Network Working Group
Request for Comments: 3463
Obsoletes: 1893
Category: Standards Track

G. Vaudreuil
Lucent Technologies

January 2003

Enhanced Mail System Status Codes

Status of this Memo

Copyright Notice

Abstract

This document defines a set of extended status codes for use within the mail system for delivery status reports, tracking, and improved diagnostics. In combination with other information provided in the Delivery Status Notification (DSN) delivery report, these codes facilitate media and language independent rendering of message delivery status.

Table of Contents

1. Overview

There is a need for a standard mechanism for the reporting of mail system errors richer than 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, human language independent status code for use in delivery status notifications [DSN]. This document proposes a new set of status codes for this purpose.

SMTP [SMTP] 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 SMTP data command. Each of the 12 useful codes are overloaded to indicate several error conditions. 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 are partitioned in the number space in 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 would 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 status code set is based on 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.

Document Conventions

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 [RFC2119].

2. Status Code Structure

This document defines a new set of status codes to report mail system conditions. These status codes are used for media and language independent status reporting. They are not intended for system specific diagnostics.

The syntax of the new status codes is defined as:

```
status-code = class "." subject "." detail

class = "2"/"4"/"5"

subject = 1*3digit

detail = 1*3digit
```

White-space characters and comments are NOT allowed within a status-code. Each numeric sub-code within the status-code MUST be expressed without leading zero digits.

Status codes consist of three numerical fields separated by ".". The first sub-code indicates whether the delivery attempt was successful. The second sub-code indicates the probable source of any delivery anomalies, and the third sub-code indicates a precise error condition.

Example: 2.1.23

The code space defined is intended to be extensible only by standards track documents. Mail system specific status codes should be mapped as close as possible to the standard status codes. Servers should send only defined, registered status codes. System specific errors and diagnostics should be carried by means other than status codes.

New subject and detail codes will be added over time. Because the number space is large, it is not intended that published status codes will ever be redefined or eliminated. Clients should preserve the extensibility of the code space by reporting the general error described in the subject sub-code when the specific detail is unrecognized.

The class sub-code provides a broad classification of the status. The enumerated values for each class are defined as:

2.XXX.XXX Success

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

4.XXX.XXX Persistent Transient Failure

A persistent transient failure is one in which the message as sent is valid, but persistence of some temporary condition has caused abandonment or delay of attempts to send the message. If this code accompanies a delivery failure report, sending in the future may be successful.

5.XXX.XXX Permanent Failure

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 class sub-code even where subsequent subject sub-codes are unrecognized.

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

X.0.XXX Other or Undefined Status

There is no additional subject information available.

X.1.XXX Addressing Status

The address status reports on the originator or destination address. It may include address syntax or validity. These errors can generally be corrected by the sender and retried.

X.2.XXX Mailbox Status

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

X.3.XXX Mail System Status

Mail 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 destination system administrator.

X.4.XXX Network and Routing Status

The networking or routing codes report status about the delivery system itself. These system components include any necessary infrastructure such as directory and routing services. Network issues are assumed to be under the control of the destination or intermediate system administrator.

X.5.XXX Mail Delivery Protocol Status

The mail delivery protocol status codes report failures involving the message delivery protocol. These failures include the full range of problems resulting from implementation errors or an unreliable connection.

X.6.XXX Message Content or Media Status

The message content or media status codes report failures involving the content of the message. These codes report failures due to translation, transcoding, or otherwise unsupported message media. Message content or media issues are under the control of both the sender and the receiver, both of which must support a common set of supported content-types.

X.7.XXX Security or Policy Status

The security or policy status codes report failures involving policies such as per-recipient or per-host filtering and cryptographic operations. Security and policy status issues are assumed to be under the control of either or both the sender and recipient. Both the sender and recipient must permit the exchange of messages and arrange the exchange of necessary keys and certificates for cryptographic operations.

3. Enumerated Status Codes

The following section defines and describes the detail sub-code. The detail value provides more information about the status and is defined relative to the subject of the status.

3.1 Other or Undefined Status

X.0.0 Other undefined Status

Other undefined status is the only undefined error code. It should be used for all errors for which only the class of the error is known.

3.2 Address Status

X.1.0 Other address status

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

X.1.1 Bad destination mailbox address

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

X.1.2 Bad destination system address

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

X.1.3 Bad destination mailbox address syntax

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

X.1.4 Destination mailbox address ambiguous

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.

X.1.5 Destination address valid

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

X.1.6 Destination mailbox has moved, No forwarding address

The mailbox address provided was at one time valid, but mail is no longer being accepted for that address. This code is only useful for permanent failures.

X.1.7 Bad sender's mailbox address syntax

The sender's address was syntactically invalid. This can apply to any field in the address.

X.1.8 Bad sender's system address

The sender's system specified in the address does not exist or is incapable of accepting return mail. For domain names, this means the address portion to the right of the "@" is invalid for mail.

3.3 Mailbox Status

X.2.0 Other or undefined mailbox status

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

X.2.1 Mailbox disabled, not accepting messages

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.

X.2.2 Mailbox full

The mailbox is full because the user has exceeded a per-mailbox administrative quota or physical capacity. 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.

X.2.3 Message length exceeds administrative limit

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.

X.2.4 Mailing list expansion problem

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.

3.4 Mail system status

X.3.0 Other or undefined mail system status

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

X.3.1 Mail system full

Mail 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.

X.3.2 System not accepting network messages

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

X.3.3 System not capable of selected features

Selected features specified for the message are not supported by the destination system. This can occur in gateways when features from one domain cannot be mapped onto the supported feature in another.

X.3.4 Message too big for system

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.

X.3.5 System incorrectly configured

The system is not configured in a manner that will permit it to accept this message.

3.5 Network and Routing Status

X.4.0 Other or undefined network or routing status

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.

X.4.1 No answer from host

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

X.4.2 Bad connection

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

X.4.3 Directory server failure

The network system was unable to forward the message, because a directory server was unavailable. This is useful only as a persistent transient error.

The inability to connect to an Internet DNS server is one example of the directory server failure error.

X.4.4 Unable to route

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

A DNS lookup returning only an SOA (Start of Administration) record for a domain name is one example of the unable to route error.

X.4.5 Mail system congestion

The mail system was unable to deliver the message because the mail system was congested. This is useful only as a persistent transient error.

X.4.6 Routing loop detected

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.

X.4.7 Delivery time expired

The message was considered too old by the rejecting system, either because it remained on that host too long or because the time-to-live value specified by the sender of the message was exceeded. If possible, the code for the actual problem found when delivery was attempted should be returned rather than this code.

3.6 Mail Delivery Protocol Status

X.5.0 Other or undefined protocol status

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.

X.5.1 Invalid command

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

X.5.2 Syntax error

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

X.5.3 Too many recipients

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.

X.5.4 Invalid command arguments

A valid mail transaction protocol 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.

X.5.5 Wrong protocol version

A protocol version mis-match existed which could not be automatically resolved by the communicating parties.

3.7 Message Content or Message Media Status

X.6.0 Other or undefined media error

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.

X.6.1 Media not supported

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

X.6.2 Conversion required and prohibited

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.

X.6.3 Conversion required but not supported

The message content must be converted in order 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 an ESMTP gateway supports 8bit transport but is not able to downgrade the message to 7 bit as required for the next hop.

X.6.4 Conversion with loss performed

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 may also be a permanent error if the sender has indicated that conversion with loss is prohibited for the message.

X.6.5 Conversion Failed

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

3.8 Security or Policy Status

X.7.0 Other or undefined security status

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.

X.7.1 Delivery not authorized, message refused

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.

X.7.2 Mailing list expansion prohibited

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

X.7.3 Security conversion required but not possible

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.

X.7.4 Security features not supported

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

X.7.5 Cryptographic failure

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.

X.7.6 Cryptographic algorithm not supported

A transport system otherwise authorized to validate or decrypt a message was unable to do so because the necessary algorithm was not supported.

X.7.7 Message integrity failure

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.

4. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

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

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

5. Security Considerations

This document describes a status code system with increased precision. Use of these status codes may disclose additional information about how an internal mail system is implemented beyond that currently available.

Appendix A - Collected Status Codes

X.1.0	Other address status
X.1.1	Bad destination mailbox address
X.1.2	Bad destination system address
X.1.3	Bad destination mailbox address syntax
X.1.4	Destination mailbox address ambiguous
X.1.5	Destination mailbox address valid
X.1.6	Mailbox has moved
X.1.7	Bad sender’s mailbox address syntax
X.1.8	Bad sender’s system address
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 mail system status
X.3.1	Mail 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

Appendix B - Changes from RFC1893

Changed Authors contact information.

Updated required standards boilerplate.

Edited the text to make it spell-checker and grammar checker compliant.

Modified the text describing the persistent transient failure to more closely reflect current practice and understanding.

Eliminated the restriction on the X.4.7 codes limiting them to persistent transient errors.

Author’s Address

Gregory M. Vaudreuil
Lucent Technologies
7291 Williamson Rd
Dallas, Tx. 75214

Phone: +1 214 823 9325
EMail: GregV@ieee.org

Full Copyright Statement

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.