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Mail Retrieval Protocol

Contents

1. Introduction

The Mail Retrieval Protocol was designed so a client host can retrieve, view and alter mail from a server host, in an efficient and reliable manner.

Throughout this document shortened phrases will be used. A host making use of the Mail Retrieval Protocol will be referred to as a "client host". The term "server host" will refer to the host that offers the Mail Retrieval Protocol service. The term "MRP" will be used as an abbreviation for Mail Retrieval Protocol.

By using a server host to store n numbers of client's mail, many elements of retrieving and storing the mail are kept simple. This method allows a client to dynamically access their mail (with their own log in) from any workstation that is able to connect to the server. Any workstation resource issues are also kept at a minimum as the server host will store the mail.

The Mail Retrieval protocol is not intended to supply extensive manipulation of mail on the server. However it is intended to supply a means of viewing and deleting mail at a minimum. Features such as flagging, spam and undeleting are explained in the optional sections of this document.

2. Basic operation

The design of the Mail Retrieval Protocol uses the same basic structure as the POP3 model [RFC1939]. The server host will begin by listening on a TCP port. When a client host wants to use this service it will establish a two-way transmission channel to the server host using TCP. Once this connection is made, the server host sends a greeting to the client host. The connection will remain alive until it is either closed or aborted.

All commands in the MRP use 4 letter case-insensitive words and abbreviations. Most of these commands are to be followed by an argument separated by a single colon character; however some of the commands will not require an argument. All commands are terminated by a CRLF pair. All keywords and argument consist of printable ASCII characters. Each keyword varies in length of 3-4 characters. Each argument may be up to 40 characters long.

Responses in the MRP consist of a status indicator and a keyword, followed by additional information where relevant. All responses are terminated by a CRLF pair. Reponses can be up to 512 characters long, including the terminating CRLF pair. Currently there are two status indicators; positive ("+OK") and negative ("-ERR"). The server host must send these status indicators in upper case.

Some of the MRP responses are multi-lined responses. Any replies that require a multi-lined response are explained clearly later in the document.

A MRP session has three states that can be progressed through. Once the client host and server host are connected, a greeting message is sent. At this point the session has entered the AUTHORISATION state. This is where the client host must

identify itself to the server host via username and password. If the client host logs in successfully then the session enters the TRANSACTION state and places a lock on the account in use. A this point a client host is able to use the server to view mail and mark mail for deletion (or use any additional features). Once the client host enters the QUIT command the session will then enter the UPDATE state. This is where any requests to delete mail (or any other additional alteration) are made permanent on the server.

A MRP server must respond to any invalid command or argument with a negative status response. A negative response must also be given if a command is used in the wrong state. For example if a client host attempts to view mail before they have logged in, they should be met with a negative status reply with a brief description of their fault.

3. The Authorisation State

Once a connection is established between the server host and the client host, the server host sends a greeting line to the client host. This can consist of any positive response. An example is shown below.

S: +OK MRP server ready

The MRP session has now entered the authorisation state. At this point the client host has to identify itself to the server host. This is done using the USER and PASS command combination. A short example can be seen below.

C: USER:myusername

S: +OK user found

C: PASS:mypassword

S: +OK user logged in

As shown above, each command is met with a status indicator. In this example both are positive as the correct username and password have been entered. However if either were entered incorrectly, a negative response should be given. If the details were entered correctly but the account was already in use, the server should send a negative response. The server should also send a negative response if a client host attempts to use the PASS command before the USER command.

Once the client host has successfully shown to authorise and identify itself to the server host, the client host will be granted access to the relevant maildrop.

If for any reason the maildrop cannot be opened the server host will respond with a negative status indicator. The connection may be closed at this point but the session can be kept alive and kept in the AUTHORISATION state.

If the maildrop is successfully opened then the server host will send a positive response followed by information on the mail within it, this will be explained in more detail later. At this stage the session is entering the TRANSACTION state.

Once the Mail Retrieval Protocol has opened the mailbox, each message will be assigned a number relevant to the mailbox it is found in. The first message of each mailbox will be assigned a number starting from 1, any message beyond this be will have a number one greater than it's previous. For example the first message will be "1", the second will be "2", this will repeat for an "n" number of messages.

Each individual maildrop will have the additional functionality of organising mail into three separate mailboxes. The three mailboes will consist of an inbox, a spam box and a deleted box. The functionality of these will be explained later in the document.

4. The Transaction State

Once the client host has successfully identified itself to the server host and the server host has opened the relevant maildrop, the session enters the TRANSACTION state. The client host may now enter any of the MRP commands repeatedly. After each command the server host will send a response. Once the client host is done with the session the QUIT command will be entered and the session will enter the UPDATE state.

Here are the Mail Retrieval Protocol commands valid in the TRANSACTION state:

ILST

Arguments: none

Restrictions:

May only be given in the TRANSACTION state

Discussion:

The server host issues a positive response with a line containing information on the mail marked as inbox from the maildrop.

The positive response consists of "+OK" followed by a single space and the number of messages marked as an inbox. This is the minimum requirement of the response line for this command. Additional information can be given on new lines such as the sender, date, and subject but not on the initial response line.

Possible Responses:

+OK 1 mail found

Examples:

C: ILST

S: +OK 1 mail found

S: mail 1

S: [additional mail info]

IOPN msg

Arguments:

A message number required which may only refer to messages marked as inbox from the maildrop.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive multi line response containing information on the selected message. The response needs to be multiline to clearly show the contents and information of the mail.

The first line of the positive response consists of "+OK" followed by the mail number. The following lines will show the contents of the mail. As a minimum it is expected that the sender, subject, date and data will be displayed

on individual lines. The data of the mail will be displayed on as many lines as the mail contains. This is the minimum requirement of the response line for this command. Further information can be displayed if desired.

If the argument entered after the command does not match any message number found in the inbox mail drop, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail information follows

-ERR no mail found

Examples:

C: IOPN:1

S: +OK mail 1 opened

S: From: example@email.com

S: Date: 01/01/18 15:00

S: Subject: Hello

S: Here is your email

S: Goodbye

...

C: IOPN:4

S: -ERR mail does not exist

5. The Update state

The only way the session will enter the UPDATE state is if the client host issues the QUIT command in the TRANSACTION state. Issuing the QUIT command in the AUTHORISATION will terminate the session without entering the UPDATE state.

If the client host disconnects or terminates the session without using the QUIT command, the session will not enter the UPDATE state. This will mean any changes made to the maildrop in the TRANSACTION state will not be executed and the maildrop

on the server will remain as it did before the relevant session was initiated.

QUIT

Arguments: none

Restrictions: none

Discussion:

The Mail Retrieval Protocol server will make any of the changes made in the TRANSACTION state to the mailbox. Any mail that has been marked for deletion will be removed from the mailbox. If an error occurs due to resources then some or none of the mail marked for deletion will be removed. In no circumstance are mail not marked for deletion removed.

If additional features are implemented such as the spam and deletion optional commands, then the changes made on the mail will be different. Mail that has been marked as spam will not be deleted. It will remain on the MRP server with a way of identifying itself as a spam mail. Mail that has been marked as deleted can still be removed at this point. However this is down to the implementation, as a user may wish to implement a feature where deleted mail can be revived after terminating a session. If any errors occur here, then some or none of the updates may take place.

Possible Responses:

+OK

-ERR some updates were not performed

Examples:

C: QUIT

S: +OK successfully logged out

...

C: QUIT

S: -ERR logged out, some updates not performed

6. Optional MRP commands

The following describes what features are optional in implementations of the Mail Retrieval Protocol. However all the commands seen before this section are the minimum requirements for all implementation.

The optional commands listed later in this document are designed to give the client host a wider selection in organising their maildrop.

If all the optional features are implemented then the client host will have an inbox, spam box and deleted box for their mail. The client host will be able to organise mail into the folders they wish them to be in. The client host will also have the option of flagging mail, but this feature should only be used for inbox mail.

It is down the users implementation whether mail marked for deletion is to be deleted within that session or placed back onto the server for a certain amount of time so it can be recovered.

Any changes made in the TRANSACTION state using these commands will use the same method as the minimum implementation. If the QUIT command is used in this state, then all of the marked changes will be made on the server. If the session terminates without the QUIT command, then no changes will be made.

7. Optional Inbox commands

The following section describes the spam commands that can be added as optional features. The following commands are to only be used in the TRANSACTION state.

ISPM msg

Arguments:

A message number required which may only refer to messages marked as inbox from the maildrop.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response identifying which message has been marked as spam.

The first line of the positive response consists of "+OK" followed by a single space and the relevant message number, this can be followed with a message clearly stating the relevant mail has been marked as spam.

If the argument entered after the command does not match any message number found in the inbox mail drop, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail sent to spam

-ERR no mail found

Examples:

C: ISPM:1

S: +OK mail 1 sent to spam

...

C: ISPM:4

S: -ERR mail does not exist

IDLT msg

Arguments:

A message number required which may only refer to messages marked as inbox from the maildrop.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response identifying which message has been removed from the inbox and marked for deletion.

The first line of the positive response consists of "+OK" followed by the mail number, this can be followed with a message clearly stating the relevant mail has been removed from the inbox and marked for deletion.

If the argument entered after the command does not match any message number found in the inbox mail drop, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail has been deleted

-ERR no mail found

Examples:

C: IDLT:1

S: +OK mail 1 sent to deleted

...

C: IDLT:4

S: -ERR mail does not exist

FLAG msg

Arguments:

A message number required which may only refer to messages marked as inbox from the maildrop.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response identifying which message has been flagged or un-flagged. This command allows the client host to flag and un-flag any message. For example, if a message is flagged and the client uses this command, it will then be un-flagged and vice versa.

The first line of the positive response consists of "+OK" followed by a single space and the relevant message number, this can be followed with a message stating whether the mail has been flagged or un-flagged.

If the argument entered after the command does not match any message number found in the inbox mail drop, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail flagged/un-flagged

-ERR no mail found

Examples:

C: FLAG:1

S: +OK mail 1 flagged/un-flagged

...

C: FLAG:4

S: -ERR mail does not exist

8. Optional Spam Commands

The following section describes the spam commands that can be added as optional features. The following commands are to only be used in the TRANSACTION state.

SLST

Arguments: none

Restrictions:

May only be given in the TRANSACTION state

Discussion:

The server host issues a positive response with a line containing information on the spam messages in the maildrop.

The positive response consists of "+OK" followed by a single space and the number of messages marked as a spam message. This is the minimum requirement of the response line for this command. Additional information can be given on new lines such as the date, subject or sender, but not on the initial response line.

If no spam is found in the maildrop, the response will still be positive.

Possible Responses:

+OK spam information follows

Examples:

C: SLST

S: +OK 1 mail found

S: message 1

S: [additional mail information here]

SOPN msg

Arguments:

A message number required which may only refer to messages found in the maildrop marked as spam.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive multi line response containing information on the selected message. The response needs to be multiline to clearly show the contents and information of the mail.

The first line of the positive response consists of "+OK" followed by a single space and the mail number. The following lines will show the contents of the mail. As a minimum it is expected that the sender, subject, date and data will be displayed on individual lines. The data of the

mail will be displayed on as many lines as the mail contains. This is the minimum requirement of the response line for this command. Further information can be displayed if desired.

If the argument entered after the command does not match any mail number found in the spam mail drop, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail information follows

-ERR no mail found

Examples:

C: SOPN:1

S: +OK mail 1 opened

S: From: example@email.com

S: Date: 03/01/18 15:00

S: Subject: Spam

S: I have sent you a spam message

S: Goodbye

...

C: SOPN:4

S: -ERR mail does not exist

SDLT msg

Arguments:

A message number required which may only refer to messages found in the maildrop marked as spam.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response identifying which message has been marked as a deleted message.

The first line of the positive response consists of "+OK" followed by a single space and the relevant mail number, this can be followed with a message clearly stating the relevant mail has been marked as deleted.

If the argument entered after the command does not match any message number found in the maildrop marked as spam, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail has been deleted

-ERR no mail found

Examples:

C: SDLT:1

S: +OK mail 1 sent to deleted

...

C: SDLT:4

S: -ERR mail does not exist

SINB msg

Arguments:

A message number required which may only refer to messages found in the maildrop marked as spam.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response

identifying which message has been marked as an inbox mail.

The first line of the positive response consists of "+OK" followed by a single space and the relevant message number, this can be followed with a message clearly stating the relevant mail has been marked as inbox.

If the argument entered after the command does not match any message number found in the maildrop marked as spam, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail sent to spam

-ERR no mail found

Examples:

C: ISPM:1

S: +OK mail 1 sent to inbox

...

C: ISPM:4

S: -ERR mail does not exist

9. Optional Delete commands

The following describes the optional delete commands and features that can be implemented. All of these commands are to only be used in the TRANSACTION state.

DLST

Arguments: none

Restrictions:

May only be given in the TRANSACTION state

Discussion:

The server host issues a positive response with a line containing information on the mail marked as deleted.

The positive response consists of "+OK" followed by a single space, the number of mails that are marked as deleted. This is the minimum requirement of the response line for this command. Additional information can be given on new lines but not on the initial response line. Any additional lines can contain specific information for each individual mail.

If no deleted mails have been made in the client host session, the response will still be positive.

Possible Responses:

+OK deleted information follows

Examples:

C: DLST

S: +OK 1 mail found

S: message 1

S: [additional mail information here]

...

C: DLST

S: +OK no messages found

DOPN msg

Arguments:

A message number required which may only refer to messages marked as deleted.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the mail number exists the server host issues a positive multi

line response containing information on the selected message. The response needs to be multiline to clearly show the contents and information of the mail.

The first line of the positive response consists of "+OK" followed by a single space and the mail number. The following lines will show the contents of the mail. As a minimum it is expected that the sender, subject, date and data will be displayed on individual lines. The data of the mail will be displayed on as many lines as the mail contains. This is the minimum requirement of the response line for this command. Further information can be displayed if desired.

If the argument entered after the command does not match any mail marked as deleted, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail information follows

-ERR no mail found

Examples:

C: DOPN:1

S: +OK mail 1 opened

S: From: example@email.com

S: Date: 03/01/18 15:00

S: Subject: Hello

S: Do not delete this message

S: Goodbye

...

C: DOPN:4

S: -ERR mail does not exist

DINB msg

Arguments:

A message number required which may only refer to messages found marked as deleted.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response identifying which message has been marked as an inbox mail. This can also be seen as undeleting a previously deleted message.

The first line of the positive response consists of "+OK" followed by a single space and the relevant mail number, this can be followed with a message clearly stating the relevant mail has now been marked as an inbox message.

If the argument entered after the command does not match any message number marked as deleted, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail sent to inbox

-ERR no mail found

Examples:

C: DINB:1

S: +OK mail 1 sent to inbox

...

C: DINB:4

S: -ERR mail does not exist

DSPM msg

Arguments:

A message number required which may only refer to messages found marked as deleted.

Restrictions:

May only be given in the TRANSACTION state

Discussion:

If an argument was given and the message number exists the server host issues a positive response identifying which message has been marked as a spam message.

The first line of the positive response consists of "+OK" followed by a single space and the relevant message number, this can be followed with a message clearly stating the relevant mail has been marked as a spam mail. This can be seen as undeleting a message.

If the argument entered after the command does not match any message number marked as deleted, then the server host will send a negative response. This will indicate to the client host that the message does not exist.

Possible Responses:

+OK mail sent to spam

-ERR no mail found

Examples:

C: DSPM:1

S: +OK mail 1 sent to spam

...

C: DPSM:4

S: -ERR mail does not exist

10. MRP Command Summary

Minimal MRP commands:

```
Authorisation State:

   USER name   – Entering a user name

   PASS string – Entering a password

   QUIT        – Terminates sessions


Transaction State:

   ILST     – Lists all mail marked as inbox

   IOPN msg – Opens selected inbox mail

   NOOP

   RSET     – Resets any changes made

   QUIT     – Terminates session
```

Optional MRP commands:

```
Transaction State

   ISPM msg – Marks selected inbox mail as spam

   IDLT msg – Marks selected inbox mail as deleted

   FLAG msg – Flags and un-flags selected inbox mail

   SLST     – Lists all mail marked as spam

   SOPN msg – Opens selected spam mail

   SINB msg – Marks selected spam mail as inbox mail

   SDLT msg – Marks selected spam mail as deleted mail

   DLST     – Lists all mail marked as deleted

   DOPN msg – Opens selected deleted mail

   DINB msg – Marks selected deleted mail as inbox mail

   DSPM msg – Marks selected deleted mail as spam mail
```

MRP replies:

```
+OK

-ERR
```

11. MRP Example Session Minimum

The following demonstrates how a client host might use the Mail Retrieval Protocol at its minimum implementation

```
S: <waiting for connection>

C: <open connection>

S: +OK MRP server ready

C: USER:yourname

S: +OK user found

C: PASS:password

S: +OK 2 mails in maildrop

C: ILST

S: +OK 2 mails found

S: mail 1

S: [additional mail information here]

S: mail 2

S: [additional mail information here]

C: IOPN:1

S: +OK mail 1 opened

S: From: example@email.com

S: Date: 01/01/18 15:00

S: Subject: Hello

S: Here is your email

S: .

C: IDLT:2

S: +OK mail 2 marked for deletion

C: QUIT

S: +OK successfully logged out
```

12. MRP Example Session Optional

The following demonstrates how a client host might use the Mail Retrieval Protocol with optional features. This assumes a connection and log in has already been made.

```
S: +OK 3 mails in maildrop
C: ILST
S: +OK 2 mails found
S: mail 1
S: [additional mail information here]
S: mail 2
S: [additional mail information here]
S: .
C: FLAG:1
S: +OK mail 1 flagged/un-flagged
C: IOPN:1
S: +OK mail 1 opened
S: Flagged: yes
S: From: example@email.com
S: Date: 01/01/18 15:00
S: Subject: Hello
S: Here is your email
S: .

C: SLST
S: +OK 1 mail found
S: mail 1
S: [additional mail information here]
```

```
C: SOPN:1

S: +OK spam mail 1 opened

S: From: example@email.com

S: Date: 04/01/18 15:00

S: Subject: Spam

S: Here is your spam email

S: .

C: SDLT:1

S: +OK spam mail 1 sent to deleted

C: SLST

S: +OK 0 mail found

C: DLST

S: +OK 1 mail found

S: mail 1

S: [additional mail information here]

S: .

C: DINB:1

S: +OK deleted mail 1 sent to inbox

C: ILST

S: +OK 3 messages (400 octets)

S: 1 150 octets

S: 2 150 octets

S: 3 100 octets

S: .

C: QUIT

S: +OK successfully logged out
```

13. Message Format

The mail transmitted while using the Mail Retrieval Protocol is assumed to follow the standard for the format of internet text messages [RFC822]. However any similar format can be used as long as minimum requirements are met.

Each mail that is displayed should at the very least show a sender, date, subject and comment from the mail that the server will host.

14. References

[RFC1939] Myers, J., “Post Office Protocol – Version 3”, STD 53, RFC 1939, Networking Working Group, May 1996.

[RFC822] Crocker, D., "Standard for the Format of ARPA-Internet Text Messages", STD 11, RFC 822, University of Delaware, August 1982.

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