

Network Working Group
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Enhanced Mail System Status Codes

[<draft-ietf-notary-status-01.txt>](mailto:draft-ietf-notary-status-01.txt)

Changes from Last Version

- 1) Numerous editorial corrections and clarifications including a revised overview section.
- 2) Several new error codes were added.
 - a) An additional status code was added for mailbox valid. It was suggested that other mailbox status was too ambiguous for use in a positive delivery report.
 - b) An additional status code was added to indicate that the address has changed and no forwarding address is available.
 - c) An additional status code was added to indicate that a conversion required for delivery failed.
- 3) The BNF was updated more clearly express the allowable values for each of the status code fields. The first digit was redefined to have the same values as the SMTP error codes, values 2-Success, 4-Persistent temporary failure, and 5-Permanent failure. This change was discussed and agreed to in San Jose but was overlooked in the first ID posting.

1. Status of this Memo

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2. Overview

There currently is not a standard mechanism for the reporting of mail system errors except for the limited set offered by SMTP and the system specific text descriptions sent in mail messages. There is a pressing need for a rich machine readable status code for use in delivery status notifications [2]. This document proposes a new set of status codes for this purpose.

SMTP [1] error codes have historically been used for reporting mail system errors. Because of limitations in the SMTP code design, these are not suitable for use in delivery status notifications. SMTP provides about 12 useful codes for delivery reports. The majority of the codes are protocol specific response codes such as the 354 response to the data command.

Each of the 12 useful codes are each overloaded to indicate several error conditions each. SMTP suffers some scars from history, most notably the unfortunate damage to the reply code extension mechanism by uncontrolled use. This proposal facilitates future extensibility by requiring the client to interpret unknown error codes according to the theory of codes while requiring servers to register new response codes.

The SMTP theory of reply codes partitioned in the number space such a manner that the remaining available codes will not provide the space needed. The most critical example is the existence of only 5 remaining codes for mail system errors. The mail system classification includes both host and mailbox error conditions. The remaining third digit space will be completely consumed as needed to indicate MIME and media conversion errors and security system errors.

A revision to the SMTP theory of reply codes to better distribute the error conditions in the number space will necessarily be incompatible with SMTP. Further, consumption of the remaining reply-code number space for delivery notification reporting will reduce the available codes for new ESMTP extensions.

The following proposal starts from the SMTP theory of reply codes. It adopts the success, permanent error, and transient error semantics of the first value, with a further description and classification in the second. This proposal re-distributes the classifications to better distribute the error conditions, such as separating mailbox from host errors. The detail value has been separated by a period and replaced by a two digit integer. This separation into an integer provides a virtually unbounded space for future growth as well as visually indicates that the codes is not SMTP.

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3. Status Codes

This document defines a new set of status codes to report delivery status in the DSN. These status codes are intended to be used for media and language independent status reporting and not for system specific diagnostics.

The syntax of the new status codes is defined as:

```
status-code = class "." subject "." detail
class = "2"/"4"/"5"
subject = 2*digit
detail = 2*digit
```

The status codes are explicit enumeration's of each of the three fields. The codes space defined is intended to be extensible only by standards track documents. Mail system specific status codes should be mapped as closely to the standard status codes. Servers should send only defined, registered status codes. System specific errors and diagnostics may be carried in the DSN via protocol specific extension fields. Clients should preserve the extensibility of the code space by reporting the general error

described in the second protocol digit when the specific detail is unrecognized.

The first digit provides a broad classification of the status. The enumerated values of this first digit are defined as:

Success (2)

Success specifies that the DSN is reporting a positive delivery action. Detail digits may provide notification of transformations required for delivery.

Persistent Transient Failure (4)

A persistent transient failure is one in which the message as sent is valid, but some temporary event prevents the successful sending of the message. Sending in the future may be successful.

Permanent Failure (5)

A permanent failure is one which is not likely to be resolved by resending the message in the current form. Some change to the message or the destination must be made for successful delivery.

A client must recognize and report based on the first digit even where subsequent digits are unrecognized.

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The second subject digit classifies the status. This digit applies to each of the three classifications. The second digit, if recognized, must be reported even if the additional detail provided by the third digit is not recognized. The enumerated values for the second digit are:

- Other or undefined status (0)
- Addressing status (1)
- Mailbox status (2)
- System status (3)
- Network and Routing Status (4)
- Protocol Status (5)
- Message Content or Media Status (6)
- Security Status (7)

The detail value provides more information about the status and is defined relative to the subject of the status as indicated by the second digit.

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4. Enumerated Status Codes

The following section defines and describes the detail status code digits.

4.1 Other or Undefined Status (0)

There is no additional detail available for other or undefined status codes. The only detail digit defined is (0).

4.2 Address Status (1)

The address status reports on the specified address. It may include address syntax or validity.

4.2.1 Other Address Status (1.0)

Something about the address specified in the message caused this DSN.

4.2.2 Bad mailbox address (1.1)

The mailbox specified in the address does not exist. For domain names, this means the address portion to the left of the "@" sign is invalid. This code is only useful for permanent failures.

4.2.3 Bad system address (1.2)

The destination system specified in the address does not exist or is incapable of accepting mail. For domain names, this means the address portion to the right of the "@" is invalid for mail. This codes is only useful for permanent failures.

4.2.4 Bad mailbox address syntax (1.3)

The address was syntactically invalid. This can apply to any field in the address. This code is only useful for permanent failures.

4.2.5 Mailbox address ambiguous (1.4)

The mailbox address as specified matches one or more recipients on the destination system. This may result if a heuristic address mapping algorithm is used to map the specified address to a local mailbox name. This code is only useful for permanent failures.

4.2.6 Address Valid (1.5)

This mailbox address as specified was valid. This status code should be used for positive delivery reports.

4.2.7 Mailbox has moved, No forwarding address (1.6)

The mailbox address is was valid but is not longer availableresident on
the
system. This code is only useful for permanent failures.

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4.3 Mailbox Status (2)

Mailbox status indicates that something having to do with the mailbox has cause this DSN. Mailbox issues are assumed to be under the general control of the individual recipient.

4.3.1 Other or undefined mailbox status (2.0)

The mailbox exists, but something about the destination mailbox has caused the sending of this DSN.

4.3.2 Mailbox disabled, not accepting messages (2.1)

The mailbox exists, but is not accepting messages. This may be a permanent error if the mailbox will never be re-enabled or a transient error if the mailbox is only temporarily disabled.

4.3.3 Mailbox full (2.2)

The mailbox is full either because the user has exceeded an administrative quota or the dedicated physical resources have been exceeded. The general semantics implies that the recipient can delete messages to make more space available. This code should be used as a persistent transient failure.

4.3.4 Message length exceeds administrative limit (2.3)

A per-mailbox administrative message length limit has been exceeded. This status code should be used when the per-mailbox message length limit is less than the general system limit. This code should be used as a permanent failure.

4.3.5 Mailing list expansion problem (2.4)

The mailbox is a mailing list address and the mailing list was unable to be expanded. This code may represent a permanent failure or a persistent transient failure.

4.3.6 System Status (3)

System status indicates that something having to do with the destination system has caused this DSN. System issues are assumed to be under the general control of the system administrator.

4.3.7 Other or undefined system status (3.0)

The destination system exists and normally accepts mail, but something about the system has caused the generation of this DSN.

4.3.8 System full (3.1)

System storage has been exceeded. The general semantics imply that the individual recipient may not be able to delete material to make room for additional messages. This is useful only as a persistent transient error.

4.3.9 System not accepting network messages (3.2)

The host on which the mailbox is resident is not accepting messages. Examples of such conditions include an immanent shutdown or system maintenance. This is useful for both permanent and permanent transient errors.

4.3.10 System not capable of selected features (3.3)

Selected message features specified for the message are not supported by the destination system. This is useful only as a permanent error.

4.3.11 Message too big for system (3.4)

The message is larger than per-message size limit. This limit may either be for physical or administrative reasons. This is useful only as a permanent error.

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4.4 Network and Routing Status (4)

The networking or routing codes report status about the delivery system itself, both the network and intermediate processing.

4.4.1 Other or undefined network or routing status (4.0)

Something went wrong with the networking, but it is not clear what the problem is, or the problem cannot be well expressed with any of the other provided detail codes.

4.4.2 No answer from host (4.1)

The outbound connection attempt was not answered, either because the remote system was busy, or otherwise unable to take a call. This is useful only as a persistent transient error.

4.4.3 Bad connection (4.2)

The outbound connection was completed, but was otherwise unable to complete the message transaction, either because of time-out, excessive packet loss, or inadequate quality. This is useful only as a persistent transient error.

4.4.4 Routing server failure (4.3)

The network system was unable to determine the next hop for the message, because a nameserver was unavailable to resolve the address or provide a route. This is useful only as a persistent transient error.

4.4.5 Unable to route (4.4)

The network was unable to determine the next hop for the message because the necessary routing information was unavailable from the routing server. This is useful for both permanent and persistent transient errors.

4.4.6 Network congestion (4.5)

The network or system was unable to deliver the message because the network was congested, or the queuing was overfilled. This is useful only as a persistent transient error.

4.4.7 Routing loop detected (4.6)

A routing loop caused the message to be forwarded too many times, either

because of incorrect routing tables or a user forwarding loop. This is useful only as a persistent transient error.

4.4.8 Delivery time expired (4.7)

The message was considered too old by the rejecting system, either because it remained on that host too long or because the TTL value specified by the sender of the message was exceeded. This is useful only as a persistent transient error.

4.5 Protocol Status (5)

4.5.1 Other or undefined protocol status (0)

Something was wrong with the protocol necessary to deliver the message to the next hop and the problem cannot be well expressed with any of the other provided detail codes.

4.5.2 Invalid command (5.1)

A command was issued which was either out of sequence or otherwise unsupported. This is useful only as a permanent error.

4.5.3 Syntax error (5.2)

A command was issued which could not be interpreted, either because the syntax was wrong or the command was not supported. This is useful only as a permanent error.

4.5.4 Too many recipients (5.3)

More recipients were specified for the message than could have been delivered by the protocol. This error should normally result in the segmentation of the message into two, the remainder of the recipients to be delivered on a subsequent delivery attempt. It is included in this list in the event that such segmentation is not possible. This is useful only as a permanent error.

4.5.5 Invalid command arguments (5.4)

A valid command was issued with invalid arguments, either because the arguments were out of range or represented unrecognized features. This is useful only as a permanent error.

4.5.6 Wrong protocol version (5.5)

A protocol version mis-match existed which could not be automatically resolved by downgrading one of the communicating parties. This should never happen in ESMTP. This is useful only as a permanent error.

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4.6 Message Content or Media Status (6)

4.6.1 Other or undefined media error (6.0)

Something about the content of a message caused it to be considered undeliverable and the problem cannot be well expressed with any of the other provided detail codes.

4.6.2 Media not supported (6.1)

The media of the message is not supported by either the delivery protocol or a host in the forwarding path. This is useful only as a permanent error.

4.6.3 Conversion required and prohibited (6.2)

The content of the message must be converted before it can be delivered and such conversion is not permitted. Such prohibitions may be the expression of the sender in the message itself or the policy of the sending host. This is useful only as a permanent error.

4.6.4 Conversion required but not supported (6.3)

The message content must be converted to be forwarded but such conversion is not possible or is not practical by a host in the forwarding path. This condition may result when a relay supports ESMTP transport but not MIME downgrade. This is useful only as a permanent error.

4.6.5 Conversion with loss performed (6.4)

This is a warning sent to the sender when message delivery was successfully but when the delivery required a conversion in which some data was lost. This is useful only for successful notification.

4.6.6 Conversion Failed (6.5)

A conversion was required but was unsuccessful. This may be useful as a permanent or persistent temporary notification.

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4.7 Security Status (7)

4.7.1 Other or undefined security status (7.0)

Something related to security caused the message to be returned, and the problem cannot be well expressed with any of the other provided detail codes. This status code may also be used when the condition cannot be further described because of security policies in force.

4.7.2 Delivery not authorized, message refused (7.1)

The sender is not authorized to send to the destination. This can be the result of per-host or per-recipient filtering. This memo does not discuss the merits of any such filtering, but provides a mechanism to report such. This is useful only as a permanent error.

4.7.3 Mailing list expansion prohibited (7.2)

The sender is not authorized to send a message to the intended mailing list. This is useful only as a permanent error.

4.7.4 Security conversion required but not possible (7.3)

A conversion from one secure messaging protocol to another was required
for delivery and such conversion was not possible. This is useful only as a permanent error.

4.7.5 Security features not supported (7.4)

A message contained security features such as secure authentication which could not be supported on the delivery protocol. This is useful only as a permanent error.

4.7.6 Cryptographic failure (7.5)

A transport system otherwise authorized to validate or decrypt a message
in transport was unable to do so because necessary information such as key
was not available or such information was invalid. This is useful only as a permanent error.

4.7.7 Cryptographic algorithm not supported (7.6)

A transport system otherwise authorized to validate or decrypt a message
was unable to do so because the necessary algorithm was not supported.
This is useful only as a permanent error.

4.7.8 Message integrity failure (7.7)

A transport system otherwise authorized to validate a message was unable to do so because the message was corrupted or altered. This may be useful as a permanent, transient persistent, or successful delivery code.

5. References

[RFC-821] Postel, J., "Simple Mail Transfer Protocol", STD 10, [RFC 821](#), USC/Information Sciences Institute, August 1982.

6. Security Consideration

This document describes a status code system with increased precision.

Use

of these status codes may disclose information about how an internal mail system is implemented beyond that currently available.

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8. Appendix - Collected Status Codes

- X.1.0 Other Address Status
- X.1.1 Bad mailbox address
- X.1.2 Bad system address
- X.1.3 Bad mailbox address syntax
- X.1.4 Mailbox address ambiguous
- X.1.5 Mailbox address valid
- X.1.6 Mailbox has moved

- X.2.0 Other or undefined mailbox status
- X.2.1 Mailbox disabled, not accepting messages
- X.2.2 Mailbox full
- X.2.3 Message length exceeds administrative limit.
- X.2.4 Mailing list expansion problem

- X.3.0 Other or undefined system status
- X.3.1 System full
- X.3.2 System not accepting network messages
- X.3.3 System not capable of selected features
- X.3.4 Message too big for system

- X.4.0 Other or undefined network or routing status
- X.4.1 No answer from host
- X.4.2 Bad connection
- X.4.3 Routing server failure
- X.4.4 Unable to route
- X.4.5 Network congestion
- X.4.6 Routing loop detected
- X.4.7 Delivery time expired

- X.5.0 Other or undefined protocol status
- X.5.1 Invalid command
- X.5.2 Syntax error
- X.5.3 Too many recipients
- X.5.4 Invalid command arguments
- X.5.5 Wrong protocol version

- X.6.0 Other or undefined media error
- X.6.1 Media not supported
- X.6.2 Conversion required and prohibited
- X.6.3 Conversion required but not supported
- X.6.4 Conversion with loss performed
- X.6.5 Conversion failed

- X.7.0 Other or undefined security status
- X.7.1 Delivery not authorized, message refused
- X.7.2 Mailing list expansion prohibited

- X.7.3 Security conversion required but not possible
- X.7.4 Security features not supported
- X.7.5 Cryptographic failure
- X.7.6 Cryptographic algorithm not supported
- X.7.7 Message integrity failure

9. Appendix - Existing SMTP Reply-Codes From [RFC 821](#)

211 System status, or system help reply
214 Help message
 [Information on how to use the receiver or the meaning of a
 particular non-standard command; this reply is useful only
 to the human user]
220 <domain> Service ready
221 <domain> Service closing transmission channel
250 Requested mail action okay, completed
251 User not local; will forward to <forward-path>

354 Start mail input; end with <CRLF>.<CRLF>

421 <domain> Service not available,
 closing transmission channel
 [This may be a reply to any command if the service knows it
 must shut down]
450 Requested mail action not taken: mailbox unavailable
 [E.g., mailbox busy]
451 Requested action aborted: local error in processing
452 Requested action not taken: insufficient system storage

500 Syntax error, command unrecognized
 [This may include errors such as command line too long]
501 Syntax error in parameters or arguments
502 Command not implemented
503 Bad sequence of commands
504 Command parameter not implemented
550 Requested action not taken: mailbox unavailable
 [E.g., mailbox not found, no access]
551 User not local; please try <forward-path>
552 Requested mail action aborted: exceeded storage allocation
553 Requested action not taken: mailbox name not allowed
 [E.g., mailbox syntax incorrect]
554 Transaction failed

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