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SMTP 521 and 556 Reply Codes

Abstract

This memo defines two Simple Mail Transfer Protocol (SMTP) reply codes, 521 and 556. The 521 code was originally described in an Experimental RFC in 1995 and is in wide use, but has not previously been formally incorporated into SMTP. The 556 code was created to support the new tests and actions specified in RFC 7505. These codes are used to indicate that an Internet host does not accept incoming mail at all. This specification is not applicable when the host sometimes accepts mail but may reject particular messages, or even all messages, under specific circumstances.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc7504.

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1. Introduction

The SMTP specification [2] (referred to, along with its various updates, as "SMTP" below) contains a list and discussion of reply codes. This document updates that list with a new code, 521, for use in response to an initial connection. In that context, it specifically denotes a system that does not receive mail or otherwise handle SMTP mail or inquiry transactions. That code differs from the use of reply code 554, recommended by RFC 5321, because the latter code can be used in a larger variety of situations, including mail that is not accepted for, or from, particular sources, destinations, or addresses. It also introduces a second reply code, 556, for use when an SMTP client encounters a domain in a forward-pointing address that it can determine (e.g., from the DNS "null MX" convention [5]) does not support receipt of mail and has to report that condition to a host that delivered the message to it for further processing.

This specification updates RFC 5321 to add the new codes. The 521 code was first formally proposed in the Experimental RFC 1846 [4]; this document updates that specification to standardize the code and provide more specific treatment of it.

1.1. Terminology

The reader of this document is expected to have reasonable familiarity with the SMTP specification in RFC 5321, particularly its discussion of reply codes and their use and theory.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [1].

2. Background

Many Internet hosts are not in a position -- whether technically, operationally, or administratively -- to offer mail service. If an SMTP client (sender) attempts to open a mail connection to a system that does not have an SMTP server, the connection attempt will time out. SMTP requires that timeouts result in the client queuing the message and retrying it for an extended period. That behavior will result in wasted resources and long delays in getting an error message back to its originator.

One alternative is to run a dummy SMTP server on hosts that do not receive mail under any circumstances and have that dummy server return a fatal error reply code in response to any connection-opening

attempt. Another is to determine, from a separate source such as a DNS record, that the host does not receive mail. This document specifies reply codes to be used for those purposes.

3. The 521 Reply Code

This specification adds the 521 reply code to the repertoire specified in SMTP, reserving it for use at connection-opening time to indicate that the host does not accept mail under any circumstances. It SHOULD be used for dummy SMTP servers whose sole purpose is to notify systems that attempt to open mail connections that the host never accepts mail. It MAY be used in other situations where the intent is to indicate that the host never accepts mail. It SHOULD NOT be used for situations in which the server rejects mail from particular hosts or addresses or in which mail for a particular destination host is not accepted. As discussed in SMTP, reply code 554 is more appropriate for most of those conditions; an additional case, in which the determination that mail is not accepted is determined outside the mail system, is covered in the next section (Section 4).

"Server does not accept mail" (or a variant such as "Host", "Domain", or a related term) is an acceptable message to accompany a 521 code used for this purpose.

Once the 521 reply code is returned instead of the usual 220, the SMTP session proceeds normally. If the SMTP client attempts to send additional commands other than QUIT, the server MAY either continue sending 521 reply codes or simply close the connection. If the purpose of running a dummy SMTP server that returns a 521 code is to conserve resources, the latter will usually be preferable.

4. The 556 Reply Code

This specification adds the 556 reply code to the repertoire specified in SMTP. When an intermediate SMTP system (typically a relay) that would normally attempt to open a mail connection to a host referred to in a forward-pointing address can determine that the host does not accept mail connections, and do so without attempting to open a connection to that target host, it is appropriate for it to return a reply with a 556 code to the system that sent it the message for outbound transmission. Interpretation of a special DNS record, found when a lookup is performed in conjunction with a RCPT command [5], is one such method (and the only standardized one at the time this specification was written).

When an SMTP server returns a 556 reply code after receiving a command (such as RCPT, which contains a forward-pointing address) because it has information (such as discussed above) that the mail will not be accepted, the SMTP client is expected to handle the response like any other permanent negative completion reply to the command. This is consistent with the SMTP specification.

5. Small Details to Avoid Loose Ends

5.1. Specific Changes to RFC 5321

This document adds the 521 code, with message "Host does not accept mail", and the 556 code, with message "Domain does not accept mail", to the function group and numerical lists (Sections 4.2.2 and 4.2.3, respectively) of RFC 5321. It also adds the 521 code to the "CONNECTION ESTABLISHMENT" portion of Section 4.3.2 ("Command-Reply Sequences"), preceding the 554 code, and the 556 code to the "RCPT" portion of that same section.

5.2. The RFC 1846 Experiment

By formalizing reply code 521, this specification ends the experiment proposed in RFC 1846. That document also discusses general strategies for hosts that do not accept mail directly. That discussion is out of scope for the present document.

6. IANA Considerations

This document updates RFC 5321 to add descriptions and text for two reply codes, but there is no registry for those codes. IANA has updated the "Enumerated Status Codes" subregistry of the "Simple Mail Transfer Protocol (SMTP) Enhanced Status Codes Registry" [3] to include these codes, specifically:

- Added 521 to the list of codes associated with the enhanced code entry for X.3.2, which now references this document.

- Added this document to the references associated with the enhanced code entry for X.1.10 and reply code 556. Note that, if a use for 556 arises that is not associated with null MX [5], it may be necessary to add an additional enhanced code, but such action is outside the scope of this document.

7. Security Considerations

Not running any SMTP server, or running an SMTP server that simply emits fixed strings in response to incoming connections, should provide significantly fewer opportunities for security problems than running a complete SMTP implementation. See the Security Considerations section of RFC 7505 [5] for a discussion of security issues with that approach. Use of the specific codes provided here provides more information to the client than a generic or arbitrarily chosen 5yz code but should have no other effect on security.

8. References

8.1. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-editor.org/info/rfc2119>.

[2] Klensin, J., "Simple Mail Transfer Protocol", RFC 5321, DOI 10.17487/RFC5321, October 2008, <http://www.rfc-editor.org/info/rfc5321>.

[3] IANA, "Simple Mail Transfer Protocol (SMTP) Enhanced Status Codes Registry", <http://www.iana.org/assignments/smtp-enhanced-status-codes>.

8.2. Informative References

[4] Durand, A. and F. Dupont, "SMTP 521 Reply Code", RFC 1846, DOI 10.17487/RFC1846, September 1995, <http://www.rfc-editor.org/info/rfc1846>.

[5] Levine, J. and M. Delany, "A "Null MX" No Service Resource Record for Domains That Accept No Mail", RFC 7505, DOI 10.17487/RFC7505, June 2015, <http://www.rfc-editor.org/info/rfc7505>.

Acknowledgments

Alain Durand and Francis Dupont proposed the 521 code in RFC 1846 [4]. They also participated in an extended conversation and provided many useful comments that led to this document. The document also contains, with their permission, some text copied from that early specification.

Discussion of the "null MX" approach and proposal [5] inspired the creation of this specification. Specific comments and suggestions from John Levine (co-author of that document) were also helpful.

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