and "MDN-sent-manually" or "MDN-sent-automatically" disposition mode).
- User possibly performs other actions on message, but no further MDNs are generated.

5. Conformance and Usage Requirements

An MUA or gateway conforms to this specification if it generates MDNs according to the protocol defined in this memo. It is not necessary to be able to generate all of the possible values of the Disposition field.

MUAs and gateways MUST NOT generate the Original-Recipient field of an MDN unless the mail protocols provide the address originally specified by the sender at the time of submission. Ordinary SMTP does not make that guarantee, but the SMTP extension defined in [RFC-DSN-SMTP] permits such information to be carried in the envelope if it is available. The Original-Recipient header defined in this document provides a way for the MTA to pass the original recipient address to the MUA.

Each sender-specified recipient address may result in more than one MDN. If an MDN is requested for a recipient that is forwarded to multiple recipients of an "alias" (as defined in [RFC-DSN-SMTP], section 6.2.7.3), each of the recipients may issue an MDN.

Successful distribution of a message to a mailing list exploder SHOULD be considered the final disposition of the message. A mailing list exploder MAY issue an MDN with a disposition type of "processed" and disposition modes of "automatic-action" and "MDN-sent-automatically" indicating that the message has been forwarded to the list. In this case, the request for MDNs is not propagated to the members of the list.

Alternatively, the mailing list exploder MAY issue no MDN and propagate the request for MDNs to all members of the list. The latter behavior is not recommended for any but small, closely knit lists, as it might cause large numbers of MDNs to be generated and may cause confidential subscribers to the list to be revealed. The mailing list exploder MAY also direct MDNs to itself, correlate them, and produce a report to the original sender of the message.

This specification places no restrictions on the processing of MDNs received by user agents or mailing lists.

6. Security Considerations

The following security considerations apply when using MDNs:

6.1. Forgery

MDNs may be forged as easily as ordinary Internet electronic mail. User agents and automatic mail handling facilities (such as mail distribution list exploders) that wish to make automatic use of MDNs should take appropriate precautions to minimize the potential damage from denial-of-service attacks.

Security threats related to forged MDNs include the sending of:

- (a) A falsified disposition notification when the indicated disposition of the message has not actually occurred,
- (b) Unsolicited MDNs

6.2. Privacy

Another dimension of security is privacy. There may be cases in which a message recipient does not wish the disposition of messages addressed to him to be known, or is concerned that the sending of MDNs may reveal other sensitive information (e.g., when the message was read). In this situation, it is acceptable for the MUA to issue "denied" MDNs or to silently ignore requests for MDNs.

If the Disposition-Notification-To header is passed on unmodified when a message is distributed to the subscribers of a mailing list, the subscribers to the list may be revealed to the sender of the original message by the generation of MDNs.

Headers of the original message returned in part 3 of the multipart/report could reveal confidential information about host names and/or network topology inside a firewall.

An unencrypted MDN could reveal confidential information about an encrypted message, especially if all or part of the original message is returned in part 3 of the multipart/report. Encrypted MDNs are not defined in this specification.

In general, any optional MDN field may be omitted if the Reporting MUA site or user determines that inclusion of the field would impose too great a compromise of site confidentiality. The need for such confidentiality must be balanced against the utility of the omitted information in MDNs.

In some cases, someone with access to the message stream may use the MDN request mechanism to monitor the mail reading habits of a target. If the target is known to generate MDN reports, they could add a disposition-notification-to field containing the envelope from address along with a source route. The source route is ignored in the comparison so the addresses will always match. But if the source route is honored when the notification is sent, it could direct the message to some other destination. This risk can be minimized by not sending MDN's automatically.

6.3. Non-Repudiation

MDNs do not provide non-repudiation with proof of delivery. Within the framework of today's Internet Mail, the MDNs defined in this document provide valuable information to the mail user; however, MDNs cannot be relied upon as a guarantee that a message was or was not seen by the recipient. Even if MDNs are not actively forged, they may be lost in transit. The recipient may bypass the MDN issuing mechanism in some manner.

One possible solution for this purpose can be found in RFC 2634 [SEC-SERVICES].

6.4. Mail Bombing

The MDN request mechanism introduces an additional way of mailbombing a mailbox. The MDN request notification provides an address to which MDN's should be sent. It is possible for an attacking agent to send a potentially large set of messages to otherwise unsuspecting third party recipients with a false "disposition-notification-to:" address. Automatic, or simplistic processing of such requests would result in a flood of MDN notifications to the target of the attack. Such an attack could overrun the capacity of the targeted mailbox and deny service.

For that reason, MDN's SHOULD NOT be sent automatically where the "disposition-notification-to:" address is different from the envelope MAIL FROM address. See section 2.1 for further discussion.

7. Collected Grammar

NOTE: The following lexical tokens are defined in [RFC-MSGFMT]: atom, CRLF, mailbox, msg-id, text. The definitions of attribute and value are as in the definition of the Content-Type header in [RFC-MIME-BODY].

Message headers:

```
mdn-request-header =
  "Disposition-Notification-To" ":"
    mailbox *(", " mailbox)

Disposition-Notification-Options =
  "Disposition-Notification-Options" ":"
    disposition-notification-parameters

disposition-notification-parameters =
  parameter *("; " parameter)

parameter = attribute "=" importance ", " value *(", " value)

importance = "required" / "optional"

original-recipient-header =
  "Original-Recipient" ":" address-type ";" generic-address
```

Report content:

```
disposition-notification-content =
  [ reporting-ua-field CRLF ]
  [ mdn-gateway-field CRLF ]
  [ original-recipient-field CRLF ]
  final-recipient-field CRLF
  [ original-message-id-field CRLF ]
  disposition-field CRLF
  *( failure-field CRLF )
  *( error-field CRLF )
  *( warning-field CRLF )
  *( extension-field CRLF )

address-type = atom

mta-name-type = atom

reporting-ua-field = "Reporting-UA" ":" ua-name [ ";" ua-product ]

ua-name = *text

ua-product = *text

mdn-gateway-field = "MDN-Gateway" ":" mta-name-type ";" mta-name

mta-name = *text
```

```
original-recipient-field
    = "Original-Recipient" ":" address-type ";"
    generic-address

generic-address = *text

final-recipient-field =
    "Final-Recipient" ":" address-type ";" generic-address

disposition-field =
    "Disposition" ":" disposition-mode ";"
    disposition-type
    [ "/" disposition-modifier
    *( "," disposition-modifier ) ]

disposition-mode = action-mode "/" sending-mode

action-mode = "manual-action" / "automatic-action"

sending-mode = "MDN-sent-manually" / "MDN-sent-automatically"

disposition-type = "displayed"
    / "deleted"

disposition-modifier = "error" / disposition-modifier-extension

disposition-modifier-extension = atom

original-message-id-field = "Original-Message-ID" ":" msg-id

failure-field = "Failure" ":" *text

error-field = "Error" ":" *text

warning-field = "Warning" ":" *text

extension-field = extension-field-name ":" *text

extension-field-name = atom
```

8. Guidelines for Gatewaying MDNs

NOTE: This section provides non-binding recommendations for the construction of mail gateways that wish to provide semi-transparent disposition notifications between the Internet and another electronic mail system. Specific MDN gateway requirements for a particular pair of mail systems may be defined by other documents.

8.1. Gatewaying from other mail systems to MDNs

A mail gateway may issue an MDN to convey the contents of a "foreign" disposition notification over Internet Mail. When there are appropriate mappings from the foreign notification elements to MDN fields, the information may be transmitted in those MDN fields. Additional information (such as might be needed to tunnel the foreign notification through the Internet) may be defined in extension MDN fields. (Such fields should be given names that identify the foreign mail protocol, e.g., X400-* for X.400 protocol elements).

The gateway must attempt to supply reasonable values for the Reporting-UA, Final-Recipient, and Disposition fields. These will normally be obtained by translating the values from the foreign notification into their Internet-style equivalents. However, some loss of information is to be expected.

The sender-specified recipient address and the original message-id, if present in the foreign notification, should be preserved in the Original-Recipient and Original-Message-ID fields.

The gateway should also attempt to preserve the "final" recipient address from the foreign system. Whenever possible, foreign protocol elements should be encoded as meaningful printable ASCII strings.

For MDNs produced from foreign disposition notifications, the name of the gateway MUST appear in the MDN-Gateway field of the MDN.

8.2. Gatewaying from MDNs to other mail systems

It may be possible to gateway MDNs from the Internet into a foreign mail system. The primary purpose of such gatewaying is to convey disposition information in a form that is usable by the destination system. A secondary purpose is to allow "tunneling" of MDNs through foreign mail systems in case the MDN may be gatewayed back into the Internet.

In general, the recipient of the MDN (i.e., the sender of the original message) will want to know, for each recipient: the closest available approximation to the original recipient address, and the disposition (displayed, printed, etc.).

If possible, the gateway should attempt to preserve the Original-Recipient address and Original-Message-ID (if present) in the resulting foreign disposition report.

If it is possible to tunnel an MDN through the destination environment, the gateway specification may define a means of preserving the MDN information in the disposition reports used by that environment.

8.3. Gatewaying of MDN-requests to other mail systems

By use of the separate disposition-notification-to request header, this specification offers a richer functionality than most, if not all, other email systems. In most other email systems, the notification recipient is identical to the message sender as indicated in the "from" address. There are two interesting cases when gatewaying into such systems:

- 1) If the address in the disposition-notification-to header is identical to the address in the SMTP "MAIL FROM", the expected behavior will result, even if the disposition-notification-to information is lost. Systems should propagate the MDN request.
- 2) If the address in the disposition-notification-to header is different from the address in the SMTP "MAIL FROM", gatewaying into a foreign system without a separate notification address will result in unintended behavior. This is especially important when the message arrives via a mailing list expansion software that may specifically replace the SMTP "MAIL FROM" address with an alternate address. In such cases, the MDN request should not be gatewayed and should be silently dropped. This is consistent with other forms of non-support for MDN.

9. Example

NOTE: This example is provided as illustration only, and is not considered part of the MDN protocol specification. If the example conflicts with the protocol definition above, the example is wrong.

Likewise, the use of *-type subfield names or extension fields in this example is not to be construed as a definition for those type names or extension fields.

This is an MDN issued after a message has been displayed to the user of an Internet Mail user agent.

```
Date: Wed, 20 Sep 1995 00:19:00 (EDT) -0400
From: Joe Recipient <Joe_Recipient@example.com>
Message-Id: <199509200019.12345@example.com>
Subject: Disposition notification
To: Jane Sender <Jane_Sender@example.org>
MIME-Version: 1.0
```


Content-Type: multipart/report; report-type=disposition-notification;
boundary="RAA14128.773615765/example.com"

--RAA14128.773615765/example.com

The message sent on 1995 Sep 19 at 13:30:00 (EDT) -0400 to Joe Recipient <Joe_Recipient@example.com> with subject "First draft of report" has been displayed. This is no guarantee that the message has been read or understood.

--RAA14128.773615765/example.com
content-type: message/disposition-notification

Reporting-UA: joes-pc.cs.example.com; Foomail 97.1
Original-Recipient: rfc822;Joe_Recipient@example.com
Final-Recipient: rfc822;Joe_Recipient@example.com
Original-Message-ID: <199509192301.23456@example.org>
Disposition: manual-action/MDN-sent-manually; displayed

--RAA14128.773615765/example.com
content-type: message/rfc822

[original message optionally goes here]

--RAA14128.773615765/example.com--

10. IANA Considerations

This document specifies three types of parameters that must be registered with the Internet Assigned Numbers Authority (IANA).

The forms below are for use when registering a new parameter name for the Disposition-Notification-Options header, a new disposition modifier name, or a new MDN extension field. Each piece of information required by a registration form may be satisfied either by providing the information on the form itself, or by including a reference to a published, publicly available specification that includes the necessary information. IANA MAY reject registrations because of incomplete registration forms or incomplete specifications.

To register, complete the following applicable form and send it via electronic mail to <IANA@IANA.ORG>.

10.1. Disposition-Notification-Options header parameter names

A registration for a Disposition-Notification-Options header parameter name MUST include the following information:

- (a) The proposed parameter name.
- (b) The syntax for parameter values, specified using BNF, ABNF, regular expressions, or other non-ambiguous language.
- (c) If parameter values are not composed entirely of graphic characters from the US-ASCII repertoire, a specification for how they are to be encoded as graphic US-ASCII characters in a Disposition-Notification-Options header.
- (d) A reference to a standards track RFC or experimental RFC approved by the IESG that describes the semantics of the parameter values.

10.2. Disposition modifier names

A registration for a disposition-modifier name (used in the Disposition field of a message/disposition-notification) MUST include the following information:

- (a) The proposed disposition-modifier name.
- (b) A reference to a standards track RFC or experimental RFC approved by the IESG that describes the semantics of the disposition modifier.

10.3. MDN extension field names

A registration for an MDN extension-field name MUST include the following information:

- (a) The proposed extension field name.
- (b) The syntax for extension values, specified using BNF, ABNF, regular expressions, or other non-ambiguous language.
- (c) If extension-field values are not composed entirely of graphic characters from the US-ASCII repertoire, a specification for how they are to be encoded as graphic US-ASCII characters in a Disposition-Notification-Options header.

- (d) A reference to a standards track RFC or experimental RFC approved by the IESG that describes the semantics of the extension field.

11. Acknowledgments

This document is an updated version of the original document written by Roger Fajman. His contributions to the definition of Message Disposition Notifications are greatly appreciated.

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12. References

12.1. Normative References

- [RFC-SMTP] Klensin, J., Ed., "Simple Mail Transfer Protocol", RFC 2821, April 2001.
- [RFC-MSGFMT] Resnick, P., Ed., "Internet Message Format", RFC 2822, April 2001.
- [RFC-MIME-BODY] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", RFC 2045, November 1996.
- [RFC-MIME-MEDIA] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types", RFC 2046, November 1996.
- [RFC-MIME-HEADER] Moore, K., "MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text", RFC 2047, November 1996.
- [RFC-REPORT] Vaudreuil, G., "The Multipart/Report Content Type for the Reporting of Mail System Administrative Messages", RFC 3462, January 2003.
- [RFC-DSN-SMTP] Moore, K., "Simple Mail Transfer Protocol (SMTP) Service Extension for Delivery Status Notifications", RFC 3461, January 2003.

[RFC-DSN-FORMAT] Moore, K., and G. Vaudreuil, "An Extensible Format for Delivery Status Notifications (DSNs)", RFC 3464, January 2003.

[RFC-KEYWORDS] Bradner, S., "Key Words for Use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

12.2. Informative References

[SEC-SERVICES] Hoffman, P., Ed., "Enhanced Security Services for S/MIME", RFC 2634, June 1999.

Appendix A - Changes from RFC 2298

The document has new editors.

The dispositions "denied", and "failed" were removed from the document reflecting the lack of implementation or usage at this time.

The disposition modifiers "warning", "superseded", "expired", "mailbox-terminated" have not seen actual implementation. They have been deleted from this document. The extension modifier, as of yet unused, has been retained for future extension.

General editorial cleanups include spelling, grammar, and consistency in usage of terms.

The document has modified BNF for disposition notification options to eliminate the need for dummy values where not otherwise needed.

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