Recommendations for Mail Based Servers

Abstract

   This document defines recommendations to be implemented in mail based
   servers in the Internet e-mail community. The requirements only
   affect the basic behaviour of servers, i.e. it mainly deals with how
   header fields are handled. Although there is also a clear need for
   recommendations in the field of end user requirements, such as
   command syntaxes for archive servers, automatic distribution list
   subscription, etc., such issues are considered more suitable to be
   dealt with in a separate document.

   It is highly desirable that other e-mail networks connected to the
   Internet, such as the GO-MHS community, also implement these
   recommendations.

Discussion group

   This document is being discussed in the RARE Working Group on Mail
   and Messaging (WG-MSG) and in the IFIP Mail Management Group. Please
   send any comments to wg-msg@rare.nl or to houttuin@rare.nl .

Status of this Memo

   To do: more comprehensive explanations for the individual
   recommendations. Finish the explicit parallel descriptions in both
   RFC and X.400 terminology.

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Contents

1.   Introduction

Mail Based Servers

   Electronic mail systems are increasingly being used as a basis for so
   called Mail Based Servers (MBSs), such as echo servers, distribution
   lists, etc. MBSs are used for a number of purposes:

   - Enhancing the Message Handling Environment. Examples of such
     usage are distribution lists (DLs), for group communication, and
     e-mail servers, for file and information retrieval.

   - Monitoring the status of the MHS. Examples of this usage are echo
     servers and forced (non-)delivery messages (E.g. the so-called
     nosuchuser test).

   Since MBSs deal with automatically receiving, forwarding and replying
   to messages, which may themselves have been generated by automated
   processes, strong requirements are needed on the one hand to minimise
   human effort to manage such servers, and on the other hand to make
   the behaviour of mail based servers deterministic enough to build
   reliable tools upon them.

   A classic example of what can go wrong is when a mailing list
   contains an invalid address. The remote mailer generates a non-
   delivery message and sends it to the originator of the original

message, which, under circumstances, could be the list itself, which
then again distributes the non-delivery message to the non-existing
recipient, etc. Following strict recommendations on how mailing lists
should handle message header fields can avoid such looping-endangered
situations.

A more complicated example of the usefulness of strong requirements
for mail based servers is the following: suppose a distributed tool
will check the connectivity of mailers by sending a message to an
echo-server. The connectivity tool could request the echo to be sent
to a remote component of the tool instead of to itself. If for some
reason the address of that other component cannot be routed to, an
automatically generated non-delivery message could be sent back to
the echo server, which results in an echo loop.

The recommendations defined in this document will as much as possible
be aligned with comparable rules that either have already been used
for a long time (X.400(84) Status Reports; distribution lists in the
Internet), or are already defined in other documents (X.400(88) DLs).

Approach

If all MBSs would agree to implement a common set of recommendations,
this set could be fairly small. In practice however, there are some
reasons why such a 'minimum approach' will not work:

  - The most obvious reason is that one cannot realistically expect
    all networks and software developers to implement one common
    strict set of rules. In different mail communities, different
    MBS conventions have already been used for a long time. Some of
    these conventions can be unacceptable for other communities to
    implement.

  - MBSs can be build upon different underlying protocols. For
    instance, it is almost impossible to have one small set of rules
    that will prevent problems between any combination of MBSs, e.g.
    between an RFC 822 MBS running over NJE and a P1 based MBS. More
    problems can be expected because header fields are crucial for
    the properly functioning of MBSs, and protocol gateways will not
    always map header fields bijectively.

  - Not all MBSs are controlled by software developers or network
    operators. Any user can write a simple program that will have
    the functionality of an MBS.

Because the 'minimum approach' is not feasible, this document
recommends the 'unilateral safety approach'. The idea is that any MBS
that implements the complete set of recommendations will be safe from
harm, regardless of what other 'dumb' MBSs it is interacting with.

This results in quite a large number of recommendations; not every single one of them is strictly necessary to prevent problems, but none of them will 'hurt' the functioning of an MBS. As for the programming overhead caused by this document, there is at least one example of an echo server (Echoput) that implements the full set of recommendations; the size of the (perl) code fits on two pages.

In addition to the rules that should protect against loops and explosions, there are also some recommendations reflecting common sense. For instance, if a user sends a message flagged 'urgent' to a mail based file server, he would not only expect his request message to be handled with extra priority, but also the reply message.

Protocols

Depending on the implementation of the MBS, different recommendations may be used. E.g. A P1 MBS cannot follow all recommendations for RFC 822 based MBSs and vice versa.

For the reader's convenience, the requirements that are applicable to different MBS implementations are explicitly stated in the different terminologies. The requirements are labelled as follows:

```
  #RFC#      Applies to RFC 822 on top of RFC 821 (SMTP) based MBSs
  #821#      Applies to RFC 821 (SMTP) based MBSs
  #822#      Applies to RFC 822 based MBSs
  #400#      Applies to X.400 (both 84 and 88) based MBSs
  #84#       Applies to X.400(84) based MBSs
  #88#       Applies to X.400(88) based MBSs
  #P1#       Applies to P1 based MBSs
  #P2#       Applies to P2 based MBSs
  #P3#       Applies to P3 based MBSs
```


2. Definitions

Mail Based Server

An MBS is a process that automatically generates one or more messages (the output messages) as a result of receiving a message (the input message). An MBS can be modelled and/or implemented in one of the following ways:

  - #RFC#: As a process sitting directly on top of SMTP. This is called an 821 MBS. If, in addition, the MBS is RFC 822 based, it is called an 822 MBS.

  – #400#: within the MTS, in which case it can be considered an
    enhancement of the X.400 message dispatcher. This is called a P1
    MBS.

  – #400#: as an MTS service user, in which case it can be considered
    an automated User Agent (UA). Per default, this is called a P3
    MBS. If, in addition, the MBS is P2 based, it is called a P2
    MBS. P7 based MBSs are not considered in this document.

The number of output messages and its contents depend on the kind of
server and on the contents of the input message.

Dedicated and non-dedicated MBSs

A dedicated MBS is an MBS that is meant to be used as an MBS only.
Examples of non-dedicated MBSs are temporarily auto-forwarding user
agents (UAs), and UAs that automatically send back vacation notes
(auto-repliers). Although software developers are encouraged to
implement such features as if it concerned a dedicated MBS, there are
some substantial differences between the two types, the main one
being that it is not realistic to assume a separate MBS administrator
(see below) for every stand-alone UA.

MBS administrator

For every dedicated MBS, there exists an MBS administrator who is
responsible for managing the MBS.

Input- and output messages

An input message is a message that triggers the generation of (a)
message(s) by an MBS.

An output message is a message that is being generated by an MBS as a
result of a received input message.

If an MBS encounters an exceptional situation (as defined in the
recommendations below), one exception output message is generated
instead of a regular output message. If a non-dedicated MBS does not
have an MBS administrator, the exception output message may either be
sent to the originator (see below) of the input message instead, or
no output message may be generated at all.

MBS Submit Permission

Associated with an MBS is a number of addresses that are allowed to
use the MBS (I.e. have the MBS send output messages). Implementation

of MBS Submit Permission is considered a local matter. The main
implementation options are:

- Implicit: Only those addresses explicitly listed are not allowed
  to send messages to the MBS.

- Explicit: Only those addresses explicitly listed are allowed to
  send messages to the MBS.

Message originator

#RFC# The originator of an input message is defined as the value of
the Sender: field, or if this attribute is not present, the value of
the From: field. For non RFC 822 messages, the originator of an input
message is defined as the value on the RFC 821 MAIL FROM: line.

#400# For P2 messages, the originator of an input message is defined
as the P2.originator, or if this attribute is not present, the
P2.authorizingUsers. For non-P2 messages, the originator of an input
message is defined as the P1.originator.

3. Mail based server types

This chapter defines the different types of MBSs. Two main types are
identified: repliers and forwarders.

3.1. Repliers

Intuitively speaking, a replier is an MBS that will send an output
message to the originator of the input message. There are also
exceptions to this rule, such as replying to a Reply-To: field. More
formally speaking, a replier is characterised by the fact that the
recipient of the output message is uniquely defined in (the heading
of) the input message. The different types of repliers can be
classified by the number and content of the output message.

Echo server

An echo server is a dedicated replier that will generate exactly one
output message, containing the input message.

Mailer demon

This document does not consider the behaviour of X.400 delivery
reports and notifications, which is assumed to be well defined in
X.400 already. RFC 822 mailers and RFC 1327 gateways however can

generate a message explaining the (NON-)Delivery of an input message.
In this case the mailer/gateway is acting as an MBS.

For mailer demons, the MBS administrator is the administrator of the
mailer/gateway.

Command server

The contents of an output message submitted by a command server
depend on commands that were included in the input message. Concrete
examples are file servers, e-mail archie servers, DL-registration
servers and address conversion servers.

Although it is beyond the scope of this document to define detailed
requirements for the command syntax used by command servers, some
general recommendations concerning header fields are made in this
document.

Auto-replier

Some UAs have an auto-reply feature that will temporarily and/or
conditionally turn the UA into an MBS. Thus an auto-replier is a non-
dedicated replier. The content of the output message is often a note
such as 'I am on holidays.' An auto-replier has a certain lifetime,
which is defined as the time span between switching the auto-replier
on and back off again.

3.2. Forwarders

A forwarder is an MBS that will send its output messages to a list of
recipients. These recipients are independent of (the heading of) the
input message.

Distribution List

Upon receiving an input message, a DL will generate output messages
to a list of DL members, which is managed by the DL administrator.

At the moment many vendor-specific implementations of DLs exist, some
of which are nothing more than local multi-recipient aliases, others
use local directories for DL expansion. This document defines the
requirements for DLs as well as implementation options.

A moderated DL is modelled as a normal DL with an extra filtering of
the input messages by a human. In case of message rejection by the
moderator, it is considered good manners for the moderator to follow
the recommendations that this document describes for mailer demons.
If the message is accepted for distribution, the moderator will

transparently pass through all MBS control information (headers) to
the actual DL. The moderation process itself is considered a local
matter.

Auto-forwarder

Some UAs have an auto-forward feature that will temporarily and/or
conditionally turn the UA into an MBS. Thus an auto-forwarder can be
considered a non-dedicated forwarder. Upon receiving an input
message, an auto-forwarder will submit an output message to a locally
defined (list of) address(es), which is managed by the owner of the
UA. Although an auto-forwarder often has a certain lifetime, like an
auto-replier, this has no implications for the requirements for auto-
forwarders.

4. Recommendations

Depending on the implementation, MBSs follow the requirements defined
in RFC 822, RFC 821, X.411 and/or X.420 as a minimum.

This document describes additional requirements in terms of RFC 821,
RFC 822, P1, P3, and P2. Note that some RFC 822 recommendations deal
with non-standard headers described in RFC 1327. This is needed to
provide protection across gateways.

The following table lists the recommendations for the MBS types
distinguished above. The key to the symbols is self-explanatory. The
last column states, for each recommendation, which MBS
implementations are affected.

```
                              Key to symbols in table 1:
                              +       Recommended
                              s       Suggested
                              o       Optional
                              d       Don't care
                              n/a     Not applicable
                              .       Depends on other factors
                              -       Not recommended
```

	auto- answ.	comm. serv.	mail. demon	echo serv.	auto- forw.	dist. list	protocols
AR1.1	+	+	+	+	.	.	P2
AR1.2	+	+	+	+	.	.	822 P2
AR1.3	+	+	+	+	.	.	822 P2
AR1.4	+	+	+	+	.	.	88.P1 88.P3
AR1.5	+	d	+	d	d	.	822 P2
AR2	+	+	+	+	+	.	all
AR3	o	+	−	+	n/a	n/a	822 P2
AR4	o	+	−	+	n/a	n/a	822 P2
AR5	o	+	.	+	n/a	n/a	822 P2
AV1	o	+	−	+	.	.	822 P2
AV2	s	+	+	+	.	.	all
AV3	+	+	+	+	n/a	n/a	822 P2
AV4	+	+	+	+	n/a	n/a	822 P2
AV5	o	+	+	+	.	.	821 P1 P3
AV6	o	+	+	+	.	.	822 P2
AV7	+	+	+	+	.	.	P1 P3
AV8	+	+	+	+	.	.	P2
AV9	s	s	o	+	−	−	822 P2
AV10	−	−	−	−	s	−	822 P2
AV11	.	.	+	.	n/a	n/a	821 P1 P3
AV12	.	.	+	.	n/a	n/a	822 P2
AV13	+	+	+	+	+	+	P1
AV14	−	−	−	−	+	−	822 P2
AC1	+	+	+	+	+	+	822 P2
AC2	+	+	+	+	+	+	822 P2
AC3	+	+	+	+	+	+	822 P1 P3
AC4	.	.	.	s	+	+	P1 P3
AC5	−	−	−	−	−	+	P1 P3
AD1	+	+	+	+	+	+	all
AD2	o	−	+	−	o	−	all
AD3	n/a	n/a	n/a	+	n/a	n/a	all
AD4	n/a	s	n/a	s	n/a	n/a	all
AD5	n/a	n/a	+	n/a	n/a	n/a	all
AD6	n/a	n/a	n/a	n/a	n/a	s	all
B1	−	o	s	+	−	−	822 P2
B2	o	o	o	o	−	o	822 P2
B3	n/a	+	n/a	n/a	n/a	n/a	822 P2
B4	n/a	+	n/a	n/a	n/a	n/a	822 P2
B5	−	−	−	−	+	−	P2
E1	+	+	+	+	+	+	822 P2
E2	+	+	+	+	+	+	all
I1	n/a	s	n/a	s	n/a	s	all
I2	o	+	+	+	o	o	all
I3	s	n/a	n/a	n/a	n/a	n/a	all
I4	n/a	n/a	n/a	n/a	n/a	s	n/a

Table 1. Table of recommendations

4.1. Attribute/header restrictions (AR)

AR1

>   The following attributes will not be used in the output message:

AR1.1

>   #P2# Recipient.replyRequest (i.e. should equal FALSE, as per
>   default)

AR1.2

```
    #84#P2#          replyBy
    #88#P2#          reply-time
    #822#            Reply-By:
```

AR1.3

```
    #84#P2#          expiryDate
    #88#P2#          expiry-time
    #822#            Expiry-Date:
```

AR1.4

```
    #88#P1#P3#       Proof-of-delivery-request
```

>   the value of this argument defaults to proof-of-delivery-not-
>   requested.

AR1.5

```
    #84#P2# replyToUsers
    #88#P2# reply-recipients
    #822# Reply-To:
```

AR2

>   An auto-forwarded message is not valid as an input message. The
>   result is the generation of an exception output message.

AR3

>   If the following field is present in the input message, the
>   output message will be sent to this address. Otherwise the
>   output message will be sent to the originator of the input
>   message. If the following field contains more than one address,
>   an output message is at least sent to the first address of this
>   filed. Sending to the others is not recommended.

```
    #84#P2# replyToUsers
    #88#P2# reply-recipients
```

```
            #822# Reply-To:

    AR4

            #822# If an output message is not sent to the originator of the
            input message, its From: field field will contain the addresses
            of the From: and the Sender: fields of the input message. In
            this case the Sender: field of the output message contains the
            address of the MBS administrator.

            #P2# If an output message is not sent to the P2.originator of
            the input message, its P2.authorizingUsers field will contain
            the addresses of the P2.originator and the P2.authorizingUsers
            of the input message.

    AR5

            Echo servers will send an exception output message if the input
            message contains either of the following attributes:

            #822#      In-Reply-To:
                       References:

            #P2#       In-Reply-To
                       crossReferences
```

4.2. Attribute/header values (AV)

```
    AV1

            If the following field is used in the output message, it will
            not contain the address of the MBS.

            #84#P2# replyToUsers
            #88#P2# reply-recipients
            #822# Reply-To:

    AV2

            Repliers will not send output messages to addresses which are
            likely to be MBSs, such as addresses with the following values
            in the local address designator (S, CN, localpart):

              autoanswer
              echo
              listserv
              mailerdaemon
              mirror
              netserv
              server
```

These values must be matched in any combination of upper case
and lower case. Instead, an exception output message is
generated. This list is subject to change; an up-to-date version
of this list is available in [Noreply]

AV3

The following attribute of the output message will have the
following value

#84#P2# inReplyTo : IPMessageID of input message
#88#P2# replied-to-IPM : this-IPM of input message
#822# In-Reply-To: : Message-ID of input message

AV4

The following attributes are optional in an output message. If
used, they will contain the following value

#84#P2# crossReferences : IPMessageID of input message
#88#P2# related-IPMs : this-IPM of input message
#822# References: : Message-ID of input message

AV5

#P1#P3# The P1.originator of the output message contains the
address of the MBS administrator.

#821# The MAIL FROM: line of the output message contains the
address of the MBS administrator.

AV6

#P2# The P2.originator of the output message contains the
address of the MBS administrator.

#822# The From: field of the output message contains the address
of the MBS administrator.

AV7

#84#P1#P3# Every PerRececipientFlag in the output message will
have the following bits set:

          Report Request: 01
          User Report Request: 00

i.e. the Non-delivery Notification service will be prevented.

AV8

The following argument will be empty in the output message:

        #84#P2# Recipient.reportRequest
        #88#P2# NotificationRequests

    AV9

        The following attribute of the output message will contain the
        string 'Re: ', concatenated with the subject of the input
        message.

        #822# Subject:
        #P2# subject

    AV10

        The following attribute of the output message will contain the
        subject of the input message, concatenated with the string
        '(for)'.

        #822# Subject:
        #P2# subject

    AV11

        #P1#P3# The P1.recipient of a (non-)DM equals the P1.originator
        of the input message.

        #821# The RCPT TO: field of a (non-)DM equals the MAIL FROM: of
        the input message.

    AV12

        #P2# The P2.recipient of a (non-)DM equals the P1.originator of
        the input message.

        #822# The To: field of a (non-)DM equals the originator of the
        input message.

    AV13

        #P1# All P1.ExtensionIdentifiers in an output message will be
        distinct.

    AV14

        #P2# The output message(s) will have the P2.autoForwarded flag
        set to true.

4.3. Attribute/header conservation (AC)

  The following attributes will have the same value in the output
  message as in the input message

     AC1

          In order to propagate the originator's request for privacy to
          the output message(s):

          #822#   Sensitivity:
          #P2#   P2.sensitivity

     AC2

          #822#   Importance:
          #P2#   Importance

     AC3
          #822#   Priority:
          #P1#P3#   Priority

     AC4

          #84#P1#P3#   ContentType

     AC5

          #P1#P3#   contents

4.4. Addresses (AD)

   Please note that all recommendations for names of MBSs and MBS
   administrators concern internationally used MBSs. Local MBSs can use
   similar mechanisms in their local language.

     AD1

          The address of the MBS administrator will be the same as that of
          the MBS, except for the

          #RFC# localpart
          #400# Personal Name

     AD2

          The MBS administrator of a mailer demon has an address with the
          following local address designation:

     AD3

          The following attribute of the echo server address will have the
          value "echo".

          #RFC# localpart
          #400# Personal Name

AD4

      The following attribute in the address of the administrator of a
      dedicated replier is that of the replier, concatenated with
      "-reply".

      #RFC# localpart
      #400# Surname

AD5

      A message addressed to an address with the following local
      address designation will always result in an NRN or a non-DM
      being generated.

      #RFC# localpart = nosuchuser
      #84# Surname=nosuchuser
      #88# Surname=nosuchuser ; CN=nosuchuser

AD6

      The following attribute in the address of the administrator of a
      dedicated replier is that of the replier, concatenated with
      "-request".

      #RFC# localpart
      #400# Surname

4.5. Body (B)

B1

      The complete input message (including headers) will be included
      in the output message in a readable format, e.g. in IA5Text or
      ASCII.

B2

      Additional information is included in separate bodyparts of the
      output message.

B3

      Commands will only be put in the body of the input message, e.g.
      a command server will ignore the following field.

      #822#   Subject:
      #P2#   subject

B4

The recipient of the output message can be uniquely identified
from the heading of the input message. I.e. Alternate recipients
will not be negotiated in the body of the input message. This
will ensure that the recipients can still be uniquely identified
after the input message has traversed a protocol gateway.

   B5

      #P2# The input message will be encoded as a
      P2.ForwardedIPMessage bodypart in the output message.

4.6. Exceptions (E)

   E1

      In case of an MBS Submit Permission violation

      #822#P2# a non delivery message will be sent to the originator
      of the input message. The non delivery message will have the
      following text in the message body:

           "Originator not allowed to send to this address"

      #84#P1# a P1.DeliveryReportMPDU will be sent to the
      P1.originator of the input message. The P1.DeliveryReportMPDU
      will have the following values:

                ReasonCode: unableToTransfer(1)
                DiagnosticCode: uaUnavailable(4)
                SupplementaryInformation: "Originator not allowed to
                                           send to this address"

   E2

      Only the types of input messages listed below are valid as input
      messages. Any other type of input message (reports, receipt
      notifications) will lead to the generation of an exception
      output message.

      #84#P1# UserMPDU
      #84#P2# IM-UAPDU
      #88#P1# Message
      #88#P2# IPM
      #822# No restrictions

      #400# P1.Probes are expected to be handled by the MTS and are
      thus not interpreted by the MBS itself.

4.7. Implementation options (I)

    I1

        MBS Submit Permission implementation will be 'implicit'. This
        means that MBSs that have not explicitly implemented this
        function can still claim to be implicitly open to anyone.

    I2

        The MBS logs the originator of the input message and the
        recipient(s) of the output message(s) so that the MBS
        administrator can track down malicious behaviour. Any further
        logging is optional.

    I3

        Auto-repliers will at least log the originator of the input
        message. During the lifetime of an auto-replier, at most one
        output message per input message originator is generated.

    I4

        #P2# Even if a DL is used for distribution of P2 messages, it is
        still recommended to implement it within the MTS, i.e. as P1
        MBSs. This has some important advantages over P3/P2 based
        implementations (see also [SHK 92]):

                    - Using P3 would result in loosing P1.TraceInformation
                    - Better alignment with X.400(88), which also defines
                      DLs within the MTS
                    - An MTS DL distributes P1.UMPDUContent transparently,
                      and will thus implicitly implement one of the
                      requirements for DLs.

5. Implementations

    There are a number of MBS implementations that follow most of the
    recommendations listed in this document. They include:

      Echoput   (echo server)
      AUSSIE   (echo server)
      Concord   (echo server, DLs)
      Squirrel   (command server)
      EAN   (DLs, auto-forwarding, auto-answer, echo)
      PP   (DLs, auto-answer, echo)

6. Acknowledgements

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initial work on the requirements for echo servers and distribution
lists was done within COSINE MHS and XNREN ([Concord]).

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8. Abbreviations

     ASCII   American Standard Code for Information Exchange
     CCITT   Comite Consultatif International de Telegraphique et
              Telephonique
     COSINE   Co-operation for OSI networking in Europe
     DL   Distribution List
     DM   Deliver Message
     EAN   MHS software (not an abbreviation)
     IPM   Inter-Personal Message
     IPN   Inter-Personal Notification
     ISO   International Organisation for Standardisation
     MHS   Message Handling System
     MBS   Mail based server
     MOTIS   Message-Oriented Text Interchange Systems
     MTA   Message Transfer Agent
     MTL   Message Transfer Layer
     MTS   Message Transfer System
     NJE   Network Job Entry
     NRN   Non-Receipt Notification
     PP   MHS software (not an abbreviation)
     RARE   Reseaux Associes pour la Recherche Europeenne
     RN   Receipt Notification
     SMTP   simple mail transfer protocol
     UA   User Agent

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