             Simple Mail Transfer Protocol (SMTP) Service Extension
                   for Delivery Status Notifications (DSNs)

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.

Copyright Notice

Abstract

   This memo defines an extension to the Simple Mail Transfer Protocol
   (SMTP) service, which allows an SMTP client to specify (a) that
   Delivery Status Notifications (DSNs) should be generated under
   certain conditions, (b) whether such notifications should return the
   contents of the message, and (c) additional information, to be
   returned with a DSN, that allows the sender to identify both the
   recipient(s) for which the DSN was issued, and the transaction in
   which the original message was sent.

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 BCP 14, RFC 2119 [7].

Table of Contents

1. Introduction

   The SMTP protocol [1] requires that an SMTP server provide
   notification of delivery failure, if it determines that a message
   cannot be delivered to one or more recipients. Traditionally, such
   notification consists of an ordinary Internet mail message (format
   defined by [2]), sent to the envelope sender address (the argument of
   the SMTP MAIL command), containing an explanation of the error and at
   least the headers of the failed message.

   Experience with large mail distribution lists [8] indicates that such
   messages are often insufficient to diagnose problems, or even to
   determine at which host or for which recipients a problem occurred.
   In addition, the lack of a standardized format for delivery
   notifications in Internet mail makes it difficult to exchange such
   notifications with other message handling systems.

   Such experience has demonstrated a need for a delivery status
   notification service for Internet electronic mail, which:

   (a) is reliable, in the sense that any DSN request will either be
        honored at the time of final delivery, or result in a response
        that indicates that the request cannot be honored,

   (b) when both success and failure notifications are requested,
        provides an unambiguous and nonconflicting indication of whether
        delivery of a message to a recipient succeeded or failed,

   (c) is stable, in that a failed attempt to deliver a DSN should
        never result in the transmission of another DSN over the
        network,

   (d) preserves sufficient information to allow the sender to identify
        both the mail transaction and the recipient address which caused
        the notification, even when mail is forwarded or gatewayed to
        foreign environments, and

   (e) interfaces acceptably with non-SMTP and non-822-based mail
        systems, both so that notifications returned from foreign mail
        systems may be useful to Internet users, and so that the
        notification requests from foreign environments may be honored.
        Among the requirements implied by this goal are the ability to
        request non-return-of-content, and the ability to specify
        whether positive delivery notifications, negative delivery
        notifications, both, or neither, should be issued.

In an attempt to provide such a service, this memo uses the mechanism
defined in [1] to define an extension to the SMTP protocol. Using
this mechanism, an SMTP client may request that an SMTP server issue
or not issue a Delivery Status Notification (DSN) under certain
conditions. The format of a DSN is defined in [3].

2. Framework for the Delivery Status Notification Extension

   The following service extension is therefore defined:

   (1)   The name of the SMTP service extension is "Delivery Status
         Notification";

   (2)   the EHLO keyword value associated with this extension is "DSN",
         the meaning of which is defined in section 3 of this memo;

   (3)   no parameters are allowed with this EHLO keyword value;

   (4)   two optional parameters are added to the RCPT command, and two
         optional parameters are added to the MAIL command:

         An optional parameter for the RCPT command, using the
         esmtp-keyword "NOTIFY", (to specify the conditions under which a
         Delivery Status Notification should be generated), is defined in
         section 5.1,

         An optional parameter for the RCPT command, using the
         esmtp-keyword "ORCPT", (used to convey the "original"
         (sender-specified) recipient address), is defined in section
         5.2, and

         An optional parameter for the MAIL command, using the
         esmtp-keyword "RET", (to request that DSNs containing an
         indication of delivery failure either return the entire contents
         of a message or only the message headers), is defined in section
         5.3,

         An optional parameter for the MAIL command, using the
         esmtp-keyword "ENVID", (used to propagate an identifier for this
         message transmission envelope, which is also known to the sender
         and will, if present, be returned in any DSNs issued for this
         transmission), is defined in section 4.4;

   (5)   no additional SMTP verbs are defined by this extension.

   The remainder of this memo specifies how support for the extension
   affects the behavior of a message transfer agent.

3. The Delivery Status Notification service extension

   An SMTP client wishing to request a DSN for a message may issue the
   EHLO command to start an SMTP session, to determine if the server
   supports any of several service extensions. If the server responds
   with code 250 to the EHLO command, and the response includes the EHLO
   keyword DSN, then the Delivery Status Notification extension (as
   described in this memo) is supported.

   Ordinarily, when an SMTP server returns a positive (2xx) reply code
   in response to a RCPT command, it agrees to accept responsibility for
   either delivering the message to the named recipient, or sending a
   notification to the sender of the message indicating that delivery
   has failed. However, an extended SMTP ("ESMTP") server which
   implements this service extension will accept an optional NOTIFY
   parameter with the RCPT command. If present, the NOTIFY parameter
   alters the conditions for generation of Delivery Status Notifications
   from the default (issue notifications only on failure) specified in
   [1]. The ESMTP client may also request (via the RET parameter)
   whether the entire contents of the original message should be
   returned (as opposed to just the headers of that message), along with
   the DSN.

   In general, an ESMTP server which implements this service extension
   will propagate Delivery Status Notification requests when relaying
   mail to other SMTP-based MTAs which also support this extension, and
   make a "best effort" to ensure that such requests are honored when
   messages are passed into other environments.

   In order for Delivery Status Notifications to be meaningful to the
   sender, ESMTP servers, which support this extension, should propagate
   the following information for use in generating DSNs to any other
   MTAs that are used to relay the message:

   (a) for each recipient, a copy of the original recipient address, as
        used by the sender of the message.

        This address need not be the same as the mailbox specified in
        the RCPT command. For example, if a message was originally
        addressed to A@B.C and later forwarded to A@D.E, after such
        forwarding has taken place, the RCPT command will specify a
        mailbox of A@D.E. However, the original recipient address
        remains A@B.C.

          Also, if the message originated from an environment which does
          not use Internet-style user@domain addresses, and was gatewayed
          into SMTP, the original recipient address will preserve the
          original form of the recipient address.

     (b) for the entire SMTP transaction, an envelope identification
          string, which may be used by the sender to associate any
          delivery status notifications with the transaction used to send
          the original message.

4. Additional parameters for RCPT and MAIL commands

   The extended RCPT and MAIL commands are issued by a client when it
   wishes to request a DSN from the server, under certain conditions,
   for a particular recipient. The extended RCPT and MAIL commands are
   identical to the RCPT and MAIL commands defined in [1], except that
   one or more of the following parameters appear after the sender or
   recipient address, respectively. The general syntax for extended
   SMTP commands is defined in [1].

   NOTE: Although RFC 822 ABNF is used to describe the syntax of these
   parameters, they are not, in the language of that document,
   "structured field bodies". Therefore, while parentheses MAY appear
   within an emstp-value, they are not recognized as comment delimiters.

   The syntax for "esmtp-value" in [1] does not allow SP, "=", control
   characters, or characters outside the traditional ASCII range of
   1-127 decimal to be transmitted in an esmtp-value. Because the ENVID
   and ORCPT parameters may need to convey values outside this range,
   the esmtp-values for these parameters are encoded as "xtext".
   "xtext" is formally defined as follows:

       xtext = *(xchar / hexchar)

       xchar = any ASCII CHAR between "!" (33) and "~" (126) inclusive,
               except for "+" and "=".

       ; "hexchar"s are intended to encode octets that cannot appear
       ; as ASCII characters within an esmtp-value.

       hexchar = ASCII "+" immediately followed by two upper case
                 hexadecimal digits

   When encoding an octet sequence as xtext:

   + Any ASCII CHAR between "!" and "~" inclusive, except for "+" and
      "=", MAY be encoded as itself. (A CHAR in this range MAY instead
      be encoded as a "hexchar", at the implementor's discretion.)

   + ASCII CHARs that fall outside the range above must be encoded as
      "hexchar".

4.1 The NOTIFY parameter of the ESMTP RCPT command

   A RCPT command issued by a client may contain the optional
   esmtp-keyword "NOTIFY", to specify the conditions under which the
   SMTP server should generate DSNs for that recipient. If the NOTIFY
   esmtp-keyword is used, it MUST have an associated esmtp-value,
   formatted according to the following rules, using the ABNF of RFC
   822:

      notify-esmtp-value = "NEVER" / 1#notify-list-element

      notify-list-element = "SUCCESS" / "FAILURE" / "DELAY"

   Notes:

   a. Multiple notify-list-elements, separated by commas, MAY appear in
      a NOTIFY parameter; however, the NEVER keyword MUST appear by
      itself.

   b. Any of the keywords NEVER, SUCCESS, FAILURE, or DELAY may be
      spelled in any combination of upper and lower case letters.

   The meaning of the NOTIFY parameter values is generally as follows:

   + A NOTIFY parameter value of "NEVER" requests that a DSN not be
      returned to the sender under any conditions.

   + A NOTIFY parameter value containing the "SUCCESS" or "FAILURE"
      keywords requests that a DSN be issued on successful delivery or
      delivery failure, respectively.

   + A NOTIFY parameter value containing the keyword "DELAY" indicates
      the sender's willingness to receive "delayed" DSNs. Delayed DSNs
      may be issued if delivery of a message has been delayed for an
      unusual amount of time (as determined by the MTA at which the
      message is delayed), but the final delivery status (whether
      successful or failure) cannot be determined. The absence of the
      DELAY keyword in a NOTIFY parameter requests that a "delayed" DSN
      NOT be issued under any conditions.

   The actual rules governing interpretation of the NOTIFY parameter are
   given in section 6.

For compatibility with SMTP clients that do not use the NOTIFY
facility, the absence of a NOTIFY parameter in a RCPT command may be
interpreted as either NOTIFY=FAILURE or NOTIFY=FAILURE,DELAY.

4.2 The ORCPT parameter to the ESMTP RCPT command

The ORCPT esmtp-keyword of the RCPT command is used to specify an
"original" recipient address that corresponds to the actual recipient
to which the message is to be delivered. If the ORCPT esmtp-keyword
is used, it MUST have an associated esmtp-value, which consists of
the original recipient address, encoded according to the rules below.
The ABNF for the ORCPT parameter is:

    orcpt-parameter = "ORCPT=" original-recipient-address

    original-recipient-address = addr-type ";" xtext

    addr-type = atom

The "addr-type" portion MUST be an IANA-registered electronic mail
address-type (as defined in [3]), while the "xtext" portion contains
an encoded representation of the original recipient address using the
rules in section 5 of this document. The entire ORCPT parameter MAY
be up to 500 characters in length.

When initially submitting a message via SMTP, if the ORCPT parameter
is used, it MUST contain the same address as the RCPT TO address
(unlike the RCPT TO address, the ORCPT parameter will be encoded as
xtext). Likewise, when a mailing list submits a message via SMTP to
be distributed to the list subscribers, if ORCPT is used, the ORCPT
parameter MUST match the new RCPT TO address of each recipient, not
the address specified by the original sender of the message.)

The "addr-type" portion of the original-recipient-address is used to
indicate the "type" of the address which appears in the ORCPT
parameter value. However, the address associated with the ORCPT
keyword is NOT constrained to conform to the syntax rules for that
"addr-type".

Ideally, the "xtext" portion of the original-recipient-address should
contain, in encoded form, the same sequence of characters that the
sender used to specify the recipient. However, for a message
gatewayed from an environment (such as X.400) in which a recipient
address is not a simple string of printable characters, the
representation of recipient address must be defined by a
specification for gatewaying between DSNs and that environment.

Due to limitations in the Delivery Status Notification format, the
value of the original recipient address prior to encoding as "xtext"
MUST consist entirely of printable (graphic and white space)
characters from the US-ASCII [4] repertoire. If an addr-type is
defined for addresses which use characters outside of this
repertoire, the specification for that addr-type MUST define the
means of encoding those addresses in printable US-ASCII characters
when are then encoded as xtext.

4.3 The RET parameter of the ESMTP MAIL command

The RET esmtp-keyword on the extended MAIL command specifies whether
or not the message should be included in any failed DSN issued for
this message transmission. If the RET esmtp-keyword is used, it MUST
have an associated esmtp-value, which is one of the following
keywords:

FULL requests that the entire message be returned in any "failed"
    Delivery Status Notification issued for this recipient.

HDRS requests that only the headers of the message be returned.

The FULL and HDRS keywords may be spelled in any combination of upper
and lower case letters.

If no RET parameter is supplied, the MTA MAY return either the
headers of the message or the entire message for any DSN containing
indication of failed deliveries.

Note that the RET parameter only applies to DSNs that indicate
delivery failure for at least one recipient. If a DSN contains no
indications of delivery failure, only the headers of the message
should be returned.

4.4 The ENVID parameter to the ESMTP MAIL command

The ENVID esmtp-keyword of the SMTP MAIL command is used to specify
an "envelope identifier" to be transmitted along with the message and
included in any DSNs issued for any of the recipients named in this
SMTP transaction. The purpose of the envelope identifier is to allow
the sender of a message to identify the transaction for which the DSN
was issued.

The ABNF for the ENVID parameter is:

    envid-parameter = "ENVID=" xtext

The ENVID esmtp-keyword MUST have an associated esmtp-value. No
meaning is assigned by the mail system to the presence or absence of
this parameter or to any esmtp-value associated with this parameter;
the information is used only by the sender or his user agent. The
ENVID parameter MAY be up to 100 characters in length.

Due to limitations in the Delivery Status Notification format, the
value of the ENVID parameter prior to encoding as "xtext" MUST
consist entirely of printable (graphic and white space) characters
from the US-ASCII [4] repertoire.

4.5 Restrictions on the use of Delivery Status Notification parameters

The RET and ENVID parameters MUST NOT appear more than once each in
any single MAIL command. If more than one of either of these
parameters appears in a MAIL command, the ESMTP server SHOULD respond
with "501 syntax error in parameters or arguments".

The NOTIFY and ORCPT parameters MUST NOT appear more than once in any
RCPT command. If more than one of either of these parameters appears
in a RCPT command, the ESMTP server SHOULD respond with "501 syntax
error in parameters or arguments".

5. Conformance requirements

The Simple Mail Transfer Protocol (SMTP) is used by Message Transfer
Agents (MTAs) when accepting, relaying, or gatewaying mail, as well
as User Agents (UAs) when submitting mail to the mail transport
system. The DSN extension to SMTP may be used to allow UAs to convey
the sender's requests as to when DSNs should be issued. A UA which
claims to conform to this specification must meet certain
requirements as described below.

Typically, a message transfer agent (MTA) which supports SMTP will
assume, at different times, both the role of a SMTP client and an
SMTP server, and may also provide local delivery, gatewaying to
foreign environments, forwarding, and mailing list expansion. An MTA
which, when acting as an SMTP server, issues the DSN keyword in
response to the EHLO command, MUST obey the rules below for a
"conforming SMTP client" when acting as a client, and a "conforming
SMTP server" when acting as a server. The term "conforming MTA"
refers to an MTA which conforms to this specification, independent of
its role of client or server.

5.1 SMTP protocol interactions

   The following rules apply to SMTP transactions in which any of the
   ENVID, NOTIFY, RET, or ORCPT keywords are used:

   (a) If an SMTP client issues a MAIL command containing a valid ENVID
       parameter and associated esmtp-value and/or a valid RET parameter
       and associated esmtp-value, a conforming SMTP server MUST return
       the same reply-code as it would to the same MAIL command without
       the ENVID and/or RET parameters. A conforming SMTP server MUST
       NOT refuse a MAIL command based on the absence or presence of
       valid ENVID or RET parameters, or on their associated
       esmtp-values.

       However, if the associated esmtp-value is not valid (i.e.,
       contains illegal characters), or if there is more than one ENVID
       or RET parameter in a particular MAIL command, the server MUST
       issue the reply-code 501 with an appropriate message (e.g.,
       "syntax error in parameter").

   (b) If an SMTP client issues a RCPT command containing any valid
       NOTIFY and/or ORCPT parameters, a conforming SMTP server MUST
       return the same response as it would to the same RCPT command
       without those NOTIFY and/or ORCPT parameters. A conforming SMTP
       server MUST NOT refuse a RCPT command based on the presence or
       absence of any of these parameters.

       However, if any of the associated esmtp-values are not valid, or
       if there is more than one of any of these parameters in a
       particular RCPT command, the server SHOULD issue the response
       "501 syntax error in parameter".

5.2 Handling of messages received via SMTP

   This section describes how a conforming MTA should handle any
   messages received via SMTP.

   NOTE: A DSN MUST NOT be returned to the sender for any message for
   which the return address from the SMTP MAIL command was NULL ("<>"),
   even if the sender's address is available from other sources (e.g.,
   the message header). However, the MTA which would otherwise issue a
   DSN SHOULD inform the local postmaster of delivery failures through
   some appropriate mechanism that will not itself result in the
   generation of DSNs.

   DISCUSSION: RFC 1123, section 2.3.3 requires error notifications to
   be sent with a NULL return address ("reverse-path"). This creates an
   interesting situation when a message arrives with one or more

nonfunctional recipient addresses in addition to a nonfunctional
return address. When delivery to one of the recipient addresses
fails, the MTA will attempt to send a nondelivery notification to the
return address, setting the return address on the notification to
NULL. When the delivery of this notification fails, the MTA
attempting delivery of that notification sees a NULL return address.
If that MTA were not to inform anyone of the situation, the original
message would be silently lost. Furthermore, a nonfunctional return
address is often indicative of a configuration problem in the
sender's MTA. Reporting the condition to the local postmaster may
help to speed correction of such errors.

5.2.1 Relay of messages to other conforming SMTP servers

   The following rules govern the behavior of a conforming MTA, when
   relaying a message which was received via the SMTP protocol, to an
   SMTP server that supports the Delivery Status Notification service
   extension:

   (a) Any ENVID parameter included in the MAIL command when a message
       was received, MUST also appear on the MAIL command with which the
       message is relayed, with the same associated esmtp-value. If no
       ENVID parameter was included in the MAIL command when the message
       was received, the ENVID parameter MUST NOT be supplied when the
       message is relayed.

   (b) Any RET parameter included in the MAIL command when a message was
       received, MUST also appear on the MAIL command with which the
       message is relayed, with the same associated esmtp-value. If no
       RET parameter was included in the MAIL command when the message
       was received, the RET parameter MUST NOT supplied when the
       message is relayed.

   (c) If the NOTIFY parameter was supplied for a recipient when the
       message was received, the RCPT command issued when the message is
       relayed MUST also contain the NOTIFY parameter along with its
       associated esmtp-value. If the NOTIFY parameter was not supplied
       for a recipient when the message was received, the NOTIFY
       parameter MUST NOT be supplied for that recipient when the
       message is relayed.

   (d) If any ORCPT parameter was present in the RCPT command for a
       recipient when the message was received, an ORCPT parameter with
       the identical original-recipient-address MUST appear in the RCPT
       command issued for that recipient when relaying the message.
       (For example, the MTA therefore MUST NOT change the case of any
       alphabetic characters in an ORCPT parameter.)

If no ORCPT parameter was present in the RCPT command when the
message was received, an ORCPT parameter MAY be added to the RCPT
command when the message is relayed. If an ORCPT parameter is
added by the relaying MTA, it MUST contain the recipient address
from the RCPT command used when the message was received by that
MTA.

5.2.2 Relay of messages to non-conforming SMTP servers

   The following rules govern the behavior of a conforming MTA (in the
   role of client), when relaying a message which was received via the
   SMTP protocol, to an SMTP server that does not support the Delivery
   Status Notification service extension:

   (a) ENVID, NOTIFY, RET, or ORCPT parameters MUST NOT be issued when
       relaying the message.

   (b) If the NOTIFY parameter was supplied for a recipient, with an
       esmtp-value containing the keyword SUCCESS, and the SMTP server
       returns a success (2xx) reply-code in response to the RCPT
       command, the client MUST issue a "relayed" DSN for that
       recipient.

   (c) If the NOTIFY parameter was supplied for a recipient with an
       esmtp-value containing the keyword FAILURE, and the SMTP server
       returns a permanent failure (5xx) reply-code in response to the
       RCPT command, the client MUST issue a "failed" DSN for that
       recipient.

   (d) If the NOTIFY parameter was supplied for a recipient with an
       esmtp-value of NEVER, the client MUST NOT issue a DSN for that
       recipient, regardless of the reply-code returned by the SMTP
       server. However, if the server returned a failure (5xx)
       reply-code, the client MAY inform the local postmaster of the
       delivery failure via an appropriate mechanism that will not
       itself result in the generation of DSNs.

       When attempting to relay a message to an SMTP server that does
       not support this extension, and if NOTIFY=NEVER was specified for
       some recipients of that message, a conforming SMTP client MAY
       relay the message for those recipients in a separate SMTP
       transaction, using an empty reverse-path in the MAIL command.
       This will prevent DSNs from being issued for those recipients by
       MTAs that conform to [1].

    (e) If a NOTIFY parameter was not supplied for a recipient, and the
        SMTP server returns a success (2xx) reply-code in response to a
        RCPT command, the client MUST NOT issue any DSN for that
        recipient.

    (f) If a NOTIFY parameter was not supplied for a recipient, and the
        SMTP server returns a permanent failure (5xx) reply-code in
        response to a RCPT command, the client MUST issue a "failed" DSN
        for that recipient.

5.2.3 Local delivery of messages

    The following rules govern the behavior of a conforming MTA upon
    successful delivery of a message that was received via the SMTP
    protocol, to a local recipient's mailbox:

    "Delivery" means that the message has been placed in the recipient's
    mailbox. For messages which are transmitted to a mailbox for later
    retrieval via IMAP [9], POP [10] or a similar message access
    protocol, "delivery" occurs when the message is made available to the
    IMAP (POP, etc.) service, rather than when the message is retrieved
    by the recipient's user agent.

    Similarly, for a recipient address which corresponds to a mailing
    list exploder, "delivery" occurs when the message is made available
    to that list exploder, even though the list exploder might refuse to
    deliver that message to the list recipients.

    (a) If the NOTIFY parameter was supplied for that recipient, with an
        esmtp-value containing the SUCCESS keyword, the MTA MUST issue a
        "delivered" DSN for that recipient.

    (b) If the NOTIFY parameter was supplied for that recipient which did
        not contain the SUCCESS keyword, the MTA MUST NOT issue a DSN for
        that recipient.

    (c) If the NOTIFY parameter was not supplied for that recipient, the
        MTA MUST NOT issue a DSN.

5.2.4 Gatewaying a message into a foreign environment

    The following rules govern the behavior of a conforming MTA, when
    gatewaying a message that was received via the SMTP protocol, into a
    foreign (non-SMTP) environment:

    (a) If the the foreign environment is capable of issuing appropriate
        notifications under the conditions requested by the NOTIFY
        parameter, and the conforming MTA can ensure that any

notification thus issued will be translated into a DSN and
delivered to the original sender, then the MTA SHOULD gateway the
message into the foreign environment, requesting notification
under the desired conditions, without itself issuing a DSN.

(b) If a NOTIFY parameter was supplied with the SUCCESS keyword, but
the destination environment cannot return an appropriate
notification on successful delivery, the MTA SHOULD issue a
"relayed" DSN for that recipient.

(c) If a NOTIFY parameter was supplied with an esmtp-keyword of
NEVER, a DSN MUST NOT be issued. If possible, the MTA SHOULD
direct the destination environment to not issue delivery
notifications for that recipient.

(d) If the NOTIFY parameter was not supplied for a particular
recipient, a DSN SHOULD NOT be issued by the gateway. The
gateway SHOULD attempt to ensure that appropriate notification
will be provided by the foreign mail environment if eventual
delivery failure occurs, and that no notification will be issued
on successful delivery.

(e) When gatewaying a message into a foreign environment, the
return-of-content conditions specified by any RET parameter are
nonbinding; however, the MTA SHOULD attempt to honor the request
using whatever mechanisms exist in the foreign environment.

5.2.5 Delays in delivery

If a conforming MTA receives a message via the SMTP protocol, and is
unable to deliver or relay the message to one or more recipients for
an extended length of time (to be determined by the MTA), it MAY
issue a "delayed" DSN for those recipients, subject to the following
conditions:

(a) If the NOTIFY parameter was supplied for a recipient and its
value included the DELAY keyword, a "delayed" DSN MAY be issued.

(b) If the NOTIFY parameter was not supplied for a recipient, a
"delayed" DSN MAY be issued.

(c) If the NOTIFY parameter was supplied which did not contain the
DELAY keyword, a "delayed" DSN MUST NOT be issued.

   NOTE: Although delay notifications are common in present-day
   electronic mail, a conforming MTA is never required to issue
   "delayed" DSNs. The DELAY keyword of the NOTIFY parameter is
   provided to allow the SMTP client to specifically request (by
   omitting the DELAY parameter) that "delayed" DSNs NOT be issued.

5.2.6 Failure of a conforming MTA to deliver a message

   The following rules govern the behavior of a conforming MTA which
   received a message via the SMTP protocol, and is unable to deliver a
   message to a recipient specified in the SMTP transaction:

   (a) If a NOTIFY parameter was supplied for the recipient with an
        esmtp-keyword containing the value FAILURE, a "failed" DSN MUST
        be issued by the MTA.

   (b) If a NOTIFY parameter was supplied for the recipient which did
        not contain the value FAILURE, a DSN MUST NOT be issued for that
        recipient. However, the MTA MAY inform the local postmaster of
        the delivery failure via some appropriate mechanism which does
        not itself result in the generation of DSNs.

   (c) If no NOTIFY parameter was supplied for the recipient, a
        "failed" DSN MUST be issued.

   NOTE: Some MTAs are known to forward undeliverable messages to the
   local postmaster or "dead letter" mailbox. This is still considered
   delivery failure, and does not diminish the requirement to issue a
   "failed" DSN under the conditions defined elsewhere in this memo. If
   a DSN is issued for such a recipient, the Action value MUST be
   "failed".

5.2.7 Forwarding, aliases, and mailing lists

   Delivery of a message to a local email address usually causes the
   message to be stored in the recipient's mailbox. However, MTAs
   commonly provide a facility where a local email address can be
   designated as an "alias" or "mailing list"; delivery to that address
   then causes the message to be forwarded to each of the (local or
   remote) recipient addresses associated with the alias or list. It is
   also common to allow a user to optionally "forward" her mail to one
   or more alternate addresses. If this feature is enabled, her mail is
   redistributed to those addresses instead of being deposited in her
   mailbox.

   Following the example of [11] (section 5.3.6), this document defines
   the difference between an "alias" and "mailing list" as follows: When
   forwarding a message to the addresses associated with an "alias", the

envelope return address (e.g., SMTP MAIL FROM) remains intact.
However, when forwarding a message to the addresses associated with a
"mailing list", the envelope return address is changed to that of the
administrator of the mailing list. This causes DSNs and other
nondelivery reports resulting from delivery to the list members to be
sent to the list administrator rather than the sender of the original
message.

The DSN processing for aliases and mailing lists is as follows:

5.2.7.1 mailing lists

When a message is delivered to a list submission address (i.e.,
placed in the list's mailbox for incoming mail, or accepted by the
process that redistributes the message to the list subscribers), this
is considered final delivery for the original message. If the NOTIFY
parameter for the list submission address contained the SUCCESS
keyword, a "delivered" DSN MUST be returned to the sender of the
original message.

NOTE: Some mailing lists are able to reject message submissions,
based on the content of the message, the sender's address, or some
other criteria. While the interface between such a mailing list and
its MTA is not well-defined, it is important that DSNs NOT be issued
by both the MTA (to report successful delivery to the list), and the
list (to report message rejection using a "failure" DSN.)

However, even if a "delivered" DSN was issued by the MTA, a mailing
list which rejects a message submission MAY notify the sender that
the message was rejected using an ordinary message instead of a DSN.

Whenever a message is redistributed to an mailing list,

(a)   The envelope return address is rewritten to point to the list
      maintainer. This address MAY be that of a process that
      recognizes DSNs and processes them automatically, but it MUST
      forward unrecognized messages to the human responsible for the
      list.

(b)   The ENVID, NOTIFY, RET, and ORCPT parameters which accompany the
      redistributed message MUST NOT be derived from those of the
      original message.

(c)   The NOTIFY and RET parameters MAY be specified by the local
      postmaster or the list administrator. If ORCPT parameters are
      supplied during redistribution to the list subscribers, they
      SHOULD contain the addresses of the list subscribers in the
      format used by the mailing list.

5.2.7.2 single-recipient aliases

   Under normal circumstances, when a message arrives for an "alias"
   which has a single forwarding address, a DSN SHOULD NOT be issued.
   Any ENVID, NOTIFY, RET, or ORCPT parameters SHOULD be propagated with
   the message as it is redistributed to the forwarding address.

5.2.7.3 multiple-recipient aliases

   An "alias" with multiple recipient addresses may be handled in any of
   the following ways:

   (a) Any ENVID, NOTIFY, RET, or ORCPT parameters are NOT propagated
        when relaying the message to any of the forwarding addresses.
        If the NOTIFY parameter for the alias contained the SUCCESS
        keyword, the MTA issues a "relayed" DSN. (In effect, the MTA
        treats the message as if it were being relayed into an
        environment that does not support DSNs.)

   (b) Any ENVID, NOTIFY, RET, or ORCPT parameters (or the equivalent
        requests if the message is gatewayed) are propagated to EXACTLY
        one of the forwarding addresses. No DSN is issued. (This is
        appropriate when aliasing is used to forward a message to a
        "vacation" auto-responder program in addition to the local
        mailbox.)

   (c) Any ENVID, RET, or ORCPT parameters are propagated to all
        forwarding addresses associated with that alias. The NOTIFY
        parameter is propagated to the forwarding addresses, except that
        it any SUCCESS keyword is removed. If the original NOTIFY
        parameter for the alias contained the SUCCESS keyword, an
        "expanded" DSN is issued for the alias. If the NOTIFY parameter
        for the alias did not contain the SUCCESS keyword, no DSN is
        issued for the alias.

5.2.7.4 confidential forwarding addresses

   If it is desired to maintain the confidentiality of a recipient's
   forwarding address, the forwarding may be treated as if it were a
   mailing list. A DSN will be issued, if appropriate, upon "delivery"
   to the recipient address specified by the sender. When the message
   is forwarded it will have a new envelope return address. Any DSNs
   which result from delivery failure of the forwarded message will not
   be returned to the original sender of the message and thus not expose
   the recipient's forwarding address.

5.2.8 DSNs describing delivery to multiple recipients

   A single DSN may describe attempts to deliver a message to multiple
   recipients of that message. If a DSN is issued for some recipients
   in an SMTP transaction and not for others according to the rules
   above, the DSN SHOULD NOT contain information for recipients for whom
   DSNs would not otherwise have been issued.

5.3 Handling of messages from other sources

   For messages which originated from "local" users (whatever that
   means), the specifications under which DSNs should be generated can
   be communicated to the MTA via any protocol agreed on between the
   sender's mail composer (user agent) and the MTA. The local MTA can
   then either relay the message, or issue appropriate delivery status
   notifications. However, if such requests are transmitted within the
   message itself (for example in the message headers), the requests
   MUST be removed from the message before it is transmitted via SMTP.

   For messages gatewayed from non-SMTP sources and further relayed by
   SMTP, the gateway SHOULD, using the SMTP extensions described here,
   attempt to provide the delivery reporting conditions expected by the
   source mail environment. If appropriate, any DSNs returned to the
   source environment SHOULD be translated into the format expected in
   that environment.

5.4 Implementation limits

   A conforming MTA MUST accept ESMTP parameters of at least the
   following sizes:

   (a) ENVID parameter: 100 characters.

   (b) NOTIFY parameter: 28 characters.

   (c) ORCPT parameter: 500 characters.

   (d) RET parameter: 8 characters.

   The maximum sizes for the ENVID and ORCPT parameters are intended to
   be adequate for the transmission of "foreign" envelope identifier and
   original recipient addresses. However, user agents which use SMTP as
   a message submission protocol SHOULD NOT generate ENVID parameters
   which are longer than 38 characters in length.

   A conforming MTA MUST be able to accept SMTP command-lines which are
   at least 1036 characters long (530 characters for the ORCPT and
   NOTIFY parameters of the RCPT command, in addition to the 512

characters required by [1]). If other SMTP extensions are supported
by the MTA, the MTA MUST be able to accept a command-line large
enough for each SMTP command and any combination of ESMTP parameters
which may be used with that command.

6. Format of delivery notifications

   The format of Delivery Status Notifications is defined in [3], which
   uses the framework defined in [5]. Delivery Status Notifications are
   to be returned to the sender of the original message as outlined
   below.

6.1 SMTP Envelope to be used with Delivery Status Notifications

   The DSN sender address (in the SMTP MAIL command) MUST be a null
   reverse-path ("<>"), as required by section 5.3.3 of [11]. The DSN
   recipient address (in the RCPT command) is copied from the MAIL
   command which accompanied the message for which the DSN is being
   issued. When transmitting a DSN via SMTP, the RET parameter MUST NOT
   be used. The NOTIFY parameter MAY be used, but its value MUST be
   NEVER. The ENVID parameter (with a newly generated envelope-id)
   and/or ORCPT parameter MAY be used.

6.2 Contents of the DSN

   A DSN is transmitted as a MIME message with a top-level content-type
   of multipart/report (as defined in [3]).

   The multipart/report content-type may be used for any of several
   kinds of reports generated by the mail system. When multipart/report
   is used to convey a DSN, the report-type parameter of the
   multipart/report content-type is "delivery-status".

   As described in [5], the first component of a multipart/report
   content-type is a human readable explanation of the report. For a
   DSN, the second component of the multipart/report is of content-type
   message/delivery-status (defined in [3]). The third component of the
   multipart/report consists of the original message or some portion
   thereof. When the value of the RET parameter is FULL, the full
   message SHOULD be returned for any DSN which conveys notification of
   delivery failure. (However, if the length of the message is greater
   than some implementation-specified length, the MTA MAY return only
   the headers even if the RET parameter specified FULL.) If a DSN
   contains no notifications of delivery failure, the MTA SHOULD return
   only the headers.

   The third component must have an appropriate content-type label.
   Issues concerning selection of the content-type are discussed in [5].

6.3 Message/delivery-status fields

   The message/delivery-status content-type defines a number of fields,
   with general specifications for their contents. The following
   requirements for any DSNs generated in response to a message received
   by the SMTP protocol by a conforming SMTP server, are in addition to
   the requirements defined in [3] for the message/delivery-status type.

   When generating a DSN for a message which was received via the SMTP
   protocol, a conforming MTA will generate the following fields of the
   message/delivery-status body part:

   (a)   if an ENVID parameter was present on the MAIL command, an
         Original-Envelope-ID field MUST be supplied, and the value
         associated with the ENVID parameter must appear in that field.
         If the message was received via SMTP with no ENVID parameter,
         the Original-Envelope-ID field MUST NOT be supplied.

         Since the ENVID parameter is encoded as xtext, but the
         Original-Envelope-ID header is NOT encoded as xtext, the MTA
         must decode the xtext encoding when copying the ENVID value to
         the Original-Envelope-ID field.

   (b)   The Reporting-MTA field MUST be supplied. If Reporting MTA can
         determine its fully-qualified Internet domain name, the MTA-
         name-type subfield MUST be "dns", and the field MUST contain the
         fully-qualified domain name of the Reporting MTA. If the
         fully-qualified Internet domain name of the Reporting MTA is not
         known (for example, for an SMTP server which is not directly
         connected to the Internet), the Reporting-MTA field may contain
         any string identifying the MTA, however, in this case the MTA-
         name-type subfield MUST NOT be "dns". A MTA-name-type subfield
         value of "x-local-hostname" is suggested.

   (c)   Other per-message fields as defined in [3] MAY be supplied as
         appropriate.

   (d)   If the ORCPT parameter was provided for this recipient, the
         Original-Recipient field MUST be supplied, with its value taken
         from the ORCPT parameter. If no ORCPT parameter was provided
         for this recipient, the Original-Recipient field MUST NOT
         appear.

   (e)   The Final-Recipient field MUST be supplied. It MUST contain the
         recipient address from the message envelope. If the message was
         received via SMTP, the address-type will be "rfc822".

   (f)   The Action field MUST be supplied.

   (g) The Status field MUST be supplied, using a status-code from [6].
        If there is no specific code which suitably describes a delivery
        failure, either 4.0.0 (temporary failure), or 5.0.0 (permanent
        failure) MUST be used.

   (h) For DSNs resulting from attempts to relay a message to one or
        more recipients via SMTP, the Remote-MTA field MUST be supplied
        for each of those recipients. The mta-name-type subfields of
        those Remote-MTA fields will be "dns".

   (i) For DSNs resulting from attempts to relay a message to one or
        more recipients via SMTP, the Diagnostic-Code MUST be supplied
        for each of those recipients. The diagnostic-type subfield will
        be "smtp". See section 9.2 of this document for a description
        of the "smtp" diagnostic-code.

   (j) For DSNs resulting from attempts to relay a message to one or
        more recipients via SMTP, an SMTP-Remote-Recipient extension
        field MAY be supplied for each recipient, which contains the
        address of that recipient which was presented to the remote SMTP
        server.

   (k) Other per-recipient fields defined in [3] MAY appear, as
        appropriate.

7. Acknowledgments

   The author wishes to thank Eric Allman, Harald Alvestrand, Jim
   Conklin, Bryan Costales, Peter Cowen, Dave Crocker, Roger Fajman, Ned
   Freed, Marko Kaittola, Steve Kille, John Klensin, Anastasios
   Kotsikonas, John Gardiner Myers, Julian Onions, Jacob Palme, Marshall
   Rose, Greg Vaudreuil, and Klaus Weide for their suggestions for
   improvement of this document.

8. Security Considerations

   The SMTP extension described in this document does not change the
   fundamental nature of the SMTP service and hence does not create any
   new security exposures in and of itself. It necessarily adds
   complexity to implementations, however, and with added complexity
   comes an increased risk of implementation errors.

   Previous ad-hoc delivery notification mechanisms sometimes produced a
   storm of receipts due to unanticipated interactions with mailing list
   expansion software. In this specification notification of successful
   delivery is carefully designed so, if properly implemented, it cannot
   interact with a list expander in this way.

The security considerations section in [5] describes security issues
associated with multipart/report objects in general and the security
considerations section in [3] describes security issues with DSNs in
particular.

9. Appendix - Type-Name Definitions

   The following type names are defined for use in DSN fields generated
   by conforming SMTP-based MTAs:

9.1 "rfc822" address-type

   The "rfc822" address-type is to be used when reporting Internet
   electronic mail address in the Original-Recipient and Final-Recipient
   DSN fields.

   (a)   address-type name: rfc822

   (b)   syntax for mailbox addresses

         RFC822 mailbox addresses are generally expected to be of the
         form

                 [route] addr-spec

         where "route" and "addr-spec" are defined in [2], and the
         "domain" portions of both "route" and "addr-spec" are fully-
         qualified domain names that are registered in the DNS. However,
         an MTA MUST NOT modify an address obtained from the message
         envelope to force it to conform to syntax rules.

   (c)   If addresses of this type 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 DSN
         Original-Recipient or Final-Recipient DSN field.

         RFC822 addresses consist entirely of graphic characters from the
         US-ASCII repertoire, so no translation is necessary.

9.2 "smtp" diagnostic-type

   The "smtp" diagnostic-type is to be used when reporting SMTP reply-
   codes in Diagnostic-Code DSN fields.

   (a)   diagnostic-type name: SMTP

   (b)   A description of the syntax to be used for expressing diagnostic
         codes of this type as graphic characters from the US-ASCII
         repertoire.

         An SMTP diagnostic-code is of the form

                 *(3*DIGIT "-" *text) 3*DIGIT SPACE *text

For a single-line SMTP reply to an SMTP command, the
diagnostic-code SHOULD be an exact transcription of the reply.
For multi-line SMTP replies, it is necessary to insert a SPACE
before each line after the first. For example, an SMTP reply
of:

        550-mailbox unavailable
        550 user has moved with no forwarding address

could appear as follows in a Diagnostic-Code DSN field:

        Diagnostic-Code: smtp ; 550-mailbox unavailable
         550 user has moved with no forwarding address

  (c) A list of valid diagnostic codes of this type and the meaning of
       each code.

       SMTP reply-codes are currently defined in [1] and [11].
       Additional codes may be defined by other RFCs.

9.3 "dns" MTA-name-type

   The "dns" MTA-name-type should be used in the Reporting-MTA field.
   An MTA-name of type "dns" is a fully-qualified domain name. The name
   must be registered in the DNS, and the address Postmaster@{mta-name}
   must be valid.

   (a) MTA-name-type name: dns

   (b) A description of the syntax of MTA names of this type, using
        BNF, regular expressions, ASN.1, or other non-ambiguous
        language.

        MTA names of type "dns" SHOULD be valid Internet domain names.
        If such domain names are not available, a domain-literal
        containing the internet protocol address is acceptable. Such
        domain names generally conform to the following syntax:

            domain = real-domain / domain-literal

            real-domain = sub-domain *("." sub-domain)

            sub-domain = atom

            domain-literal = "[" 1*3DIGIT 3("." 1*3DIGIT) "]"

        where "atom" and "DIGIT" are defined in [2].

   (c) If MTA names of this type do not consist entirely of graphic
        characters from the US-ASCII repertoire, a specification for how
        an MTA name of this type should be expressed as a sequence of
        graphic US-ASCII characters.

        MTA names of type "dns" consist entirely of graphic US-ASCII
        characters, so no translation is needed.

10. Appendix - Example

   This example traces the flow of a single message addressed to
   multiple recipients. The message is sent by Alice@Example.ORG to
   Bob@Example.COM, Carol@Ivory.EDU, Dana@Ivory.EDU, Eric@Bombs.AF.MIL,
   Fred@Bombs.AF.MIL, and George@Tax-ME.GOV, with a variety of per-
   recipient options. The message is successfully delivered to Bob,
   Dana (via a gateway), Eric, and Fred. Delivery fails for Carol and
   George.

   NOTE: Formatting rules for RFCs require that no line be longer than
   72 characters. Therefore, in the following examples, some SMTP
   commands longer than 72 characters are printed on two lines, with the
   first line ending in "\". In an actual SMTP transaction, such a
   command would be sent as a single line (i.e., with no embedded
   CRLFs), and without the "\" character that appears in these examples.

10.1 Submission

   Alice's user agent sends the message to the SMTP server at
   Example.ORG. Note that while this example uses SMTP as a mail
   submission protocol, other protocols could also be used.

```
    <<< 220 Example.ORG SMTP server here
    >>> EHLO Example.ORG
    <<< 250-Example.ORG
    <<< 250-DSN
    <<< 250-EXPN
    <<< 250 SIZE
    >>> MAIL FROM:<Alice@Example.ORG> RET=HDRS ENVID=QQ314159
    <<< 250 <Alice@Example.ORG> sender ok
    >>> RCPT TO:<Bob@Example.COM> NOTIFY=SUCCESS \
        ORCPT=rfc822;Bob@Example.COM
    <<< 250 <Bob@Example.COM> recipient ok
    >>> RCPT TO:<Carol@Ivory.EDU> NOTIFY=FAILURE \
        ORCPT=rfc822;Carol@Ivory.EDU
    <<< 250 <Carol@Ivory.EDU> recipient ok
    >>> RCPT TO:<Dana@Ivory.EDU> NOTIFY=SUCCESS,FAILURE \
        ORCPT=rfc822;Dana@Ivory.EDU
    <<< 250 <Dana@Ivory.EDU> recipient ok
    >>> RCPT TO:<Eric@Bombs.AF.MIL> NOTIFY=FAILURE \
        ORCPT=rfc822;Eric@Bombs.AF.MIL
    <<< 250 <Eric@Bombs.AF.MIL> recipient ok
    >>> RCPT TO:<Fred@Bombs.AF.MIL> NOTIFY=NEVER
    <<< 250 <Fred@Bombs.AF.MIL> recipient ok
    >>> RCPT TO:<George@Tax-ME.GOV> NOTIFY=FAILURE \
        ORCPT=rfc822;George@Tax-ME.GOV
    <<< 250 <George@Tax-ME.GOV> recipient ok
    >>> DATA
    <<< 354 okay, send message
    >>> (message goes here)
    >>> .
    <<< 250 message accepted
    >>> QUIT
    <<< 221 goodbye
```

10.2 Relay to Example.COM

   The SMTP at Example.ORG then relays the message to Example.COM. (For
   the purpose of this example, mail.Example.COM is the primary mail
   exchanger for Example.COM).

      <<< 220 mail.Example.COM says hello
      >>> EHLO Example.ORG
      <<< 250-mail.Example.COM
      <<< 250 DSN
      >>> MAIL FROM:<Alice@Example.ORG> RET=HDRS ENVID=QQ314159
      <<< 250 sender okay
      >>> RCPT TO:<Bob@Example.COM> NOTIFY=SUCCESS \
          ORCPT=rfc822;Bob@Example.COM
      <<< 250 recipient okay
      >>> DATA
      <<< 354 send message
      >>> (message goes here)
      >>> .
      <<< 250 message received
      >>> QUIT
      <<< 221 bcnu

10.3 Relay to Ivory.EDU

   The SMTP at Example.ORG relays the message to Ivory.EDU, which (as it
   happens) is a gateway to a LAN-based mail system that accepts SMTP
   mail and supports the DSN extension.

```
    <<< 220 Ivory.EDU gateway to FooMail(tm) here
    >>> EHLO Example.ORG
    <<< 250-Ivory.EDU
    <<< 250 DSN
    >>> MAIL FROM:<Alice@Example.ORG> RET=HDRS ENVID=QQ314159
    <<< 250 ok
    >>> RCPT TO:<Carol@Ivory.EDU> NOTIFY=FAILURE \
        ORCPT=rfc822;Carol@Ivory.EDU
    <<< 550 error - no such recipient
    >>> RCPT TO:<Dana@Ivory.EDU> NOTIFY=SUCCESS,FAILURE \
        ORCPT=rfc822;Dana@Ivory.EDU
    <<< 250 recipient ok
    >>> DATA
    <<< 354 send message, end with '.'
    >>> (message goes here)
    >>> .
    <<< 250 message received
    >>> QUIT
    <<< 221 bye
```

   Note that since the Ivory.EDU refused to accept mail for
   Carol@Ivory.EDU, and the sender specified NOTIFY=FAILURE, the
   sender-SMTP (in this case Example.ORG) must generate a DSN.

10.4 Relay to Bombs.AF.MIL

   The SMTP at Example.ORG relays the message to Bombs.AF.MIL, which
   does not support the SMTP extension. Because the sender specified
   NOTIFY=NEVER for recipient Fred@Bombs.AF.MIL, the SMTP at Example.ORG
   chooses to send the message for that recipient in a separate
   transaction with a reverse-path of <>.

```
   <<< 220-Bombs.AF.MIL reporting for duty.
   <<< 220 Electronic mail is to be used for official business only.
   >>> EHLO Example.ORG
   <<< 502 command not implemented
   >>> RSET
   <<< 250 reset
   >>> HELO Example.ORG
   <<< 250 Bombs.AF.MIL
   >>> MAIL FROM:<Alice@Example.ORG>
   <<< 250 ok
   >>> RCPT TO:<Eric@Bombs.AF.MIL>
   <<< 250 ok
   >>> DATA
   <<< 354 send message
   >>> (message goes here)
   >>> .
   <<< 250 message accepted
   >>> MAIL FROM:<>
   <<< 250 ok
   >>> RCPT TO:<Fred@Bombs.AF.MIL>
   <<< 250 ok
   >>> DATA
   <<< 354 send message
   >>> (message goes here)
   >>> .
   <<< 250 message accepted
   >>> QUIT
   <<< 221 Bombs.AF.MIL closing connection
```

10.5 Forward from George@Tax-ME.GOV to Sam@Boondoggle.GOV

   The SMTP at Example.ORG relays the message to Tax-ME.GOV. (this step
   is not shown). MTA Tax-ME.GOV then forwards the message to
   Sam@Boondoggle.GOV (shown below). Both Tax-ME.GOV and Example.ORG
   support the SMTP DSN extension. Note that RET, ENVID, and ORCPT all
   retain their original values.

```
      <<< 220 BoonDoggle.GOV says hello
      >>> EHLO Example.ORG
      <<< 250-mail.Example.COM
      <<< 250 DSN
      >>> MAIL FROM:<Alice@Example.ORG> RET=HDRS ENVID=QQ314159
      <<< 250 sender okay
      >>> RCPT TO:<Sam@Boondoggle.GOV> NOTIFY=SUCCESS \
          ORCPT=rfc822;George@Tax-ME.GOV
      <<< 250 recipient okay
      >>> DATA
      <<< 354 send message
      >>> (message goes here)
      >>> .
      <<< 250 message received
      >>> QUIT
      <<< 221 bcnu
```

10.6 "Delivered" DSN for Bob@Example.COM

   MTA mail.Example.COM successfully delivers the message to
   Bob@Example.COM. Because the sender specified NOTIFY=SUCCESS,
   mail.Example.COM issues the following DSN, and sends it to
   Alice@Example.ORG.

      To: Alice@Example.ORG
      From: postmaster@mail.Example.COM
      Subject: Delivery Notification (success) for Bob@Example.COM
      Content-Type: multipart/report; report-type=delivery-status;
          boundary=abcde
      MIME-Version: 1.0

      --abcde
      Content-type: text/plain; charset=us-ascii

      Your message (id QQ314159) was successfully delivered to
      Bob@Example.COM.

      --abcde
      Content-type: message/delivery-status

      Reporting-MTA: dns; mail.Example.COM
      Original-Envelope-ID: QQ314159

      Original-Recipient: rfc822;Bob@Example.COM
      Final-Recipient: rfc822;Bob@Example.COM
      Action: delivered
      Status: 2.0.0

      --abcde
      Content-type: message/rfc822

      (headers of returned message go here)

      --abcde--

10.7 Failed DSN for Carol@Ivory.EDU

   Because delivery to Carol failed and the sender specified
   NOTIFY=FAILURE for Carol@Ivory.EDU, MTA Example.ORG (the SMTP client
   to which the failure was reported via SMTP) issues the following DSN.

      To: Alice@Example.ORG
      From: postmaster@Example.ORG
      Subject: Delivery Notification (failure) for Carol@Ivory.EDU
      Content-Type: multipart/report; report-type=delivery-status;
                    boundary=bcdef
      MIME-Version: 1.0

      --bcdef
      Content-type: text/plain; charset=us-ascii

      Your message (id QQ314159) could not be delivered to
      Carol@Ivory.EDU.

      A transcript of the session follows:

      (while talking to Ivory.EDU)
      >>> RCPT TO:<Carol@Ivory.EDU> NOTIFY=FAILURE
      <<< 550 error - no such recipient

      --bcdef
      Content-type: message/delivery-status

      Reporting-MTA: dns; Example.ORG
      Original-Envelope-ID: QQ314159

      Original-Recipient: rfc822;Carol@Ivory.EDU
      Final-Recipient: rfc822;Carol@Ivory.EDU
      SMTP-Remote-Recipient: Carol@Ivory.EDU
      Diagnostic-Code: smtp; 550 error - no such recipient
      Action: failed
      Status: 5.0.0

      --bcdef
      Content-type: message/rfc822

      (headers of returned message go here)

      --bcdef--

10.8 Relayed DSN For Dana@Ivory.EDU

   Although the mail gateway Ivory.EDU supports the DSN SMTP extension,
   the LAN mail system attached to its other side does not generate
   positive delivery confirmations. So Ivory.EDU issues a "relayed"
   DSN:

      To: Alice@Example.ORG
      From: postmaster@Ivory.EDU
      Subject: mail relayed for Dana@Ivory.EDU
      Content-Type: multipart/report; report-type=delivery-status;
          boundary=cdefg
      MIME-Version: 1.0

      --cdefg
      Content-type: text/plain; charset=us-ascii

      Your message (addressed to Dana@Ivory.EDU) was successfully
      relayed to:

      ymail!Dana

      by the FooMail gateway at Ivory.EDU.

      Unfortunately, the remote mail system does not support
      confirmation of actual delivery. Unless delivery to ymail!Dana
      fails, this will be the only Delivery Status Notification sent.

      --cdefg
      Content-type: message/delivery-status

      Reporting-MTA: dns; Ivory.EDU
      Original-Envelope-ID: QQ314159

      Original-Recipient: rfc822;Dana@Ivory.EDU
      Final-Recipient: rfc822;Dana@Ivory.EDU
      Action: relayed
      Status: 2.0.0

      --cdefg
      Content-type: message/rfc822

      (headers of returned message go here)

      --cdefg--

10.9 Failure notification for Sam@Boondoggle.GOV

   The message originally addressed to George@Tax-ME.GOV was forwarded
   to Sam@Boondoggle.GOV, but the MTA for Boondoggle.GOV was unable to
   deliver the message due to a lack of disk space in Sam's mailbox.
   After trying for several days, Boondoggle.GOV returned the following
   DSN:

      To: Alice@Example.ORG
      From: Postmaster@Boondoggle.GOV
      Subject: Delivery failure for Sam@Boondoggle.GOV
      Content-Type: multipart/report; report-type=delivery-status;
                    boundary=defgh
      MIME-Version: 1.0

      --defgh
      Your message, originally addressed to George@Tax-ME.GOV, and
      forwarded from there to Sam@Boondoggle.GOV could not be delivered,
      for the following reason:

      write error to mailbox, disk quota exceeded

      --defgh
      Content-type: message/delivery-status

      Reporting-MTA: Boondoggle.GOV
      Original-Envelope-ID: QQ314159

      Original-Recipient: rfc822;George@Tax-ME.GOV
      Final-Recipient: rfc822;Sam@Boondoggle.GOV
      Action: failed
      Status: 4.2.2 (disk quota exceeded)

      --defgh
      Content-type: message/rfc822

      (headers of returned message go here)

      --defgh--

11. Appendix - Changes since RFC 1891

      -     updated author's address

      -     In examples, changed Pure-Heart.ORG and Big-Bucks.COM to
            Example.ORG and Example.COM, respectively. Since publication
            of RFC 1891, the former two domains have been registered.

        -    Clarified that ENVID and ORCPT parameters must consist
             entirely of US-ASCII characters prior to encoding as xtext.

        -    A Security Considerations section was added.

12. References

12.1 Normative References

    [1] Postel, J., "Simple Mail Transfer Protocol", STD 10, RFC 821,
         August 1982.

    [2] Crocker, D., "Standard for the format of ARPA Internet Text
         Messages", STD 11, RFC 822, August 1982.

    [3] Moore, K., and G. Vaudreuil, "An Extensible Message Format for
         Delivery Status Notifications", RFC 3464, January 2003.

    [4] Coded Character Set - 7-Bit American Standard Code for
         Information Interchange, ANSI X3.4-1986.

    [5] Vaudreuil, G., "The Multipart/Report Content Type for the
         Reporting of Mail System Administrative Messages", RFC 3462,
         January 2003.

    [6] Vaudreuil, G., "Enhanced Mail System Status Codes", RFC 3463,
         January 2003.

    [7] Bradner, S., "Key words for use in RFCs to Indicate Requirement
         Levels", BCP 14, RFC 2119, March 1997.

12.2 Informative References

    [8] Westine, A. and J. Postel, "Problems with the Maintenance of
         Large Mailing Lists.", RFC 1211, March 1991.

    [9] Crispin, M., "Internet Message Access Protocol - Version 4rev1",
         RFC 2060, December 1996.

    [10] Myers, J. and M. Rose, "Post Office Protocol - Version 3", STD
         53, RFC 1939, May 1996.

    [11] Braden, R., Ed., "Requirements for Internet Hosts - Application
         and Support", STD 3, RFC 1123, October 1989.

13. Author's Address

    Keith Moore
    University of Tennessee
    1122 Volunteer Blvd, Suite 203
    Knoxville, TN 37996-3450
    USA

    EMail: moore@cs.utk.edu

14. Full Copyright Statement

Acknowledgement