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**Message Disposition Notification**  
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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 header fields 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 [\[4\]](#) 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 [\[6\]](#).

This memo defines the format of the notifications and the RFC-MSGFMT [\[2\]](#) header fields used to request them.

This memo is an update to [RFC 3798](#) and is intended to be published at Internet Standard Level.

This memo is currently marked with the 'pre5378Trust200902' IPR statements until a release has been obtained from all previous authors and editors of this text.

### [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 [9].

All syntax descriptions use the ABNF specified by RFC-MSGFMT [2], in which the lexical tokens (used below) are defined: "atom", "CRLF", "FWS", "CFWS", "field-name", "mailbox", "msg-id", and "text". The following lexical tokens are defined in the definition of the Content-Type header field in RFC-MIME-BODY [3]: "attribute" and "value".

## **2. Requesting Message Disposition Notifications**

Message disposition notifications are requested by including a Disposition-Notification-To header field 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 header fields 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 field into the message. The syntax of the header field is

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

The presence of a Disposition-Notification-To header field in a message is merely a request for an MDN. The recipients' user agents are always free to silently ignore such a request.

An MDN MUST NOT itself have a Disposition-Notification-To header field. 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.

MDNs SHOULD NOT be sent automatically if the address in the Disposition-Notification-To header field differs from the address in the Return-Path header field (see RFC-MSGFMT [2]). 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 field in the message, or if there is more than one distinct address in the Disposition-Notification-To header field.

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

[[CREF1: (From Bruce) the domains might differ, yet refer to the same place (equivalent MX mail exchangers, A vs. CNAME DNS records, DNS names vs. domain literals, etc.) These are not addressed in 3798. ]]

[[CREF2: (From Bruce) local-parts and domains might differ as literal text, but be equivalent when put in canonical form. The issues are discussed in [RFC 3696](#) -- but beware -- 3696 has a number of errors; refer to [RFC 5322](#) for the actual quoting and escaping rules. ]]

[[CREF3: (From Bruce) internationalization issues might further compound comparison issues between local-parts and domains (specifying that the on-the-wire forms must be compared might suffice) ]]

[[CREF4: (From Bruce) there exist some conventions (not standardized as far as I know) regarding subaddressing applied to local parts, e.g. as in tony+[rfc3798](#)@maillennium.att.com (that example also illustrates an issue regarding subdomains) ]]

[[CREF5: (From Bruce) Of those, the angle bracket issue ought to be understood, but clarification could benefit implementors, especially as [RFC 5322](#) defined the Return-Path syntax somewhat peculiarly. Canonicalization of local-parts and domains should probably be required prior to comparison, and use of on-the-wire forms should probably also be specified. DNS equivalence issues might be tricky for some implementations (e.g. offline reading); perhaps the



specification could use [RFC 2119](#) "MAY" to give implementations leeway to consider A vs. CNAME and DNS vs domain literal equivalence for situations where DNS is available to the implementation (I'm not sure about MX). About the only thing that can be said w.r.t. subaddressing and subdomains is a caution to sending MUA and address-rewriting MTA authors that a mismatch might result in no MDN being produced. ]]

If the message contains more than one Return-Path header field, 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 field SHOULD also contain a Message-ID header field as specified in RFC-MSGFMT [2]. 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 field and one without. Many of the other header fields 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 field 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 header fields. 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 field and some without.

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

## **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 field provides an extensible mechanism for such information. The syntax of this header field is as follows:



```
Disposition-Notification-Options =  
    "Disposition-Notification-Options" ":" [FWS]  
        disposition-notification-parameter-list  
disposition-notification-parameter-list =  
    disposition-notification-parameter  
    *(";" [FWS] disposition-notification-parameter)  
disposition-notification-parameter = attribute [FWS] "="  
    [FWS] importance "," [FWS] value *(";" [FWS] value)  
importance = "required" / "optional"
```

An importance of "required" indicates that interpretation of the disposition-notification-parameter is necessary for proper generation of an MDN in response to this request. An importance of "optional" indicates that an MUA that does not understand the meaning of this disposition-notification-parameter MAY generate an MDN in response anyway, ignoring the value of the disposition-notification-parameter.

No disposition-notification-parameter attribute names are defined in this specification. Attribute names may be defined in the future by later revisions or extensions to this specification. Disposition-notification-parameter attribute names beginning with "X-" will never be defined as standard names; such names are reserved for experimental use. disposition-notification-parameter attribute 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. [[ more work needed here ]]  
(See [Section 10](#) for a registration form.)

### **[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 [\[1\]](#) and RFC-DSN-SMTP [\[7\]](#).

RFC-DSN-SMTP [\[7\]](#) is amended as follows: If the ORCPT information is available, the delivering MTA SHOULD insert an Original-Recipient header field at the beginning of the message (along with the Return-Path header field). The delivering MTA MAY delete any other Original-Recipient header fields that occur in the message. The syntax of this header field 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 header fields `Disposition-Notification-To`, `Disposition-Notification-Options`, and `Original-Recipient` with the MIME message/partial content type (RFC-MIME-MEDIA [4]) requires further definition.

When a message is segmented into two or more message/partial fragments, the three header fields mentioned in the above paragraph SHOULD be placed in the "inner" or "enclosed" message (using the terms of RFC-MIME-MEDIA [4]). These header fields SHOULD NOT be used in the header fields of any of the fragments themselves.

When the multiple message/partial fragments are reassembled, the following applies. If these header fields occur along with the other header fields of a message/partial fragment message, they pertain to an MDN that will be generated for the fragment. If these header fields occur in the header fields of the "inner" or "enclosed" message (using the terms of RFC-MIME-MEDIA [4]), they pertain to an MDN that will be generated for the reassembled message.

[Section 5.2.2.1](#) of RFC-MIME-MEDIA [4]) is amended to specify that, in addition to the header fields specified there, the three header fields described in this specification are to be appended, in order, to the header fields of the reassembled message. Any occurrences of the three header fields defined here in the header fields 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 [6]). 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 [6].





- 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 header fields 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 [2] header fields 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 field and the transport envelope) to the address(es) from the Disposition-Notification-To header field from the original message for which the MDN is being generated.

The From field of the message header field 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 field.

The Message-ID header field (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.

(While the 7bit restriction applies to the message/disposition-notification portion of the multipart/report content, it does not apply to the optional third portion of the multipart/report content.)

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 [\[2\]](#) 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 )
                                   *( extension-field CRLF )
extension-field = extension-field-name ":" *(CFWS / text)
extension-field-name = field-name
```

[ [ more work needed here ] ]



[[CREF6: Is this wording okay ? ]] Note that the order of the above fields is fixed.

### **3.1.1. General conventions for fields**

Since these fields are defined according to the rules of RFC-MSGFMT [2], 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 [5].

### **3.1.2. "-type" subfields**

Several fields consist of a "-type" subfield, followed by a semi-colon, followed by "\*text". [[ more work needed here ]]  
[[CREF7: ( Shouldn't this allow FWS somehow? Alexey: yes!) ]]  
[[CREF8: ( I see that address-type and mta-name-type uses atom instead of \*text, which not only permits FWS, but goes further to allow CFWS. ) ]]  
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

[[ more work needed here ]]  
[[CREF9: This is not \*text ]]

- 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

[[ more work needed here ]]  
[[CREF10: This is not \*text ]]



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 [[7](#)].) Registration forms for address-type and mta-name-type appear in RFC-DSN-FORMAT [[8](#)].

### [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-no-semi
ua-product = *text-no-semi
text-no-semi = %d1-9 /                ; text characters excluding NUL, CR,
              %d11 / %d12 / %d14-58 / %d60-127 ; LF, or semi-colon
```

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 field from the message for which the MDN is being generated. If there is no Original-Recipient header field 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 field 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 field in the message, the MUA may choose the one to use, or act as if no Original-Recipient header field 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 [\[2\]](#). 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 field 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 field of the message for which the MDN is issued. This field MUST be present if the original message contained a Message-ID header field. 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 [\[2\]](#).

#### **[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" ":" [FWS] disposition-mode ";"  
    [FWS] disposition-type  
    [ "/" disposition-modifier  
    *( "," disposition-modifier ) ]  
disposition-mode = action-mode "/" [FWS] sending-mode  
action-mode = "manual-action" / "automatic-action"  
sending-mode = "MDN-sent-manually" / "MDN-sent-automatically"  
disposition-type = "displayed" / "deleted" / "dispatched" /  
    "processed"  
disposition-modifier = [FWS]  
    ("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.
"dispatched"	The message has been sent somewhere in some manner (e.g., printed, faxed, forwarded) without necessarily having been previously displayed to the user. The user may or may not see the message later.
"processed"	The message has been processed in some manner (i.e., by some sort of rules or server) without being displayed to the user. The user may or may not see the message later, or there may not even be a human user associated with the mailbox.
"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 and Error Fields**

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

```
failure-field = "Failure" ":" *text
error-field = "Error" ":" *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" or "deleted" 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", or "deleted" 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 [7] permits such information to be carried in the envelope if it is available. The Original-Recipient header field 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 [7], 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 silently ignore requests for MDNs.

If the Disposition-Notification-To header field 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-SEC-SERVICES [\[10\]](#).

### **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 [\[2\]](#): atom, CRLF, FWS, CFWS, field-name, mailbox, msg-id, text. The definitions of attribute and value are as in the definition of the Content-Type header field in RFC-MIME-BODY [\[3\]](#).



## Message header fields:

```
mdn-request-header =
    "Disposition-Notification-To" ":" [FWS]
        mailbox *("," [FWS] mailbox)
Disposition-Notification-Options =
    "Disposition-Notification-Options" ":" [FWS]
        disposition-notification-parameter-list
disposition-notification-parameter-list =
    disposition-notification-parameter
        *("," [FWS] disposition-notification-parameter)
disposition-notification-parameter = attribute [FWS] "=" [FWS]
    importance "," [FWS] value *("," [FWS] 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 )
    *( extension-field CRLF )
address-type = atom
mta-name-type = atom
reporting-ua-field = "Reporting-UA" ":" ua-name [ ";" ua-product ]
ua-name = *text-no-semi
ua-product = *text-no-semi
text-no-semi = %d1-9 /          ; text characters excluding NUL, CR,
    %d11 / %d12 / %d14-58 / %d60-127      ; LF, or semi-colon
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
original-message-id-field = "Original-Message-ID" ":" msg-id
disposition-field =
    "Disposition" ":" [FWS] disposition-mode ";"
    [FWS] disposition-type
    [ "/" disposition-modifier
    *( "," disposition-modifier ) ]
disposition-mode = action-mode "/" [FWS] sending-mode
action-mode = "manual-action" / "automatic-action"
```



```
sending-mode = "MDN-sent-manually" / "MDN-sent-automatically"
disposition-type = "displayed" / "deleted" / "dispatched" /
    "processed"
disposition-modifier = [FWS]
    ("error" / disposition-modifier-extension)
disposition-modifier-extension = atom
failure-field = "Failure" ":" *text
error-field = "Error" ":" *text
extension-field = extension-field-name ":" *text
extension-field-name = field-name
```

## **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 field, 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 field 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 field 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 disposition-notification-parameter name for the Disposition-Notification-Options header field, 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 field disposition-notification-parameter names**

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

- a. The proposed disposition-notification-parameter name.
- b. The syntax for disposition-notification-parameter values, specified using BNF, ABNF, regular expressions, or other non-ambiguous language.
- c. If disposition-notification-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 field.
- d. A reference to a standards track RFC or experimental RFC approved by the IESG that describes the semantics of the disposition-notification-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 field.
- d. A reference to a standards track RFC or experimental RFC approved by the IESG that describes the semantics of the extension field.

## **11. Acknowledgements**

The contributions of Bruce Lilly and Alfred Hoenes are gratefully acknowledged for this revision.

The contributions of Roger Fajman and Greg Vaudreuil to earlier versions of this document are also gratefully acknowledged.



## **12. References**

### **12.1. Normative References**

- [1] Klensin, J., "Simple Mail Transfer Protocol", [RFC 2821](#), April 2001.
- [2] Resnick, P., Ed., "Internet Message Format", [RFC 5322](#), October 2008.
- [3] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", [RFC 2045](#), November 1996.
- [4] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types", [RFC 2046](#), November 1996.
- [5] Moore, K., "MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text", [RFC 2047](#), November 1996.
- [6] Vaudreuil, G., "The Multipart/Report Content Type for the Reporting of Mail System Administrative Messages", [RFC 3462](#), January 2003.
- [7] Moore, K., "Simple Mail Transfer Protocol (SMTP) Service Extension for Delivery Status Notifications (DSNs)", [RFC 3461](#), January 2003.
- [8] Moore, K. and G. Vaudreuil, "An Extensible Message Format for Delivery Status Notifications", [RFC 3464](#), January 2003.
- [9] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

### **12.2. Informative References**

- [10] Hoffman, P., "Enhanced Security Services for S/MIME", [RFC 2634](#), June 1999.

## **Appendix A. Changes from [RFC 3798](#)**

The values of "dispatched" and "processed" were lost from the ABNF for "disposition-type".





Because the warning disposition modifier was previously removed, warning-field has also been removed.

The ABNF for ua-name and ua-product included semi-colon, which could not be distinguished from \*text in the production. The ua-name and ua-product definitions were restricted to not include semi-colon.

The ABNF did not indicate all places that whitespace was allowable, in particular folding whitespace, although all implementations allow whitespace and folding in the header fields just like any other [RFC5322](#) [2]-formatted header field. There were also a number of places in the ABNF that inconsistently permitted comments and whitespace in one leg of the production and not another. The ABNF now specifies FWS and CFWS in several places that should have already been specified by the grammar.

Extension-field was defined in the collected grammar but not in the main text.

[[CREF11: Shouldn't the places we use \*text and \*text-no-semi allow FWS? ]]

The comparison of mailboxes in Disposition-Notification-To to the Return-Path addr-spec was clarified.

The use of the grammar production "parameter" was confusing with the [RFC2045](#) [3] production of the same name, as well as other uses of the same term. These have been clarified.

[[CREF12: Not sure what to do with this one: (From Bruce) In the case of the message header fields, [RFC 2822](#) also specifies minimum and maximum counts for each header field, and similar guidance would clarify 3798 (e.g. are multiple Disposition-Notification-Options fields permitted in a single message header, and if so, what semantics apply?). ]]

[[CREF13: Not sure what to do with this one: (From Bruce) Note also that [RFC 2045](#) is itself based on [RFC 822](#) rather than 2822, so the issue of where CFWS is permitted or prohibited should probably be clearly specified where "attribute" and "value" are used. Note further that the [RFC 2045](#) definitions are clarified by errata and modified by [RFC 2231](#), and by [RFC 2231](#) errata. Finally, note that [RFC 2231](#) has provisions for continuation of long parameter values (where there would otherwise be problems with the maximum line length specifications of RFCs 822 and 2822), specification of language and charset, and provision for compatible handling of non-ASCII text, none of which are provided for in the [RFC 3798](#) disposition-notification parameters. It might be a good idea to think about that now, as a future change would almost certainly reset the document status to "Proposed". ]]



A clarification was added on the extent of the 7bit nature of MDNs.

Uses of the terms "may" and "might" were clarified.

A clarification was added on the order of the fields in the message/disposition-notification content.

[[CREF14: Not sure what to do with this one: (From Bruce) 3.1.1 explicitly mentions use of [RFC 2047](#) encoded-words in comments (however, as noted above there is no explicit provision for comments), but fails to mention the other contexts in which encoded-words may be used, viz. in an RFC [2]822 "phrase" (e.g. in the display name of a name-addr mailbox in Disposition-Notification-To (therefore, the discussion of encoded-words should probably be moved earlier in the document, prior to the specification of Disposition-Notification-To)), and in unstructured text (i.e. every instance of \*text in the ABNF). In particular, use of encoded-words might be highly desirable in the following places: \*) the ua-product portion of the Reporting-UA field; \*) the generic-address part of the Original-Recipient and Final-Recipient fields; \*) the (unstructured) field bodies of Error, Failure, and Warning fields; in structured extension fields where the context (per [RFC 2047](#)) is appropriate in unstructured extension fields; \*) in X- extension fields (see [RFC 2047](#) for related X- message header fields). In cases where the field syntax is shared with DSN fields, some coordination with the RFC 346x authors might be desirable. ]]

[[CREF15: I think a couple of clarifications are in order: 1) This restriction is within a given mail user agent. If the user uses multiple MUAs, it is possible that multiple MDNs MAY be generated. 2) A mail user agent SHOULD use underlying protocol support when possible to prevent multiple MDNs from being generated. If underlying protocol support is not available, the mail user agent MUST use local knowledge to prevent multiple MDNs. I don't think we need to worry about the case of an MUA error; accidents and bad implementations DO happen. (From Bruce) 3.2.6.3 prohibition against multiple MDNs being issued on behalf of each recipient poses some implementation difficulties: \*) While IMAP servers maintain state that could possibly be used to prevent issuance of multiple MDNs, the POP protocol has no such provision. Even in the case of IMAP, there is some ambiguity in the case of shared mailboxes. \*) Some MUAs are known to have extreme difficulty keeping track of which messages have been seen, let alone responded to. Software version updates, minor configuration changes (e.g. domain name or IP address change of POP or IMAP server) are known to "confuse" some MUAs. \*) there is no standardized mechanism for communicating status between multiple MUAs accessing the same mailbox (except in the case of IMAP, as noted above). Therefore, if an MDN is sent when a message is viewed (etc.) using one MUA, a different MUA subsequently being used to view the same message in the same user's mailbox (either via POP, or from a



flat file mailbox) might have no way to determine that an MDN had already been sent. This is a fundamental difficulty with the specified protocol (relaxing "MUST NOT" to "SHOULD NOT" is one possible way around that difficulty -- otherwise the document contains a "known technical omission" viz. no defined means of establishing whether or not an MDN has already been sent for a particular message. I believe that "known technical omissions" are a barrier to further Standards Track progress). \*) Due to aliases, forwarding, etc. an original message sent to multiple addresses might end up as multiple copies in a single recipient's mailbox. It is unclear whether or not multiple MDNs are permitted in that case (the Message-ID, if present in the original, will be the same in the copies, and the "particular recipient" could be interpreted as being the same, even though the addresses specified in the original message transport envelope might have appeared to have been distinct to the originator who requested MDNs. ]]

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