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Message Tracking Query Protocol

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Abstract

Customers buying enterprise message systems often ask: Can I track the messages? Message tracking is the ability to find out the path that a particular message has taken through a messaging system and the current routing status of that message. This document describes the

Message Tracking Query Protocol that is used in conjunction with extensions to the ESMTP protocol to provide a complete message tracking solution for the Internet.

1. Introduction

The Message Tracking Models and Requirements document [RFC-TRACK-MODEL] discusses the models that message tracking solutions could follow, along with requirements for a message tracking solution that can be used with the Internet-wide message infrastructure. This memo and its companions, [RFC-TRACK-ESMTP] and [RFC-TRACK-TSN], describe a complete message tracking solution that satisfies those requirements. The memo [RFC-TRACK-ESMTP] defines an extension to the SMTP service that provides the information necessary to track messages. This memo defines a protocol that can be used to query the status of messages that have been transmitted on the Internet via SMTP. The memo [RFC-TRACK-TSN] describes the message/tracking-status MIME media type that is used to report tracking status information. Using the model document's terminology, this solution uses active enabling and active requests with both request and chaining referrals.

1.1. 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 [RFC-KEYWORDS].

All syntax descriptions use the ABNF specified by [RFC-ABNF]. Terminal nodes not defined elsewhere in this document are defined in [RFC-ABNF], [RFC-URI], [RFC-TRACK-ESMTP] or [RFC-SMTPEXT].

1.2. To Do

provide information on finding an MTQP server

provide TTL info, maximum times for keeping info

determine the TCP port to use

2. Basic Operation

The Message Tracking Query Protocol (MTQP) is similar to many other line-oriented Internet protocols, such as [POP3] and [NNTP]. Initially, the server host starts the MTQP service by listening on TCP port TBD. When a client wishes to make use of the service, it establishes a TCP connection with the server host. When the connection is established, the MTQP server sends a greeting. The client and MTQP server then exchange commands and responses (respectively) until the connection is

closed or aborted.

2.1. Commands

Commands in MTQP consist of a case-insensitive keyword, possibly followed by one or more parameters. All commands are terminated by a CRLF pair. Keywords and parameters consist of printable ASCII characters. Keywords and parameters are separated by whitespace (one or more space or tab characters). A command line is limited to 998 characters before the CRLF.

2.2. Responses

Responses in MTQP consist of a status indicator that indicates success or failure. Successful commands may also be followed by additional lines of data. All response lines are terminated by a CRLF pair and are limited to 998 characters before the CRLF. There are several status indicators: "+OK" indicates success; "+OK+" indicates a success followed by additional lines of data, a multi-line success response; "-TEMP" indicates a temporary failure; "-ERR" indicates a permanent failure; and "-BAD" indicates a protocol error (such as for unrecognized commands).

A status indicator MAY be followed by a series of machine-parseable, case-insensitive response information giving more data about the errors. These are separated from the status indicator and each other by a single slash character ("/", decimal code 47). Following that, there MAY be white space and a human-readable text message.

In a multi-line success response, each subsequent line is terminated by a CRLF pair and limited to 998 characters before the CRLF. When all lines of the response have been sent, a final line is sent consisting of a single period (".", decimal code 046) and a CRLF pair. If any line of the multi-line response begins with a period, the line is "dot-stuffed" by prepending the period with a second period. When examining a multi-line response, the client checks to see if the line begins with a period. If so, and octets other than CRLF follow, the first octet of the line (the period) is stripped away. If so, and if CRLF immediately follows the period, then the response from the MTQP server is ended and the line containing the ".CRLF" is not considered part of the multi-line response.

An MTQP server MUST respond to an unrecognized, unimplemented, or syntactically invalid command by responding with a negative -BAD status indicator. A server MUST respond to a command issued when the session is in an incorrect state by responding with a negative -ERR status indicator.

2.3. Optional Timers

An MTQP server MAY have an inactivity autologout timer. Such a timer MUST be of at least 10 minutes in duration. The receipt of any command from the client during that interval should suffice to reset the autologout timer. An MTQP server MAY limit the number of commands or total connection time to prevent denial of service attacks.

3. Initialization and Option Response

Once the TCP connection has been opened by an MTQP client, the MTQP server issues an initial status response indicates its readiness. If the status response is positive (+OK or +OK+), the client may proceed with other commands.

The initial status response MUST include the response information "/MTQP". Negative responses MUST include a reason code as response information. The following reason codes are defined here; unrecognized reason codes added in the future may be treated as equivalent to "unknown".

"/" "unavailable"
"/" "admin"
"/" "unknown"
"/" "referral" "=" net_loc

If the server has any options enabled, they are listed as the multi-line response of the initial status response, one per line. An option specification consists of an identifier, optionally followed by option-specific parameters. An option specification may be continued onto additional lines by starting the continuation lines with white space. The option identifier is case insensitive. Option identifiers beginning with the characters "vnd." are reserved for vendor use.

One option specification is defined here:

STARTTLS

This capability MUST be listed if the optional STARTTLS command is supported by the MTQP server. It has no parameters.

Example #1 (no options):
S: +OK/MTQP MTQP server ready

Example #2 (service temporarily unavailable):
S: -TEMP/MTQP/admin Service down for admin, call back later

Example #3 (service permanently unavailable):
S: -ERR/MTQP/unavailable Service down

Example #4 (alternative for no options):
S: +OK+/MTQP MTQP server ready
S: .

Example #5 (options available):
S: +OK+/MTQP MTQP server ready
S: starttls
S: Option2 with parameters
S: Option3 with a very long
S: list of parameters
S: .

Example #6 (Referred to another server):
S: -ERR/MTQP/referral=server42.example.com:37

4. TRACK Command

Syntax:
"TRACK" 1*WSP envid 1*WSP mtrk-secret CRLF

mtrk-secret = base64

Envid is defined in [RFC-TRACK-ESMTP]. Mtrk-secret is the secret S described in [RFC-TRACK-ESMTP], encoded using base64.

When the client issues the TRACK command, the MTQP server retrieves tracking information about an email message. A successful response MUST be multi-line, consisting of a [MIME] body part. The default content-type for this MIME body part is message/tracking-status, as defined in [RFC-TRACK-TSN]. The response contains the tracking information about the email message that used the given tracking-id. Multiple responses would be reported using a multipart/mixed body part with message/tracking-status internals. The tracking-id and authorization-cookie are defined in [RFC-TRACK-ESMTP].

TBD: Give details on different modes of responses and how they map into message/tracking-status

Example #7 :
C: TRACK <tracking-id> 1234567890ABCDEF
S: +OK+ Tracking information follows
S: Content-Type: message/tracking-status
S:
S: ... details go here when ...
S: ... draft-ietf-msgtrk-trkstat becomes available ...
S: .

5. COMMENT Command

Syntax:

"COMMENT" opt-text CRLF

opt-text = [WSP *(VCHAR / WSP)]

When the client issues the COMMENT command, the MTQP server MUST respond with a successful response (+OK or +OK+). All optional text provided with the COMMENT command are ignored.

6. STARTTLS Command

Syntax:

"STARTTLS" CRLF

TLS [TLS], more commonly known as SSL, is a popular mechanism for enhancing TCP communications with privacy and authentication. An MTQP server MAY support TLS. If an MTQP server supports TLS, it MUST include "STARTTLS" in the option specifications list on protocol startup.

If the server returns a negative response, it MAY use one of the following response codes:

"/" "unsupported"

"/" "unavailable"

After receiving a positive response to a STARTTLS command, the client MUST start the TLS negotiation before giving any other MTQP commands.

If the MTQP client is using pipelining, the STARTTLS command must be the last command in a group.

6.1. Processing After the STARTTLS Command

After the TLS handshake has been completed, both parties MUST immediately decide whether or not to continue based on the authentication and privacy achieved. The MTQP client and server may decide to move ahead even if the TLS negotiation ended with no authentication and/or no privacy because most MTQP services are performed with no authentication and no privacy, but some MTQP clients or servers may want to continue only if a particular level of authentication and/or privacy was achieved.

If the MTQP client decides that the level of authentication or privacy is not high enough for it to continue, it SHOULD issue an MTQP QUIT command immediately after the TLS negotiation is complete. If the MTQP server decides that the level of authentication or privacy is not

high enough for it to continue, it SHOULD reply to every MTQP command from the client (other than a QUIT command) with a negative "-BAD" response and a response code of "/insecure".

6.2. Result of the STARTTLS Command

Upon completion of the TLS handshake, the MTQP protocol is reset to the initial state (the state in MTQP after a server starts up). The server MUST discard any knowledge obtained from the client prior to the TLS negotiation itself. The client MUST discard any knowledge obtained from the server, such as the list of MTQP options, which was not obtained from the TLS negotiation itself.

At the end of the TLS handshake, the server acts as if the connection had been initiated and responds with an initial status response and, optionally, a list of server options. The list of MTQP server options received after the TLS handshake MUST be different than the list returned before the TLS handshake. In particular, a server MUST NOT return the STARTTLS option in the list of server options after a TLS handshake has completed.

Both the client and the server MUST know if there is a TLS session active. A client MUST NOT attempt to start a TLS session if a TLS session is already active.

7. QUIT Command

Syntax:

"QUIT" CRLF

When the client issues the QUIT command, the MTQP session terminates. The QUIT command has no parameters. The server MUST respond with a successful response. The client may close the session from its end immediately after issuing this command.

8. Pipelining

The MTQP client may elect to transmit groups of MTQP commands in batches without waiting for a response to each individual command. The MTQP server MUST process the commands in the order received.

Specific commands may place further constraints on pipelining. For example, STARTTLS must be the last command in a batch of MTQP commands.

The following two examples are identical:

Example #8 :

C: TRACK <tracking-id> 1234567890ABCDEF

```
S: +OK+ Tracking information follows
S:
S: ... details go here ...
S: .
C: TRACK <tracking-id-2> ABCDEF1234567890
S: +OK+ Tracking information follows
S:
S: ... details #2 go here ...
S: .
```

Example #9 :

```
C: TRACK <tracking-id> 1234567890ABCDEF
C: TRACK <tracking-id-2> ABCDEF1234567890
S: +OK+ Tracking information follows
S:
S: ... details go here ...
S: .
S: +OK+ Tracking information follows
S:
S: ... details #2 go here ...
S: .
```

9. URL Format

The MTQP URL scheme is used to designate MTQP servers on Internet hosts accessible using the MTQP protocol. An MTQP URL takes one of the following forms:

```
mtqp://<mserver>/track/<envid>/<mtrk-secret>
mtqp://<mserver>:<port>/track/<envid>/<mtrk-secret>
```

The first form is used to refer to an MTQP server on the standard port, while the second form specifies a non-standard port. Both of these forms specify that the TRACK command is to be issued using the given tracking id and authorization cookie. The path element "/track/" is case insensitive, but the envid and mtrk-secret may not be.

9.1. MTQP URL Syntax

This is an ABNF description of the MTQP URL.

```
mtqp-url = "mtqp://" net_loc "/track/" envid ":" mtrk-secret
```

10. IANA Considerations

The service name to be registered with the Internet Assigned Number Authority (IANA) is "MTQP".

This document requests that IANA maintain one new registry: MTQP options.

Additional options for this protocol whose names do not begin with "vnd." MUST be defined in a standards track or IESG approved experimental RFC. New MTQP options MUST include the following information:

option identifier
option parameters
added commands
standard commands affected
specification reference
discussion

Additional options for this protocol whose names begin with "vnd." MUST be registered with IANA on a Firt Come First Served basis.

11. Security Considerations

Security considerations discussed in [RFC-TRACK-MODEL] and [RFC-TRACK-ESMTP] are relevant.

The security of tracking information is dependent on the randomness of the secret chosen for each message and the level of exposure of that secret. If different secrets are used for each message, then the maximum exposure from tracking any message will be that single message for the time that the tracking information is kept on any MTQP server. If this level of exposure is too much, TLS may be used to reduce the exposure further.

It should be noted that message tracking is not an end-to-end mechanism. Thus, if an MTQP client/server pair decide to use TLS privacy, they are not securing tracking queries with any prior or successive MTQP servers.

Both the STMP client and server must check the result of the TLS negotiation to see whether acceptable authentication or privacy was achieved. Ignoring this step completely invalidates using TLS for security. The decision about whether acceptable authentication or privacy was achieved is made locally, is implementation-dependant, and is beyond the scope of this document.

The SMTP client and server should note carefully the result of the TLS negotiation. If the negotiation results in no privacy, or if it results in privacy using algorithms or key lengths that are deemed not strong enough, or if the authentication is not good enough for either party, the client may choose to end the MTQP session with an immediate QUIT command, or the server may choose to not accept any more MTQP

commands.

A man-in-the-middle attack can be launched by deleting the "STARTTLS" option response from the server. This would cause the client not to try to start a TLS session. An MTQP client can protect against this attack by recording the fact that a particular MTQP server offers TLS during one session and generating an alarm if it does not appear in an option response for a later session.

If TLS is not used, a tracking request is vulnerable to replay attacks, such that a snoop can later replay the same handshake again to potentially gain more information about a message's status.

Before the TLS handshake has begun, any protocol interactions are performed in the clear and may be modified by an active attacker. For this reason, clients and servers MUST discard any knowledge obtained prior to the start of the TLS handshake upon completion of the TLS handshake.

12. Protocol Syntax

This is a collected ABNF description of the MTQP protocol.

```
conversation = command-response *( client-command command-response )

# client side
client-command = track-command / starttls-command / quit-command /
comment-command

track-command = "TRACK" 1*WS envid 1*WS mtrk-secret CRLF

mtrk-secret = base64

starttls-command = "STARTTLS" CRLF

quit-command = "QUIT" CRLF

comment-command = "COMMENT" opt-text CRLF

# server side
command-response = success-response / temp-response / error-response /
bad-response

temp-response = "-TEMP" response-info opt-text CRLF

opt-text = [WSP *(VCHAR / WSP)]

error-response = "-ERR" response-info opt-text CRLF

bad-response = "-BAD" response-info opt-text CRLF
```

```
success-response = single-line-success / multi-line-success

single-line-success = "+OK" response-info opt-text CRLF

multi-line-success = "+OK+" response-info opt-text CRLF *dataline dotcrlf

dataline = *998OCTET CRLF

dotcrlf = "." CRLF

option-list = *option-line

option-line = identifier opt-text *[CRLF WSP opt-text] CRLF

identifier = (ALPHA / "_") *(ALPHA / DIGIT / "-" / "_")
```

13. Acknowledgements

The description of STARTTLS is based on [RFC-SMTP-TLS].

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