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INTERNET MESSAGE ACCESS PROTOCOL - VERSION 4rev1

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Abstract

The Internet Message Access Protocol, Version 4rev1 (IMAP4rev1) allows a client to access and manipulate electronic mail messages on a server. IMAP4rev1 permits manipulation of mailboxes (remote message folders) in a way that is functionally equivalent to local folders. IMAP4rev1 also provides the capability for an offline client to resynchronize with the server.

IMAP4rev1 includes operations for creating, deleting, and renaming mailboxes, checking for new messages, permanently removing messages, setting and clearing flags, RFC 2822 and RFC 2045 parsing, searching, and selective fetching of message attributes, texts, and portions thereof. Messages in IMAP4rev1 are accessed by the use of numbers. These numbers are either message sequence numbers or unique identifiers.

IMAP4rev1 supports a single server. A mechanism for accessing configuration information to support multiple IMAP4rev1 servers is discussed in RFC 2244.

IMAP4rev1 does not specify a means of posting mail; this function is handled by a mail transfer protocol such as RFC 2821.

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IMAP4rev1 Protocol Specification

1. How to Read This Document

1.1. Organization of This Document

This document is written from the point of view of the implementor of an IMAP4rev1 client or server. Beyond the protocol overview in section 2, it is not optimized for someone trying to understand the operation of the protocol. The material in sections 3 through 5 provides the general context and definitions with which IMAP4rev1 operates.

Sections 6, 7, and 9 describe the IMAP commands, responses, and syntax, respectively. The relationships among these are such that it is almost impossible to understand any of them separately. In particular, do not attempt to deduce command syntax from the command section alone; instead refer to the Formal Syntax section.

1.2. Conventions Used in This Document

"Conventions" are basic principles or procedures. Document conventions are noted in this section.

In examples, "C:" and "S:" indicate lines sent by the client and server respectively.

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

The word "can" (not "may") is used to refer to a possible circumstance or situation, as opposed to an optional facility of the protocol.

"User" is used to refer to a human user, whereas "client" refers to the software being run by the user.

"Connection" refers to the entire sequence of client/server interaction from the initial establishment of the network connection until its termination.

"Session" refers to the sequence of client/server interaction from the time that a mailbox is selected (SELECT or EXAMINE command) until the time that selection ends (SELECT or EXAMINE of another mailbox, CLOSE command, or connection termination).

Characters are 7-bit US-ASCII unless otherwise specified. Other character sets are indicated using a "CHARSET", as described in [MIME-IMT] and defined in [CHARSET]. CHARSETs have important additional semantics in addition to defining character set; refer to these documents for more detail.

There are several protocol conventions in IMAP. These refer to aspects of the specification which are not strictly part of the IMAP protocol, but reflect generally-accepted practice. Implementations need to be aware of these conventions, and avoid conflicts whether or not they implement the convention. For example, "&" may not be used as a hierarchy delimiter since it conflicts with the Mailbox International Naming Convention, and other uses of "&" in mailbox names are impacted as well.

1.3. Special Notes to Implementors

Implementors of the IMAP protocol are strongly encouraged to read the IMAP implementation recommendations document [IMAP-IMPLEMENTATION] in conjunction with this document, to help understand the intricacies of this protocol and how best to build an interoperable product.

IMAP4rev1 is designed to be upwards compatible from the [IMAP2] and unpublished IMAP2bis protocols. IMAP4rev1 is largely compatible with the IMAP4 protocol described in RFC 1730; the exception being in certain facilities added in RFC 1730 that proved problematic and were subsequently removed. In the course of the evolution of IMAP4rev1, some aspects in the earlier protocols have become obsolete. Obsolete commands, responses, and data formats which an IMAP4rev1 implementation can encounter when used with an earlier implementation are described in [IMAP-OBSOLETE].

Other compatibility issues with IMAP2bis, the most common variant of the earlier protocol, are discussed in [IMAP-COMPAT]. A full discussion of compatibility issues with rare (and presumed extinct)

variants of [IMAP2] is in [IMAP-HISTORICAL]; this document is primarily of historical interest.

IMAP was originally developed for the older [RFC-822] standard, and as a consequence several fetch items in IMAP incorporate "RFC822" in their name. With the exception of RFC822.SIZE, there are more modern replacements; for example, the modern version of RFC822.HEADER is BODY.PEEK[HEADER]. In all cases, "RFC822" should be interpreted as a reference to the updated [RFC-2822] standard.

2. Protocol Overview

2.1. Link Level

The IMAP4rev1 protocol assumes a reliable data stream such as that provided by TCP. When TCP is used, an IMAP4rev1 server listens on port 143.

2.2. Commands and Responses

An IMAP4rev1 connection consists of the establishment of a client/server network connection, an initial greeting from the server, and client/server interactions. These client/server interactions consist of a client command, server data, and a server completion result response.

All interactions transmitted by client and server are in the form of lines, that is, strings that end with a CRLF. The protocol receiver of an IMAP4rev1 client or server is either reading a line, or is reading a sequence of octets with a known count followed by a line.

2.2.1. Client Protocol Sender and Server Protocol Receiver

The client command begins an operation. Each client command is prefixed with an identifier (typically a short alphanumeric string, e.g., A0001, A0002, etc.) called a "tag". A different tag is generated by the client for each command.

Clients MUST follow the syntax outlined in this specification strictly. It is a syntax error to send a command with missing or extraneous spaces or arguments.

There are two cases in which a line from the client does not represent a complete command. In one case, a command argument is quoted with an octet count (see the description of literal in String under Data Formats); in the other case, the command arguments require server feedback (see the AUTHENTICATE command). In either case, the

server sends a command continuation request response if it is ready for the octets (if appropriate) and the remainder of the command. This response is prefixed with the token "+".

> Note: If instead, the server detected an error in the command, it sends a BAD completion response with a tag matching the command (as described below) to reject the command and prevent the client from sending any more of the command.
>
> It is also possible for the server to send a completion response for some other command (if multiple commands are in progress), or untagged data. In either case, the command continuation request is still pending; the client takes the appropriate action for the response, and reads another response from the server. In all cases, the client MUST send a complete command (including receiving all command continuation request responses and command continuations for the command) before initiating a new command.

The protocol receiver of an IMAP4rev1 server reads a command line from the client, parses the command and its arguments, and transmits server data and a server command completion result response.

2.2.2. Server Protocol Sender and Client Protocol Receiver

Data transmitted by the server to the client and status responses that do not indicate command completion are prefixed with the token "*", and are called untagged responses.

Server data MAY be sent as a result of a client command, or MAY be sent unilaterally by the server. There is no syntactic difference between server data that resulted from a specific command and server data that were sent unilaterally.

The server completion result response indicates the success or failure of the operation. It is tagged with the same tag as the client command which began the operation. Thus, if more than one command is in progress, the tag in a server completion response identifies the command to which the response applies. There are three possible server completion responses: OK (indicating success), NO (indicating failure), or BAD (indicating a protocol error such as unrecognized command or command syntax error).

Servers SHOULD enforce the syntax outlined in this specification strictly. Any client command with a protocol syntax error, including (but not limited to) missing or extraneous spaces or arguments,

SHOULD be rejected, and the client given a BAD server completion response.

The protocol receiver of an IMAP4rev1 client reads a response line from the server. It then takes action on the response based upon the first token of the response, which can be a tag, a "*", or a "+".

A client MUST be prepared to accept any server response at all times. This includes server data that was not requested. Server data SHOULD be recorded, so that the client can reference its recorded copy rather than sending a command to the server to request the data. In the case of certain server data, the data MUST be recorded.

This topic is discussed in greater detail in the Server Responses section.

2.3. Message Attributes

In addition to message text, each message has several attributes associated with it. These attributes can be retrieved individually or in conjunction with other attributes or message texts.

2.3.1. Message Numbers

Messages in IMAP4rev1 are accessed by one of two numbers; the unique identifier or the message sequence number.

2.3.1.1. Unique Identifier (UID) Message Attribute

A 32-bit value assigned to each message, which when used with the unique identifier validity value (see below) forms a 64-bit value that MUST NOT refer to any other message in the mailbox or any subsequent mailbox with the same name forever. Unique identifiers are assigned in a strictly ascending fashion in the mailbox; as each message is added to the mailbox it is assigned a higher UID than the message(s) which were added previously. Unlike message sequence numbers, unique identifiers are not necessarily contiguous.

The unique identifier of a message MUST NOT change during the session, and SHOULD NOT change between sessions. Any change of unique identifiers between sessions MUST be detectable using the UIDVALIDITY mechanism discussed below. Persistent unique identifiers are required for a client to resynchronize its state from a previous session with the server (e.g., disconnected or offline access clients); this is discussed further in [IMAP-DISC].

Associated with every mailbox are two values which aid in unique identifier handling: the next unique identifier value and the unique identifier validity value.

The next unique identifier value is the predicted value that will be assigned to a new message in the mailbox. Unless the unique identifier validity also changes (see below), the next unique identifier value MUST have the following two characteristics. First, the next unique identifier value MUST NOT change unless new messages are added to the mailbox; and second, the next unique identifier value MUST change whenever new messages are added to the mailbox, even if those new messages are subsequently expunged.

> Note: The next unique identifier value is intended to provide a means for a client to determine whether any messages have been delivered to the mailbox since the previous time it checked this value. It is not intended to provide any guarantee that any message will have this unique identifier. A client can only assume, at the time that it obtains the next unique identifier value, that messages arriving after that time will have a UID greater than or equal to that value.

The unique identifier validity value is sent in a UIDVALIDITY response code in an OK untagged response at mailbox selection time. If unique identifiers from an earlier session fail to persist in this session, the unique identifier validity value MUST be greater than the one used in the earlier session.

> Note: Ideally, unique identifiers SHOULD persist at all times. Although this specification recognizes that failure to persist can be unavoidable in certain server environments, it STRONGLY ENCOURAGES message store implementation techniques that avoid this problem. For example:
>
> 1) Unique identifiers MUST be strictly ascending in the mailbox at all times. If the physical message store is re-ordered by a non-IMAP agent, this requires that the unique identifiers in the mailbox be regenerated, since the former unique identifiers are no longer strictly ascending as a result of the re-ordering.
>
> 2) If the message store has no mechanism to store unique identifiers, it must regenerate unique identifiers at each session, and each session must have a unique UIDVALIDITY value.

3) If the mailbox is deleted and a new mailbox with the same name is created at a later date, the server must either keep track of unique identifiers from the previous instance of the mailbox, or it must assign a new UIDVALIDITY value to the new instance of the mailbox. A good UIDVALIDITY value to use in this case is a 32-bit representation of the creation date/time of the mailbox. It is alright to use a constant such as 1, but only if it guaranteed that unique identifiers will never be reused, even in the case of a mailbox being deleted (or renamed) and a new mailbox by the same name created at some future time.

4) The combination of mailbox name, UIDVALIDITY, and UID must refer to a single immutable message on that server forever. In particular, the internal date, [RFC-2822] size, envelope, body structure, and message texts (RFC822, RFC822.HEADER, RFC822.TEXT, and all BODY[...] fetch data items) must never change. This does not include message numbers, nor does it include attributes that can be set by a STORE command (e.g., FLAGS).

2.3.1.2. Message Sequence Number Message Attribute

A relative position from 1 to the number of messages in the mailbox. This position MUST be ordered by ascending unique identifier. As each new message is added, it is assigned a message sequence number that is 1 higher than the number of messages in the mailbox before that new message was added.

Message sequence numbers can be reassigned during the session. For example, when a message is permanently removed (expunged) from the mailbox, the message sequence number for all subsequent messages is decremented. The number of messages in the mailbox is also decremented. Similarly, a new message can be assigned a message sequence number that was once held by some other message prior to an expunge.

In addition to accessing messages by relative position in the mailbox, message sequence numbers can be used in mathematical calculations. For example, if an untagged "11 EXISTS" is received, and previously an untagged "8 EXISTS" was received, three new messages have arrived with message sequence numbers of 9, 10, and 11. Another example, if message 287 in a 523 message mailbox has UID 12345, there are exactly 286 messages which have lesser UIDs and 236 messages which have greater UIDs.

2.3.2. Flags Message Attribute

A list of zero or more named tokens associated with the message. A flag is set by its addition to this list, and is cleared by its removal. There are two types of flags in IMAP4rev1. A flag of either type can be permanent or session-only.

A system flag is a flag name that is pre-defined in this specification. All system flags begin with "\". Certain system flags (\Deleted and \Seen) have special semantics described elsewhere. The currently-defined system flags are:

\Seen
Message has been read

\Answered
Message has been answered

\Flagged
Message is "flagged" for urgent/special attention

\Deleted
Message is "deleted" for removal by later EXPUNGE

\Draft
Message has not completed composition (marked as a draft).

\Recent
Message is "recently" arrived in this mailbox. This session is the first session to have been notified about this message; if the session is read-write, subsequent sessions will not see \Recent set for this message. This flag can not be altered by the client.

If it is not possible to determine whether or not this session is the first session to be notified about a message, then that message SHOULD be considered recent.

If multiple connections have the same mailbox selected simultaneously, it is undefined which of these connections will see newly-arrived messages with \Recent set and which will see it without \Recent set.

A keyword is defined by the server implementation. Keywords do not begin with "\". Servers MAY permit the client to define new keywords in the mailbox (see the description of the PERMANENTFLAGS response code for more information).

A flag can be permanent or session-only on a per-flag basis. Permanent flags are those which the client can add or remove from the message flags permanently; that is, concurrent and subsequent sessions will see any change in permanent flags. Changes to session flags are valid only in that session.

> Note: The \Recent system flag is a special case of a session flag. \Recent can not be used as an argument in a STORE or APPEND command, and thus can not be changed at all.

2.3.3. Internal Date Message Attribute

The internal date and time of the message on the server. This is not the date and time in the [RFC-2822] header, but rather a date and time which reflects when the message was received. In the case of messages delivered via [SMTP], this SHOULD be the date and time of final delivery of the message as defined by [SMTP]. In the case of messages delivered by the IMAP4rev1 COPY command, this SHOULD be the internal date and time of the source message. In the case of messages delivered by the IMAP4rev1 APPEND command, this SHOULD be the date and time as specified in the APPEND command description. All other cases are implementation defined.

2.3.4. [RFC-2822] Size Message Attribute

The number of octets in the message, as expressed in [RFC-2822] format.

2.3.5. Envelope Structure Message Attribute

A parsed representation of the [RFC-2822] header of the message. Note that the IMAP Envelope structure is not the same as an [SMTP] envelope.

2.3.6. Body Structure Message Attribute

A parsed representation of the [MIME-IMB] body structure information of the message.

2.4. Message Texts

In addition to being able to fetch the full [RFC-2822] text of a message, IMAP4rev1 permits the fetching of portions of the full message text. Specifically, it is possible to fetch the [RFC-2822] message header, [RFC-2822] message body, a [MIME-IMB] body part, or a [MIME-IMB] header.

3. State and Flow Diagram

Once the connection between client and server is established, an IMAP4rev1 connection is in one of four states. The initial state is identified in the server greeting. Most commands are only valid in certain states. It is a protocol error for the client to attempt a command while the connection is in an inappropriate state, and the server will respond with a BAD or NO (depending upon server implementation) command completion result.

3.1. Not Authenticated State

In the not authenticated state, the client MUST supply authentication credentials before most commands will be permitted. This state is entered when a connection starts unless the connection has been pre-authenticated.

3.2. Authenticated State

In the authenticated state, the client is authenticated and MUST select a mailbox to access before commands that affect messages will be permitted. This state is entered when a pre-authenticated connection starts, when acceptable authentication credentials have been provided, after an error in selecting a mailbox, or after a successful CLOSE command.

3.3. Selected State

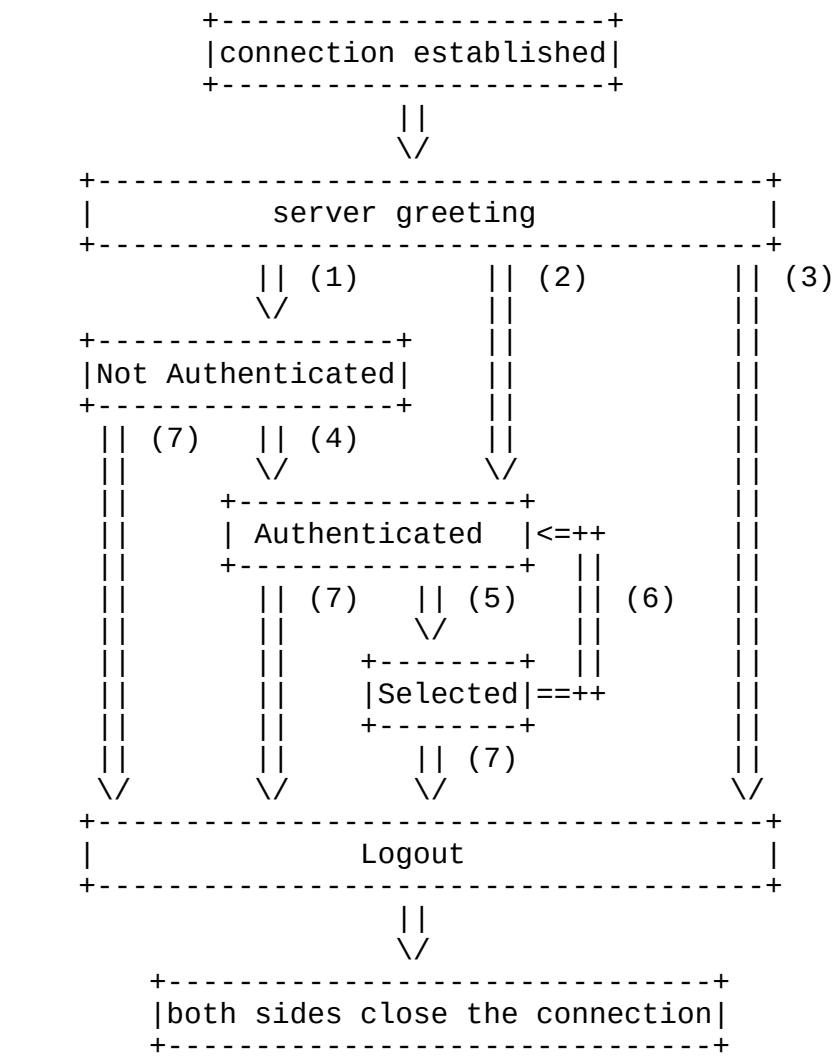
In a selected state, a mailbox has been selected to access. This state is entered when a mailbox has been successfully selected.

3.4. Logout State

In the logout state, the connection is being terminated. This state can be entered as a result of a client request (via the LOGOUT command) or by unilateral action on the part of either the client or server.

If the client requests the logout state, the server MUST send an untagged BYE response and a tagged OK response to the LOGOUT command before the server closes the connection; and the client MUST read the tagged OK response to the LOGOUT command before the client closes the connection.

A server MUST NOT unilaterally close the connection without sending an untagged BYE response that contains the reason for having done so. A client SHOULD NOT unilaterally close the connection, and instead SHOULD issue a LOGOUT command. If the server detects that the client has unilaterally closed the connection, the server MAY omit the untagged BYE response and simply close its connection.



(1) connection without pre-authentication (OK greeting)
(2) pre-authenticated connection (PREAUTH greeting)
(3) rejected connection (BYE greeting)
(4) successful LOGIN or AUTHENTICATE command
(5) successful SELECT or EXAMINE command
(6) CLOSE command, or failed SELECT or EXAMINE command
(7) LOGOUT command, server shutdown, or connection closed

4. Data Formats

IMAP4rev1 uses textual commands and responses. Data in IMAP4rev1 can be in one of several forms: atom, number, string, parenthesized list, or NIL. Note that a particular data item may take more than one form; for example, a data item defined as using "astring" syntax may be either an atom or a string.

4.1. Atom

An atom consists of one or more non-special characters.

4.2. Number

A number consists of one or more digit characters, and represents a numeric value.

4.3. String

A string is in one of two forms: either literal or quoted string. The literal form is the general form of string. The quoted string form is an alternative that avoids the overhead of processing a literal at the cost of limitations of characters which may be used.

A literal is a sequence of zero or more octets (including CR and LF), prefix-quoted with an octet count in the form of an open brace ("{"), the number of octets, close brace ("}"), and CRLF. In the case of literals transmitted from server to client, the CRLF is immediately followed by the octet data. In the case of literals transmitted from client to server, the client MUST wait to receive a command continuation request (described later in this document) before sending the octet data (and the remainder of the command).

A quoted string is a sequence of zero or more 7-bit characters, excluding CR and LF, with double quote (<">) characters at each end.

The empty string is represented as either "" (a quoted string with zero characters between double quotes) or as {0} followed by CRLF (a literal with an octet count of 0).

> Note: Even if the octet count is 0, a client transmitting a literal MUST wait to receive a command continuation request.

4.3.1. 8-bit and Binary Strings

8-bit textual and binary mail is supported through the use of a [MIME-IMB] content transfer encoding. IMAP4rev1 implementations MAY transmit 8-bit or multi-octet characters in literals, but SHOULD do so only when the [CHARSET] is identified.

Although a BINARY body encoding is defined, unencoded binary strings are not permitted. A "binary string" is any string with NUL characters. Implementations MUST encode binary data into a textual form, such as BASE64, before transmitting the data. A string with an excessive amount of CTL characters MAY also be considered to be binary.

4.4. Parenthesized List

Data structures are represented as a "parenthesized list"; a sequence of data items, delimited by space, and bounded at each end by parentheses. A parenthesized list can contain other parenthesized lists, using multiple levels of parentheses to indicate nesting.

The empty list is represented as () -- a parenthesized list with no members.

4.5. NIL

The special form "NIL" represents the non-existence of a particular data item that is represented as a string or parenthesized list, as distinct from the empty string "" or the empty parenthesized list ().

> Note: NIL is never used for any data item which takes the form of an atom. For example, a mailbox name of "NIL" is a mailbox named NIL as opposed to a non-existent mailbox name. This is because mailbox uses "astring" syntax which is an atom or a string. Conversely, an addr-name of NIL is a non-existent personal name, because addr-name uses "nstring" syntax which is NIL or a string, but never an atom.

5. Operational Considerations

The following rules are listed here to ensure that all IMAP4rev1 implementations interoperate properly.

5.1. Mailbox Naming

Mailbox names are 7-bit. Client implementations MUST NOT attempt to create 8-bit mailbox names, and SHOULD interpret any 8-bit mailbox names returned by LIST or LSUB as UTF-8. Server implementations SHOULD prohibit the creation of 8-bit mailbox names, and SHOULD NOT return 8-bit mailbox names in LIST or LSUB. See section 5.1.3 for more information on how to represent non-ASCII mailbox names.

> Note: 8-bit mailbox names were undefined in earlier versions of this protocol. Some sites used a local 8-bit character set to represent non-ASCII mailbox names. Such usage is not interoperable, and is now formally deprecated.

The case-insensitive mailbox name INBOX is a special name reserved to mean "the primary mailbox for this user on this server". The interpretation of all other names is implementation-dependent.

In particular, this specification takes no position on case sensitivity in non-INBOX mailbox names. Some server implementations are fully case-sensitive; others preserve case of a newly-created name but otherwise are case-insensitive; and yet others coerce names to a particular case. Client implementations MUST interact with any of these. If a server implementation interprets non-INBOX mailbox names as case-insensitive, it MUST treat names using the international naming convention specially as described in section 5.1.3.

There are certain client considerations when creating a new mailbox name:

1) Any character which is one of the atom-specials (see the Formal Syntax) will require that the mailbox name be represented as a quoted string or literal.

2) CTL and other non-graphic characters are difficult to represent in a user interface and are best avoided.

3) Although the list-wildcard characters ("%" and "*") are valid in a mailbox name, it is difficult to use such mailbox names with the LIST and LSUB commands due to the conflict with wildcard interpretation.

4) Usually, a character (determined by the server implementation) is reserved to delimit levels of hierarchy.

5) Two characters, "#" and "&", have meanings by convention, and should be avoided except when used in that convention.

5.1.1. Mailbox Hierarchy Naming

If it is desired to export hierarchical mailbox names, mailbox names MUST be left-to-right hierarchical using a single character to separate levels of hierarchy. The same hierarchy separator character is used for all levels of hierarchy within a single name.

5.1.2. Mailbox Namespace Naming Convention

By convention, the first hierarchical element of any mailbox name which begins with "#" identifies the "namespace" of the remainder of the name. This makes it possible to disambiguate between different types of mailbox stores, each of which have their own namespaces.

> For example, implementations which offer access to USENET newsgroups MAY use the "#news" namespace to partition the USENET newsgroup namespace from that of other mailboxes. Thus, the comp.mail.misc newsgroup would have a mailbox name of "#news.comp.mail.misc", and the name "comp.mail.misc" can refer to a different object (e.g., a user's private mailbox).

5.1.3. Mailbox International Naming Convention

By convention, international mailbox names in IMAP4rev1 are specified using a modified version of the UTF-7 encoding described in [UTF-7]. Modified UTF-7 may also be usable in servers that implement an earlier version of this protocol.

In modified UTF-7, printable US-ASCII characters, except for "&", represent themselves; that is, characters with octet values 0x20-0x25 and 0x27-0x7e. The character "&" (0x26) is represented by the two-octet sequence "&-".

All other characters (octet values 0x00-0x1f and 0x7f-0xff) are represented in modified BASE64, with a further modification from [UTF-7] that "," is used instead of "/". Modified BASE64 MUST NOT be used to represent any printing US-ASCII character which can represent itself.

"&" is used to shift to modified BASE64 and "-" to shift back to US-ASCII. There is no implicit shift from BASE64 to US-ASCII, and null shifts ("-&" while in BASE64; note that "&-" while in US-ASCII means "&") are not permitted. However, all names start in US-ASCII, and MUST end in US-ASCII; that is, a name that ends with a non-ASCII ISO-10646 character MUST end with a "-").

The purpose of these modifications is to correct the following problems with UTF-7:

1) UTF-7 uses the "+" character for shifting; this conflicts with the common use of "+" in mailbox names, in particular USENET newsgroup names.

2) UTF-7's encoding is BASE64 which uses the "/" character; this conflicts with the use of "/" as a popular hierarchy delimiter.

3) UTF-7 prohibits the unencoded usage of "\"; this conflicts with the use of "\" as a popular hierarchy delimiter.

4) UTF-7 prohibits the unencoded usage of "~"; this conflicts with the use of "~" in some servers as a home directory indicator.

5) UTF-7 permits multiple alternate forms to represent the same string; in particular, printable US-ASCII characters can be represented in encoded form.

Although modified UTF-7 is a convention, it establishes certain requirements on server handling of any mailbox name with an embedded "&" character. In particular, server implementations MUST preserve the exact form of the modified BASE64 portion of a modified UTF-7 name and treat that text as case-sensitive, even if names are otherwise case-insensitive or case-folded.

Server implementations SHOULD verify that any mailbox name with an embedded "&" character, used as an argument to CREATE, is: in the correctly modified UTF-7 syntax, has no superfluous shifts, and has no encoding in modified BASE64 of any printing US-ASCII character which can represent itself. However, client implementations MUST NOT depend upon the server doing this, and SHOULD NOT attempt to create a mailbox name with an embedded "&" character unless it complies with the modified UTF-7 syntax.

Server implementations which export a mail store that does not follow the modified UTF-7 convention MUST convert to modified UTF-7 any mailbox name that contains either non-ASCII characters or the "&" character.

For example, here is a mailbox name which mixes English, Chinese, and Japanese text:
~peter/mail/&U,BTFw-/&ZeVnLIqe-

For example, the string "&Jjo!" is not a valid mailbox name because it does not contain a shift to US-ASCII before the "!". The correct form is "&Jjo-!". The string "&U,BTFw-&ZeVnLIqe-" is not permitted because it contains a superfluous shift. The correct form is "&U,BTF2XlZyyKng-".

5.2. Mailbox Size and Message Status Updates

At any time, a server can send data that the client did not request. Sometimes, such behavior is REQUIRED. For example, agents other than the server MAY add messages to the mailbox (e.g., new message delivery), change the flags of the messages in the mailbox (e.g., simultaneous access to the same mailbox by multiple agents), or even remove messages from the mailbox. A server MUST send mailbox size updates automatically if a mailbox size change is observed during the processing of a command. A server SHOULD send message flag updates automatically, without requiring the client to request such updates explicitly.

Special rules exist for server notification of a client about the removal of messages to prevent synchronization errors; see the description of the EXPUNGE response for more detail. In particular, it is NOT permitted to send an EXISTS response that would reduce the number of messages in the mailbox; only the EXPUNGE response can do this.

Regardless of what implementation decisions a client makes on remembering data from the server, a client implementation MUST record mailbox size updates. It MUST NOT assume that any command after the initial mailbox selection will return the size of the mailbox.

5.3. Response when no Command in Progress

Server implementations are permitted to send an untagged response (except for EXPUNGE) while there is no command in progress. Server implementations that send such responses MUST deal with flow control considerations. Specifically, they MUST either (1) verify that the size of the data does not exceed the underlying transport’s available window size, or (2) use non-blocking writes.

5.4. Autologout Timer

If a server has an inactivity autologout timer, the duration of that timer MUST be at least 30 minutes. The receipt of ANY command from the client during that interval SHOULD suffice to reset the autologout timer.

5.5. Multiple Commands in Progress

The client MAY send another command without waiting for the completion result response of a command, subject to ambiguity rules (see below) and flow control constraints on the underlying data stream. Similarly, a server MAY begin processing another command before processing the current command to completion, subject to ambiguity rules. However, any command continuation request responses and command continuations MUST be negotiated before any subsequent command is initiated.

The exception is if an ambiguity would result because of a command that would affect the results of other commands. Clients MUST NOT send multiple commands without waiting if an ambiguity would result. If the server detects a possible ambiguity, it MUST execute commands to completion in the order given by the client.

The most obvious example of ambiguity is when a command would affect the results of another command, e.g., a FETCH of a message's flags and a STORE of that same message's flags.

A non-obvious ambiguity occurs with commands that permit an untagged EXPUNGE response (commands other than FETCH, STORE, and SEARCH), since an untagged EXPUNGE response can invalidate sequence numbers in a subsequent command. This is not a problem for FETCH, STORE, or SEARCH commands because servers are prohibited from sending EXPUNGE responses while any of those commands are in progress. Therefore, if the client sends any command other than FETCH, STORE, or SEARCH, it MUST wait for the completion result response before sending a command with message sequence numbers.

> Note: UID FETCH, UID STORE, and UID SEARCH are different commands from FETCH, STORE, and SEARCH. If the client sends a UID command, it must wait for a completion result response before sending a command with message sequence numbers.

For example, the following non-waiting command sequences are invalid:

```
FETCH + NOOP + STORE
STORE + COPY + FETCH
COPY + COPY
CHECK + FETCH
```

The following are examples of valid non-waiting command sequences:

```
FETCH + STORE + SEARCH + CHECK
STORE + COPY + EXPUNGE
```

UID SEARCH + UID SEARCH may be valid or invalid as a non-waiting command sequence, depending upon whether or not the second UID SEARCH contains message sequence numbers.

6. Client Commands

IMAP4rev1 commands are described in this section. Commands are organized by the state in which the command is permitted. Commands which are permitted in multiple states are listed in the minimum permitted state (for example, commands valid in authenticated and selected state are listed in the authenticated state commands).

Command arguments, identified by "Arguments:" in the command descriptions below, are described by function, not by syntax. The precise syntax of command arguments is described in the Formal Syntax section.

Some commands cause specific server responses to be returned; these are identified by "Responses:" in the command descriptions below. See the response descriptions in the Responses section for information on these responses, and the Formal Syntax section for the precise syntax of these responses. It is possible for server data to be transmitted as a result of any command. Thus, commands that do not specifically require server data specify "no specific responses for this command" instead of "none".

The "Result:" in the command description refers to the possible tagged status responses to a command, and any special interpretation of these status responses.

The state of a connection is only changed by successful commands which are documented as changing state. A rejected command (BAD response) never changes the state of the connection or of the selected mailbox. A failed command (NO response) generally does not change the state of the connection or of the selected mailbox; the exception being the SELECT and EXAMINE commands.

6.1. Client Commands - Any State

The following commands are valid in any state: CAPABILITY, NOOP, and LOGOUT.

6.1.1. CAPABILITY Command

Arguments: none

Responses: REQUIRED untagged response: CAPABILITY

Result: OK - capability completed
BAD - command unknown or arguments invalid

The CAPABILITY command requests a listing of capabilities that the server supports. The server MUST send a single untagged CAPABILITY response with "IMAP4rev1" as one of the listed capabilities before the (tagged) OK response.

A capability name which begins with "AUTH=" indicates that the server supports that particular authentication mechanism. All such names are, by definition, part of this specification. For example, the authorization capability for an experimental "blurdybloop" authenticator would be "AUTH=XBLURDYBLOOP" and not "XAUTH=BLURDYBLOOP" or "XAUTH=XBLURDYBLOOP".

Other capability names refer to extensions, revisions, or amendments to this specification. See the documentation of the CAPABILITY response for additional information. No capabilities, beyond the base IMAP4rev1 set defined in this specification, are enabled without explicit client action to invoke the capability.

Client and server implementations MUST implement the STARTTLS, LOGINDISABLED, and AUTH=PLAIN (described in [IMAP-TLS]) capabilities. See the Security Considerations section for important information.

See the section entitled "Client Commands - Experimental/Expansion" for information about the form of site or implementation-specific capabilities.

```
Example:    C: abcd CAPABILITY
            S: * CAPABILITY IMAP4rev1 STARTTLS AUTH=GSSAPI
            LOGINDISABLED
            S: abcd OK CAPABILITY completed
            C: efgh STARTTLS
            S: efgh OK STARTLS completed
            <TLS negotiation, further commands are under [TLS] layer>
            C: ijkl CAPABILITY
            S: * CAPABILITY IMAP4rev1 AUTH=GSSAPI AUTH=PLAIN
            S: ijkl OK CAPABILITY completed
```

6.1.2. NOOP Command

Arguments: none

Responses: no specific responses for this command (but see below)

Result: OK - noop completed
BAD - command unknown or arguments invalid

The NOOP command always succeeds. It does nothing.

Since any command can return a status update as untagged data, the NOOP command can be used as a periodic poll for new messages or message status updates during a period of inactivity (this is the preferred method to do this). The NOOP command can also be used to reset any inactivity autologout timer on the server.

```
Example:    C: a002 NOOP
            S: a002 OK NOOP completed
               . . .
            C: a047 NOOP
            S: * 22 EXPUNGE
            S: * 23 EXISTS
            S: * 3 RECENT
            S: * 14 FETCH (FLAGS (\Seen \Deleted))
            S: a047 OK NOOP completed
```

6.1.3. LOGOUT Command

Arguments: none

Responses: REQUIRED untagged response: BYE

Result: OK - logout completed
BAD - command unknown or arguments invalid

The LOGOUT command informs the server that the client is done with the connection. The server MUST send a BYE untagged response before the (tagged) OK response, and then close the network connection.

Example: C: A023 LOGOUT
S: * BYE IMAP4rev1 Server logging out
S: A023 OK LOGOUT completed
(Server and client then close the connection)

6.2. Client Commands - Not Authenticated State

In the not authenticated state, the AUTHENTICATE or LOGIN command establishes authentication and enters the authenticated state. The AUTHENTICATE command provides a general mechanism for a variety of authentication techniques, privacy protection, and integrity checking; whereas the LOGIN command uses a traditional user name and plaintext password pair and has no means of establishing privacy protection or integrity checking.

The STARTTLS command is an alternate form of establishing session privacy protection and integrity checking, but does not establish authentication or enter the authenticated state.

Server implementations MAY allow access to certain mailboxes without establishing authentication. This can be done by means of the ANONYMOUS [SASL] authenticator described in [ANONYMOUS]. An older convention is a LOGIN command using the userid "anonymous"; in this case, a password is required although the server may choose to accept any password. The restrictions placed on anonymous users are implementation-dependent.

Once authenticated (including as anonymous), it is not possible to re-enter not authenticated state.

In addition to the universal commands (CAPABILITY, NOOP, and LOGOUT), the following commands are valid in the not authenticated state: STARTTLS, AUTHENTICATE and LOGIN. See the Security Considerations section for important information about these commands.

6.2.1. STARTTLS Command

Arguments: none

Responses: no specific response for this command

Result: OK - starttls completed, begin TLS negotiation
BAD - command unknown or arguments invalid

A [TLS] negotiation begins immediately after the CRLF at the end of the tagged OK response from the server. Once a client issues a STARTTLS command, it MUST NOT issue further commands until a server response is seen and the [TLS] negotiation is complete.

The server remains in the non-authenticated state, even if client credentials are supplied during the [TLS] negotiation. This does not preclude an authentication mechanism such as EXTERNAL (defined in [SASL]) from using client identity determined by the [TLS] negotiation.

Once [TLS] has been started, the client MUST discard cached information about server capabilities and SHOULD re-issue the CAPABILITY command. This is necessary to protect against man-in-the-middle attacks which alter the capabilities list prior to STARTTLS. The server MAY advertise different capabilities after STARTTLS.

Example:
```
C: a001 CAPABILITY
S: * CAPABILITY IMAP4rev1 STARTTLS LOGINDISABLED
S: a001 OK CAPABILITY completed
C: a002 STARTTLS
S: a002 OK Begin TLS negotiation now
<TLS negotiation, further commands are under [TLS] layer>
C: a003 CAPABILITY
S: * CAPABILITY IMAP4rev1 AUTH=PLAIN
S: a003 OK CAPABILITY completed
C: a004 LOGIN joe password
S: a004 OK LOGIN completed
```

6.2.2. AUTHENTICATE Command

Arguments: authentication mechanism name

Responses: continuation data can be requested

Result: OK - authenticate completed, now in authenticated state
NO - authenticate failure: unsupported authentication mechanism, credentials rejected
BAD - command unknown or arguments invalid, authentication exchange cancelled

The AUTHENTICATE command indicates a [SASL] authentication mechanism to the server. If the server supports the requested authentication mechanism, it performs an authentication protocol exchange to authenticate and identify the client. It MAY also negotiate an OPTIONAL security layer for subsequent protocol interactions. If the requested authentication mechanism is not supported, the server SHOULD reject the AUTHENTICATE command by sending a tagged NO response.

The AUTHENTICATE command does not support the optional "initial response" feature of [SASL]. Section 5.1 of [SASL] specifies how to handle an authentication mechanism which uses an initial response.

The service name specified by this protocol's profile of [SASL] is "imap".

The authentication protocol exchange consists of a series of server challenges and client responses that are specific to the authentication mechanism. A server challenge consists of a command continuation request response with the "+" token followed by a BASE64 encoded string. The client response consists of a single line consisting of a BASE64 encoded string. If the client wishes to cancel an authentication exchange, it issues a line consisting of a single "*". If the server receives such a response, it MUST reject the AUTHENTICATE command by sending a tagged BAD response.

If a security layer is negotiated through the [SASL] authentication exchange, it takes effect immediately following the CRLF that concludes the authentication exchange for the client, and the CRLF of the tagged OK response for the server.

While client and server implementations MUST implement the AUTHENTICATE command itself, it is not required to implement any authentication mechanisms other than the PLAIN mechanism described

in [IMAP-TLS]. Also, an authentication mechanism is not required to support any security layers.

> Note: a server implementation MUST implement a configuration in which it does NOT permit any plaintext password mechanisms, unless either the STARTTLS command has been negotiated or some other mechanism that protects the session from password snooping has been provided. Server sites SHOULD NOT use any configuration which permits a plaintext password mechanism without such a protection mechanism against password snooping. Client and server implementations SHOULD implement additional [SASL] mechanisms that do not use plaintext passwords, such the GSSAPI mechanism described in [SASL] and/or the [DIGEST-MD5] mechanism.

Servers and clients can support multiple authentication mechanisms. The server SHOULD list its supported authentication mechanisms in the response to the CAPABILITY command so that the client knows which authentication mechanisms to use.

A server MAY include a CAPABILITY response code in the tagged OK response of a successful AUTHENTICATE command in order to send capabilities automatically. It is unnecessary for a client to send a separate CAPABILITY command if it recognizes these automatic capabilities. This should only be done if a security layer was not negotiated by the AUTHENTICATE command, because the tagged OK response as part of an AUTHENTICATE command is not protected by encryption/integrity checking. [SASL] requires the client to re-issue a CAPABILITY command in this case.

If an AUTHENTICATE command fails with a NO response, the client MAY try another authentication mechanism by issuing another AUTHENTICATE command. It MAY also attempt to authenticate by using the LOGIN command (see section 6.2.3 for more detail). In other words, the client MAY request authentication types in decreasing order of preference, with the LOGIN command as a last resort.

The authorization identity passed from the client to the server during the authentication exchange is interpreted by the server as the user name whose privileges the client is requesting.

```
Example:    S: * OK IMAP4rev1 Server
            C: A001 AUTHENTICATE GSSAPI
            S: +
            C: YIIB+wYJKoZIhvcSAQICAQBuggHqMIIB5qADAgEFoQMCAQ6iBw
               MFACAAAACjggEmYYIBIjCCAR6gAwIBBaESGxB1Lndhc2hpbmd0
               b24uZWR1oi0wK6ADAgEDoSQwIhsEaW1hcBsac2hpdmFtcy5jYW
               Mud2FzaGluZ3Rvbi5lZHWjgdMwgdCgAwIBAaEDAgEDooHDBIHA
               cS1GSa5b+fXnPZNmXB9SjL8Ollj2SKyb+3S0iXMljen/jNkpJX
               AleKTz6BQPzj8duz8EtoOuNfKgweViyn/9B9bccy1uuAE2HI0y
               C/PHXNNU9ZrBziJ8Lm0tTNc98kUpjXnHZhsMcz5Mx2GR6dGknb
               I0iaGcRerMUsWOuBmKKKRmVMMdR9T3EZdpqsBd7jZCNMWotjhi
               vd5zovQlFqQ2Wjc2+y46vKP/iXxWIuQJuDiisyXF0Y8+5GTpAL
               pHDc1/pIGmMIGjoAMCAQGigZsEgZg2on5mSuxoDHEA1w9bcW9n
               FdFxDKpdrQhVGVRDIzcCMCTzvUboqb5KjY1NJKJsfjRQiBYBdE
               NKfzK+g5DlV8nrw81uOcP8NOQCLR5XkoMHC0Dr/80ziQzbNqhx
               O6652Npft0LQwJvenwDI13YxpwOdMXzkWZN/XrEqOWp6GCgXTB
               vCyLWLlWnbaUkZdEYbKHBPjd8t/1x5Yg==
            S: + YGgGCSqGSIb3EgECAgIAb1kwV6ADAgEFoQMCAQ+iSzBJoAMC
               AQGiQgRAtHTEuOP2BXb9sBYFR4SJlDZxmg39IxmRBOhXRKdDA0
               uHTCOT9Bq3OsUTXUlk0CsFLoa8j+gvGDlgHuqzWHPSQg==
            C:
            S: + YDMGCSqGSIb3EgECAgIBAAD/////6jcyG4GE3KkTzBeBiVHe
               ceP2CWY0SR0fAQAgAAQEBAQ=
            C: YDMGCSqGSIb3EgECAgIBAAD/////3LQBHXTpFfZgrejpLlLImP
               wkhbfa2QteAQAgAG1yYwE=
            S: A001 OK GSSAPI authentication successful
```

Note: The line breaks within server challenges and client responses are for editorial clarity and are not in real authenticators.

6.2.3. LOGIN Command

```
Arguments:  user name
            password

Responses:  no specific responses for this command

Result:     OK - login completed, now in authenticated state
            NO - login failure: user name or password rejected
            BAD - command unknown or arguments invalid
```

The LOGIN command identifies the client to the server and carries the plaintext password authenticating this user.

A server MAY include a CAPABILITY response code in the tagged OK response to a successful LOGIN command in order to send capabilities automatically. It is unnecessary for a client to send a separate CAPABILITY command if it recognizes these automatic capabilities.

Example: C: a001 LOGIN SMITH SESAME
S: a001 OK LOGIN completed

Note: Use of the LOGIN command over an insecure network (such as the Internet) is a security risk, because anyone monitoring network traffic can obtain plaintext passwords. The LOGIN command SHOULD NOT be used except as a last resort, and it is recommended that client implementations have a means to disable any automatic use of the LOGIN command.

Unless either the STARTTLS command has been negotiated or some other mechanism that protects the session from password snooping has been provided, a server implementation MUST implement a configuration in which it advertises the LOGINDISABLED capability and does NOT permit the LOGIN command. Server sites SHOULD NOT use any configuration which permits the LOGIN command without such a protection mechanism against password snooping. A client implementation MUST NOT send a LOGIN command if the LOGINDISABLED capability is advertised.

6.3. Client Commands - Authenticated State

In the authenticated state, commands that manipulate mailboxes as atomic entities are permitted. Of these commands, the SELECT and EXAMINE commands will select a mailbox for access and enter the selected state.

In addition to the universal commands (CAPABILITY, NOOP, and LOGOUT), the following commands are valid in the authenticated state: SELECT, EXAMINE, CREATE, DELETE, RENAME, SUBSCRIBE, UNSUBSCRIBE, LIST, LSUB, STATUS, and APPEND.

6.3.1. SELECT Command

Arguments: mailbox name

Responses: REQUIRED untagged responses: FLAGS, EXISTS, RECENT
REQUIRED OK untagged responses: UNSEEN, PERMANENTFLAGS, UIDNEXT, UIDVALIDITY

Result: OK - select completed, now in selected state
NO - select failure, now in authenticated state: no such mailbox, can't access mailbox
BAD - command unknown or arguments invalid

The SELECT command selects a mailbox so that messages in the mailbox can be accessed. Before returning an OK to the client, the server MUST send the following untagged data to the client. Note that earlier versions of this protocol only required the FLAGS, EXISTS, and RECENT untagged data; consequently, client implementations SHOULD implement default behavior for missing data as discussed with the individual item.

FLAGS Defined flags in the mailbox. See the description of the FLAGS response for more detail.

<n> EXISTS The number of messages in the mailbox. See the description of the EXISTS response for more detail.

<n> RECENT The number of messages with the \Recent flag set. See the description of the RECENT response for more detail.

OK [UNSEEN <n>]
The message sequence number of the first unseen message in the mailbox. If this is missing, the client can not make any assumptions about the first unseen message in the mailbox, and needs to issue a SEARCH command if it wants to find it.

OK [PERMANENTFLAGS (<list of flags>)]
A list of message flags that the client can change permanently. If this is missing, the client should assume that all flags can be changed permanently.

OK [UIDNEXT <n>]
The next unique identifier value. Refer to section 2.3.1.1 for more information. If this is missing, the client can not make any assumptions about the next unique identifier value.

OK [UIDVALIDITY <n>]
The unique identifier validity value. Refer to section 2.3.1.1 for more information. If this is missing, the server does not support unique identifiers.

Only one mailbox can be selected at a time in a connection; simultaneous access to multiple mailboxes requires multiple connections. The SELECT command automatically deselects any currently selected mailbox before attempting the new selection. Consequently, if a mailbox is selected and a SELECT command that fails is attempted, no mailbox is selected.

If the client is permitted to modify the mailbox, the server SHOULD prefix the text of the tagged OK response with the "[READ-WRITE]" response code.

If the client is not permitted to modify the mailbox but is permitted read access, the mailbox is selected as read-only, and the server MUST prefix the text of the tagged OK response to SELECT with the "[READ-ONLY]" response code. Read-only access through SELECT differs from the EXAMINE command in that certain read-only mailboxes MAY permit the change of permanent state on a per-user (as opposed to global) basis. Netnews messages marked in a server-based .newsrc file are an example of such per-user permanent state that can be modified with read-only mailboxes.

Example:
```
C: A142 SELECT INBOX
S: * 172 EXISTS
S: * 1 RECENT
S: * OK [UNSEEN 12] Message 12 is first unseen
S: * OK [UIDVALIDITY 3857529045] UIDs valid
S: * OK [UIDNEXT 4392] Predicted next UID
S: * FLAGS (\Answered \Flagged \Deleted \Seen \Draft)
S: * OK [PERMANENTFLAGS (\Deleted \Seen \*)] Limited
S: A142 OK [READ-WRITE] SELECT completed
```

6.3.2. EXAMINE Command

Arguments: mailbox name

Responses: REQUIRED untagged responses: FLAGS, EXISTS, RECENT
REQUIRED OK untagged responses: UNSEEN, PERMANENTFLAGS, UIDNEXT, UIDVALIDITY

Result: OK - examine completed, now in selected state
NO - examine failure, now in authenticated state: no such mailbox, can't access mailbox
BAD - command unknown or arguments invalid

The EXAMINE command is identical to SELECT and returns the same output; however, the selected mailbox is identified as read-only. No changes to the permanent state of the mailbox, including per-user state, are permitted; in particular, EXAMINE MUST NOT cause messages to lose the \Recent flag.

The text of the tagged OK response to the EXAMINE command MUST begin with the "[READ-ONLY]" response code.

Example:
```
C: A932 EXAMINE blurdybloop
S: * 17 EXISTS
S: * 2 RECENT
S: * OK [UNSEEN 8] Message 8 is first unseen
S: * OK [UIDVALIDITY 3857529045] UIDs valid
S: * OK [UIDNEXT 4392] Predicted next UID
S: * FLAGS (\Answered \Flagged \Deleted \Seen \Draft)
S: * OK [PERMANENTFLAGS ()] No permanent flags permitted
S: A932 OK [READ-ONLY] EXAMINE completed
```

6.3.3. CREATE Command

Arguments: mailbox name

Responses: no specific responses for this command

Result: OK - create completed
NO - create failure: can't create mailbox with that name
BAD - command unknown or arguments invalid

The CREATE command creates a mailbox with the given name. An OK response is returned only if a new mailbox with that name has been created. It is an error to attempt to create INBOX or a mailbox with a name that refers to an extant mailbox. Any error in creation will return a tagged NO response.

If the mailbox name is suffixed with the server's hierarchy separator character (as returned from the server by a LIST command), this is a declaration that the client intends to create mailbox names under this name in the hierarchy. Server implementations that do not require this declaration MUST ignore the declaration. In any case, the name created is without the trailing hierarchy delimiter.

If the server's hierarchy separator character appears elsewhere in the name, the server SHOULD create any superior hierarchical names that are needed for the CREATE command to be successfully completed. In other words, an attempt to create "foo/bar/zap" on a server in which "/" is the hierarchy separator character SHOULD create foo/ and foo/bar/ if they do not already exist.

If a new mailbox is created with the same name as a mailbox which was deleted, its unique identifiers MUST be greater than any unique identifiers used in the previous incarnation of the mailbox UNLESS the new incarnation has a different unique identifier validity value. See the description of the UID command for more detail.

Example: C: A003 CREATE owatagusiam/
S: A003 OK CREATE completed
C: A004 CREATE owatagusiam/blurdybloop
S: A004 OK CREATE completed

Note: The interpretation of this example depends on whether "/" was returned as the hierarchy separator from LIST. If "/" is the hierarchy separator, a new level of hierarchy named "owatagusiam" with a member called "blurdybloop" is created. Otherwise, two mailboxes at the same hierarchy level are created.

6.3.4. DELETE Command

Arguments: mailbox name

Responses: no specific responses for this command

Result: OK - delete completed
NO - delete failure: can't delete mailbox with that name
BAD - command unknown or arguments invalid

The DELETE command permanently removes the mailbox with the given name. A tagged OK response is returned only if the mailbox has been deleted. It is an error to attempt to delete INBOX or a mailbox name that does not exist.

The DELETE command MUST NOT remove inferior hierarchical names. For example, if a mailbox "foo" has an inferior "foo.bar" (assuming "." is the hierarchy delimiter character), removing "foo" MUST NOT remove "foo.bar". It is an error to attempt to delete a name that has inferior hierarchical names and also has the \Noselect mailbox name attribute (see the description of the LIST response for more details).

It is permitted to delete a name that has inferior hierarchical names and does not have the \Noselect mailbox name attribute. In this case, all messages in that mailbox are removed, and the name will acquire the \Noselect mailbox name attribute.

The value of the highest-used unique identifier of the deleted mailbox MUST be preserved so that a new mailbox created with the same name will not reuse the identifiers of the former incarnation, UNLESS the new incarnation has a different unique identifier validity value. See the description of the UID command for more detail.

```
Examples:   C: A682 LIST "" *
            S: * LIST () "/" blurdybloop
            S: * LIST (\Noselect) "/" foo
            S: * LIST () "/" foo/bar
            S: A682 OK LIST completed
            C: A683 DELETE blurdybloop
            S: A683 OK DELETE completed
            C: A684 DELETE foo
            S: A684 NO Name "foo" has inferior hierarchical names
            C: A685 DELETE foo/bar
            S: A685 OK DELETE Completed
            C: A686 LIST "" *
            S: * LIST (\Noselect) "/" foo
            S: A686 OK LIST completed
            C: A687 DELETE foo
            S: A687 OK DELETE Completed
```

```
C: A82 LIST "" *
S: * LIST () "." blurdybloop
S: * LIST () "." foo
S: * LIST () "." foo.bar
S: A82 OK LIST completed
C: A83 DELETE blurdybloop
S: A83 OK DELETE completed
C: A84 DELETE foo
S: A84 OK DELETE Completed
C: A85 LIST "" *
S: * LIST () "." foo.bar
S: A85 OK LIST completed
C: A86 LIST "" %
S: * LIST (\Noselect) "." foo
S: A86 OK LIST completed
```

6.3.5. RENAME Command

Arguments: existing mailbox name
new mailbox name

Responses: no specific responses for this command

Result: OK - rename completed
NO - rename failure: can't rename mailbox with that name, can't rename to mailbox with that name
BAD - command unknown or arguments invalid

The RENAME command changes the name of a mailbox. A tagged OK response is returned only if the mailbox has been renamed. It is an error to attempt to rename from a mailbox name that does not exist or to a mailbox name that already exists. Any error in renaming will return a tagged NO response.

If the name has inferior hierarchical names, then the inferior hierarchical names MUST also be renamed. For example, a rename of "foo" to "zap" will rename "foo/bar" (assuming "/" is the hierarchy delimiter character) to "zap/bar".

If the server's hierarchy separator character appears in the name, the server SHOULD create any superior hierarchical names that are needed for the RENAME command to complete successfully. In other words, an attempt to rename "foo/bar/zap" to baz/rag/zowie on a server in which "/" is the hierarchy separator character SHOULD create baz/ and baz/rag/ if they do not already exist.

The value of the highest-used unique identifier of the old mailbox name MUST be preserved so that a new mailbox created with the same name will not reuse the identifiers of the former incarnation, UNLESS the new incarnation has a different unique identifier validity value. See the description of the UID command for more detail.

Renaming INBOX is permitted, and has special behavior. It moves all messages in INBOX to a new mailbox with the given name, leaving INBOX empty. If the server implementation supports inferior hierarchical names of INBOX, these are unaffected by a rename of INBOX.

Examples:
```
C: A682 LIST "" *
S: * LIST () "/" blurdybloop
S: * LIST (\Noselect) "/" foo
S: * LIST () "/" foo/bar
S: A682 OK LIST completed
C: A683 RENAME blurdybloop sarasoop
S: A683 OK RENAME completed
C: A684 RENAME foo zowie
S: A684 OK RENAME Completed
C: A685 LIST "" *
S: * LIST () "/" sarasoop
S: * LIST (\Noselect) "/" zowie
S: * LIST () "/" zowie/bar
S: A685 OK LIST completed

C: Z432 LIST "" *
S: * LIST () "." INBOX
S: * LIST () "." INBOX.bar
S: Z432 OK LIST completed
C: Z433 RENAME INBOX old-mail
S: Z433 OK RENAME completed
C: Z434 LIST "" *
S: * LIST () "." INBOX
S: * LIST () "." INBOX.bar
S: * LIST () "." old-mail
S: Z434 OK LIST completed
```

6.3.6. SUBSCRIBE Command

Arguments: mailbox

Responses: no specific responses for this command

Result: OK - subscribe completed
NO - subscribe failure: can't subscribe to that name
BAD - command unknown or arguments invalid

The SUBSCRIBE command adds the specified mailbox name to the server's set of "active" or "subscribed" mailboxes as returned by the LSUB command. This command returns a tagged OK response only if the subscription is successful.

A server MAY validate the mailbox argument to SUBSCRIBE to verify that it exists. However, it MUST NOT unilaterally remove an existing mailbox name from the subscription list even if a mailbox by that name no longer exists.

> Note: This requirement is because a server site can choose to routinely remove a mailbox with a well-known name (e.g., "system-alerts") after its contents expire, with the intention of recreating it when new contents are appropriate.

Example: C: A002 SUBSCRIBE #news.comp.mail.mime
S: A002 OK SUBSCRIBE completed

6.3.7. UNSUBSCRIBE Command

Arguments: mailbox name

Responses: no specific responses for this command

Result: OK - unsubscribe completed
NO - unsubscribe failure: can't unsubscribe that name
BAD - command unknown or arguments invalid

The UNSUBSCRIBE command removes the specified mailbox name from the server's set of "active" or "subscribed" mailboxes as returned by the LSUB command. This command returns a tagged OK response only if the unsubscription is successful.

Example: C: A002 UNSUBSCRIBE #news.comp.mail.mime
S: A002 OK UNSUBSCRIBE completed

6.3.8. LIST Command

Arguments: reference name
mailbox name with possible wildcards

Responses: untagged responses: LIST

Result: OK - list completed
NO - list failure: can't list that reference or name
BAD - command unknown or arguments invalid

The LIST command returns a subset of names from the complete set of all names available to the client. Zero or more untagged LIST replies are returned, containing the name attributes, hierarchy delimiter, and name; see the description of the LIST reply for more detail.

The LIST command SHOULD return its data quickly, without undue delay. For example, it SHOULD NOT go to excess trouble to calculate the \Marked or \Unmarked status or perform other processing; if each name requires 1 second of processing, then a list of 1200 names would take 20 minutes!

An empty ("" string) reference name argument indicates that the mailbox name is interpreted as by SELECT. The returned mailbox names MUST match the supplied mailbox name pattern. A non-empty reference name argument is the name of a mailbox or a level of mailbox hierarchy, and indicates the context in which the mailbox name is interpreted.

An empty ("" string) mailbox name argument is a special request to return the hierarchy delimiter and the root name of the name given in the reference. The value returned as the root MAY be the empty string if the reference is non-rooted or is an empty string. In all cases, a hierarchy delimiter (or NIL if there is no hierarchy) is returned. This permits a client to get the hierarchy delimiter (or find out that the mailbox names are flat) even when no mailboxes by that name currently exist.

The reference and mailbox name arguments are interpreted into a canonical form that represents an unambiguous left-to-right hierarchy. The returned mailbox names will be in the interpreted form.

Note: The interpretation of the reference argument is implementation-defined. It depends upon whether the server implementation has a concept of the "current working directory" and leading "break out characters", which override the current working directory.

For example, on a server which exports a UNIX or NT filesystem, the reference argument contains the current working directory, and the mailbox name argument would contain the name as interpreted in the current working directory.

If a server implementation has no concept of break out characters, the canonical form is normally the reference name appended with the mailbox name. Note that if the server implements the namespace convention (section 5.1.2), "#" is a break out character and must be treated as such.

If the reference argument is not a level of mailbox hierarchy (that is, it is a \NoInferiors name), and/or the reference argument does not end with the hierarchy delimiter, it is implementation-dependent how this is interpreted. For example, a reference of "foo/bar" and mailbox name of "rag/baz" could be interpreted as "foo/bar/rag/baz", "foo/barrag/baz", or "foo/rag/baz". A client SHOULD NOT use such a reference argument except at the explicit request of the user. A hierarchical browser MUST NOT make any assumptions about server interpretation of the reference unless the reference is a level of mailbox hierarchy AND ends with the hierarchy delimiter.

Any part of the reference argument that is included in the interpreted form SHOULD prefix the interpreted form. It SHOULD also be in the same form as the reference name argument. This rule permits the client to determine if the returned mailbox name is in the context of the reference argument, or if something about the mailbox argument overrode the reference argument. Without this rule, the client would have to have knowledge of the server's naming semantics including what characters are "breakouts" that override a naming context.

For example, here are some examples of how references and mailbox names might be interpreted on a UNIX-based server:

Reference	Mailbox Name	Interpretation
~smith/Mail/	foo.*	~smith/Mail/foo.*
archive/	%	archive/%
#news.	comp.mail.*	#news.comp.mail.*
~smith/Mail/	/usr/doc/foo	/usr/doc/foo
archive/	~fred/Mail/*	~fred/Mail/*

The first three examples demonstrate interpretations in the context of the reference argument. Note that "~smith/Mail" SHOULD NOT be transformed into something like "/u2/users/smith/Mail", or it would be impossible for the client to determine that the interpretation was in the context of the reference.

The character "*" is a wildcard, and matches zero or more characters at this position. The character "%" is similar to "*", but it does not match a hierarchy delimiter. If the "%" wildcard is the last character of a mailbox name argument, matching levels of hierarchy are also returned. If these levels of hierarchy are not also selectable mailboxes, they are returned with the \Noselect mailbox name attribute (see the description of the LIST response for more details).

Server implementations are permitted to "hide" otherwise accessible mailboxes from the wildcard characters, by preventing certain characters or names from matching a wildcard in certain situations. For example, a UNIX-based server might restrict the interpretation of "*" so that an initial "/" character does not match.

The special name INBOX is included in the output from LIST, if INBOX is supported by this server for this user and if the uppercase string "INBOX" matches the interpreted reference and mailbox name arguments with wildcards as described above. The criteria for omitting INBOX is whether SELECT INBOX will return failure; it is not relevant whether the user’s real INBOX resides on this or some other server.

```
Example:    C: A101 LIST "" ""
            S: * LIST (\Noselect) "/" ""
            S: A101 OK LIST Completed
            C: A102 LIST #news.comp.mail.misc ""
            S: * LIST (\Noselect) "." #news.
            S: A102 OK LIST Completed
            C: A103 LIST /usr/staff/jones ""
            S: * LIST (\Noselect) "/" /
            S: A103 OK LIST Completed
            C: A202 LIST ~/Mail/ %
            S: * LIST (\Noselect) "/" ~/Mail/foo
            S: * LIST () "/" ~/Mail/meetings
            S: A202 OK LIST completed
```

6.3.9. LSUB Command

```
Arguments:  reference name
            mailbox name with possible wildcards

Responses:  untagged responses: LSUB

Result:     OK - lsub completed
            NO - lsub failure: can't list that reference or name
            BAD - command unknown or arguments invalid
```

The LSUB command returns a subset of names from the set of names that the user has declared as being "active" or "subscribed". Zero or more untagged LSUB replies are returned. The arguments to LSUB are in the same form as those for LIST.

The returned untagged LSUB response MAY contain different mailbox flags from a LIST untagged response. If this should happen, the flags in the untagged LIST are considered more authoritative.

A special situation occurs when using LSUB with the % wildcard. Consider what happens if "foo/bar" (with a hierarchy delimiter of "/") is subscribed but "foo" is not. A "%" wildcard to LSUB must return foo, not foo/bar, in the LSUB response, and it MUST be flagged with the \Noselect attribute.

The server MUST NOT unilaterally remove an existing mailbox name from the subscription list even if a mailbox by that name no longer exists.

```
Example:    C: A002 LSUB "#news." "comp.mail.*"
            S: * LSUB () "." #news.comp.mail.mime
            S: * LSUB () "." #news.comp.mail.misc
            S: A002 OK LSUB completed
            C: A003 LSUB "#news." "comp.%"
            S: * LSUB (\NoSelect) "." #news.comp.mail
            S: A003 OK LSUB completed
```

6.3.10. STATUS Command

```
Arguments:  mailbox name
            status data item names

Responses:  untagged responses: STATUS

Result:     OK - status completed
            NO - status failure: no status for that name
            BAD - command unknown or arguments invalid
```

The STATUS command requests the status of the indicated mailbox. It does not change the currently selected mailbox, nor does it affect the state of any messages in the queried mailbox (in particular, STATUS MUST NOT cause messages to lose the \Recent flag).

The STATUS command provides an alternative to opening a second IMAP4rev1 connection and doing an EXAMINE command on a mailbox to query that mailbox's status without deselecting the current mailbox in the first IMAP4rev1 connection.

Unlike the LIST command, the STATUS command is not guaranteed to be fast in its response. Under certain circumstances, it can be quite slow. In some implementations, the server is obliged to open the mailbox read-only internally to obtain certain status information. Also unlike the LIST command, the STATUS command does not accept wildcards.

> Note: The STATUS command is intended to access the status of mailboxes other than the currently selected mailbox. Because the STATUS command can cause the mailbox to be opened internally, and because this information is available by other means on the selected mailbox, the STATUS command SHOULD NOT be used on the currently selected mailbox.

The STATUS command MUST NOT be used as a "check for new messages in the selected mailbox" operation (refer to sections 7, 7.3.1, and 7.3.2 for more information about the proper method for new message checking).

Because the STATUS command is not guaranteed to be fast in its results, clients SHOULD NOT expect to be able to issue many consecutive STATUS commands and obtain reasonable performance.

The currently defined status data items that can be requested are:

MESSAGES
The number of messages in the mailbox.

RECENT
The number of messages with the \Recent flag set.

UIDNEXT
The next unique identifier value of the mailbox. Refer to section 2.3.1.1 for more information.

UIDVALIDITY
The unique identifier validity value of the mailbox. Refer to section 2.3.1.1 for more information.

UNSEEN
The number of messages which do not have the \Seen flag set.

Example: C: A042 STATUS blurdybloop (UIDNEXT MESSAGES)
S: * STATUS blurdybloop (MESSAGES 231 UIDNEXT 44292)
S: A042 OK STATUS completed

6.3.11. APPEND Command

Arguments: mailbox name
OPTIONAL flag parenthesized list
OPTIONAL date/time string
message literal

Responses: no specific responses for this command

Result: OK - append completed
NO - append error: can't append to that mailbox, error in flags or date/time or message text
BAD - command unknown or arguments invalid

The APPEND command appends the literal argument as a new message to the end of the specified destination mailbox. This argument SHOULD be in the format of an [RFC-2822] message. 8-bit characters are permitted in the message. A server implementation that is unable to preserve 8-bit data properly MUST be able to reversibly convert 8-bit APPEND data to 7-bit using a [MIME-IMB] content transfer encoding.

> Note: There MAY be exceptions, e.g., draft messages, in which required [RFC-2822] header lines are omitted in the message literal argument to APPEND. The full implications of doing so MUST be understood and carefully weighed.

If a flag parenthesized list is specified, the flags SHOULD be set in the resulting message; otherwise, the flag list of the resulting message is set to empty by default. In either case, the Recent flag is also set.

If a date-time is specified, the internal date SHOULD be set in the resulting message; otherwise, the internal date of the resulting message is set to the current date and time by default.

If the append is unsuccessful for any reason, the mailbox MUST be restored to its state before the APPEND attempt; no partial appending is permitted.

If the destination mailbox does not exist, a server MUST return an error, and MUST NOT automatically create the mailbox. Unless it is certain that the destination mailbox can not be created, the server MUST send the response code "[TRYCREATE]" as the prefix of the text of the tagged NO response. This gives a hint to the client that it can attempt a CREATE command and retry the APPEND if the CREATE is successful.

If the mailbox is currently selected, the normal new message actions SHOULD occur. Specifically, the server SHOULD notify the client immediately via an untagged EXISTS response. If the server does not do so, the client MAY issue a NOOP command (or failing that, a CHECK command) after one or more APPEND commands.

```
Example:    C: A003 APPEND saved-messages (\Seen) {310}
            S: + Ready for literal data
            C: Date: Mon, 7 Feb 1994 21:52:25 -0800 (PST)
            C: From: Fred Foobar <foobar@Blurdybloop.COM>
            C: Subject: afternoon meeting
            C: To: mooch@owatagu.siam.edu
            C: Message-Id: <B27397-0100000@Blurdybloop.COM>
            C: MIME-Version: 1.0
            C: Content-Type: TEXT/PLAIN; CHARSET=US-ASCII
            C:
            C: Hello Joe, do you think we can meet at 3:30 tomorrow?
            C:
            S: A003 OK APPEND completed
```

Note: The APPEND command is not used for message delivery, because it does not provide a mechanism to transfer [SMTP] envelope information.

6.4. Client Commands - Selected State

In the selected state, commands that manipulate messages in a mailbox are permitted.

In addition to the universal commands (CAPABILITY, NOOP, and LOGOUT), and the authenticated state commands (SELECT, EXAMINE, CREATE, DELETE, RENAME, SUBSCRIBE, UNSUBSCRIBE, LIST, LSUB, STATUS, and APPEND), the following commands are valid in the selected state: CHECK, CLOSE, EXPUNGE, SEARCH, FETCH, STORE, COPY, and UID.

6.4.1. CHECK Command

```
Arguments:  none

Responses:  no specific responses for this command

Result:     OK - check completed
            BAD - command unknown or arguments invalid
```

The CHECK command requests a checkpoint of the currently selected mailbox. A checkpoint refers to any implementation-dependent housekeeping associated with the mailbox (e.g., resolving the server's in-memory state of the mailbox with the state on its

disk) that is not normally executed as part of each command. A checkpoint MAY take a non-instantaneous amount of real time to complete. If a server implementation has no such housekeeping considerations, CHECK is equivalent to NOOP.

There is no guarantee that an EXISTS untagged response will happen as a result of CHECK. NOOP, not CHECK, SHOULD be used for new message polling.

Example: C: FXXZ CHECK
S: FXXZ OK CHECK Completed

6.4.2. CLOSE Command

Arguments: none

Responses: no specific responses for this command

Result: OK - close completed, now in authenticated state
BAD - command unknown or arguments invalid

The CLOSE command permanently removes all messages that have the \Deleted flag set from the currently selected mailbox, and returns to the authenticated state from the selected state. No untagged EXPUNGE responses are sent.

No messages are removed, and no error is given, if the mailbox is selected by an EXAMINE command or is otherwise selected read-only.

Even if a mailbox is selected, a SELECT, EXAMINE, or LOGOUT command MAY be issued without previously issuing a CLOSE command. The SELECT, EXAMINE, and LOGOUT commands implicitly close the currently selected mailbox without doing an expunge. However, when many messages are deleted, a CLOSE-LOGOUT or CLOSE-SELECT sequence is considerably faster than an EXPUNGE-LOGOUT or EXPUNGE-SELECT because no untagged EXPUNGE responses (which the client would probably ignore) are sent.

Example: C: A341 CLOSE
S: A341 OK CLOSE completed

6.4.3. EXPUNGE Command

Arguments: none

Responses: untagged responses: EXPUNGE

Result: OK - expunge completed
NO - expunge failure: can't expunge (e.g., permission denied)
BAD - command unknown or arguments invalid

The EXPUNGE command permanently removes all messages that have the \Deleted flag set from the currently selected mailbox. Before returning an OK to the client, an untagged EXPUNGE response is sent for each message that is removed.

Example:
```
C: A202 EXPUNGE
S: * 3 EXPUNGE
S: * 3 EXPUNGE
S: * 5 EXPUNGE
S: * 8 EXPUNGE
S: A202 OK EXPUNGE completed
```

Note: In this example, messages 3, 4, 7, and 11 had the \Deleted flag set. See the description of the EXPUNGE response for further explanation.

6.4.4. SEARCH Command

Arguments: OPTIONAL [CHARSET] specification
searching criteria (one or more)

Responses: REQUIRED untagged response: SEARCH

Result: OK - search completed
NO - search error: can't search that [CHARSET] or criteria
BAD - command unknown or arguments invalid

The SEARCH command searches the mailbox for messages that match the given searching criteria. Searching criteria consist of one or more search keys. The untagged SEARCH response from the server contains a listing of message sequence numbers corresponding to those messages that match the searching criteria.

When multiple keys are specified, the result is the intersection (AND function) of all the messages that match those keys. For example, the criteria DELETED FROM "SMITH" SINCE 1-Feb-1994 refers to all deleted messages from Smith that were placed in the mailbox since February 1, 1994. A search key can also be a parenthesized list of one or more search keys (e.g., for use with the OR and NOT keys).

Server implementations MAY exclude [MIME-IMB] body parts with terminal content media types other than TEXT and MESSAGE from consideration in SEARCH matching.

The OPTIONAL [CHARSET] specification consists of the word "CHARSET" followed by a registered [CHARSET]. It indicates the [CHARSET] of the strings that appear in the search criteria. [MIME-IMB] content transfer encodings, and [MIME-HDRS] strings in [RFC-2822]/[MIME-IMB] headers, MUST be decoded before comparing text in a [CHARSET] other than US-ASCII. US-ASCII MUST be supported; other [CHARSET]s MAY be supported.

If the server does not support the specified [CHARSET], it MUST return a tagged NO response (not a BAD). This response SHOULD contain the BADCHARSET response code, which MAY list the [CHARSET]s supported by the server.

In all search keys that use strings, a message matches the key if the string is a substring of the field. The matching is case-insensitive.

The defined search keys are as follows. Refer to the Formal Syntax section for the precise syntactic definitions of the arguments.

<sequence set>
   Messages with message sequence numbers corresponding to the specified message sequence number set.

ALL
   All messages in the mailbox; the default initial key for ANDing.

ANSWERED
   Messages with the \Answered flag set.

BCC <string>
Messages that contain the specified string in the envelope structure's BCC field.

BEFORE <date>
Messages whose internal date (disregarding time and timezone) is earlier than the specified date.

BODY <string>
Messages that contain the specified string in the body of the message.

CC <string>
Messages that contain the specified string in the envelope structure's CC field.

DELETED
Messages with the \Deleted flag set.

DRAFT
Messages with the \Draft flag set.

FLAGGED
Messages with the \Flagged flag set.

FROM <string>
Messages that contain the specified string in the envelope structure's FROM field.

HEADER <field-name> <string>
Messages that have a header with the specified field-name (as defined in [RFC-2822]) and that contains the specified string in the text of the header (what comes after the colon). If the string to search is zero-length, this matches all messages that have a header line with the specified field-name regardless of the contents.

KEYWORD <flag>
Messages with the specified keyword flag set.

LARGER <n>
Messages with an [RFC-2822] size larger than the specified number of octets.

NEW
Messages that have the \Recent flag set but not the \Seen flag. This is functionally equivalent to "(RECENT UNSEEN)".

NOT <search-key>
Messages that do not match the specified search key.

OLD
Messages that do not have the \Recent flag set. This is functionally equivalent to "NOT RECENT" (as opposed to "NOT NEW").

ON <date>
Messages whose internal date (disregarding time and timezone) is within the specified date.

OR <search-key1> <search-key2>
Messages that match either search key.

RECENT
Messages that have the \Recent flag set.

SEEN
Messages that have the \Seen flag set.

SENTBEFORE <date>
Messages whose [RFC-2822] Date: header (disregarding time and timezone) is earlier than the specified date.

SENTON <date>
Messages whose [RFC-2822] Date: header (disregarding time and timezone) is within the specified date.

SENTSINCE <date>
Messages whose [RFC-2822] Date: header (disregarding time and timezone) is within or later than the specified date.

SINCE <date>
Messages whose internal date (disregarding time and timezone) is within or later than the specified date.

SMALLER <n>
Messages with an [RFC-2822] size smaller than the specified number of octets.

SUBJECT <string>
Messages that contain the specified string in the envelope structure's SUBJECT field.

TEXT <string>
Messages that contain the specified string in the header or body of the message.

TO <string>
Messages that contain the specified string in the envelope structure's TO field.

UID <sequence set>
Messages with unique identifiers corresponding to the specified unique identifier set. Sequence set ranges are permitted.

UNANSWERED
Messages that do not have the \Answered flag set.

UNDELETED
Messages that do not have the \Deleted flag set.

UNDRAFT
Messages that do not have the \Draft flag set.

UNFLAGGED
Messages that do not have the \Flagged flag set.

UNKEYWORD <flag>
Messages that do not have the specified keyword flag set.

UNSEEN
Messages that do not have the \Seen flag set.

```
Example:    C: A282 SEARCH FLAGGED SINCE 1-Feb-1994 NOT FROM "Smith"
            S: * SEARCH 2 84 882
            S: A282 OK SEARCH completed
            C: A283 SEARCH TEXT "string not in mailbox"
            S: * SEARCH
            S: A283 OK SEARCH completed
            C: A284 SEARCH CHARSET UTF-8 TEXT {6}
            C: XXXXXX
            S: * SEARCH 43
            S: A284 OK SEARCH completed
```

Note: Since this document is restricted to 7-bit ASCII text, it is not possible to show actual UTF-8 data. The "XXXXXX" is a placeholder for what would be 6 octets of 8-bit data in an actual transaction.

6.4.5. FETCH Command

```
Arguments:  sequence set
            message data item names or macro

Responses:  untagged responses: FETCH

Result:     OK - fetch completed
            NO - fetch error: can't fetch that data
            BAD - command unknown or arguments invalid
```

The FETCH command retrieves data associated with a message in the mailbox. The data items to be fetched can be either a single atom or a parenthesized list.

Most data items, identified in the formal syntax under the msg-att-static rule, are static and MUST NOT change for any particular message. Other data items, identified in the formal syntax under the msg-att-dynamic rule, MAY change, either as a result of a STORE command or due to external events.

> For example, if a client receives an ENVELOPE for a message when it already knows the envelope, it can safely ignore the newly transmitted envelope.

There are three macros which specify commonly-used sets of data items, and can be used instead of data items. A macro must be used by itself, and not in conjunction with other macros or data items.

ALL
Macro equivalent to: (FLAGS INTERNALDATE RFC822.SIZE ENVELOPE)

FAST
Macro equivalent to: (FLAGS INTERNALDATE RFC822.SIZE)

FULL
Macro equivalent to: (FLAGS INTERNALDATE RFC822.SIZE ENVELOPE BODY)

The currently defined data items that can be fetched are:

BODY
Non-extensible form of BODYSTRUCTURE.

BODY[<section>]<<partial>>
The text of a particular body section. The section specification is a set of zero or more part specifiers delimited by periods. A part specifier is either a part number or one of the following: HEADER, HEADER.FIELDS, HEADER.FIELDS.NOT, MIME, and TEXT. An empty section specification refers to the entire message, including the header.

Every message has at least one part number. Non-[MIME-IMB] messages, and non-multipart [MIME-IMB] messages with no encapsulated message, only have a part 1.

Multipart messages are assigned consecutive part numbers, as they occur in the message. If a particular part is of type message or multipart, its parts MUST be indicated by a period followed by the part number within that nested multipart part.

A part of type MESSAGE/RFC822 also has nested part numbers, referring to parts of the MESSAGE part's body.

The HEADER, HEADER.FIELDS, HEADER.FIELDS.NOT, and TEXT part specifiers can be the sole part specifier or can be prefixed by one or more numeric part specifiers, provided that the numeric part specifier refers to a part of type MESSAGE/RFC822. The MIME part specifier MUST be prefixed by one or more numeric part specifiers.

The HEADER, HEADER.FIELDS, and HEADER.FIELDS.NOT part specifiers refer to the [RFC-2822] header of the message or of an encapsulated [MIME-IMT] MESSAGE/RFC822 message. HEADER.FIELDS and HEADER.FIELDS.NOT are followed by a list of field-name (as defined in [RFC-2822]) names, and return a

subset of the header. The subset returned by HEADER.FIELDS contains only those header fields with a field-name that matches one of the names in the list; similarly, the subset returned by HEADER.FIELDS.NOT contains only the header fields with a non-matching field-name. The field-matching is case-insensitive but otherwise exact. Subsetting does not exclude the [RFC-2822] delimiting blank line between the header and the body; the blank line is included in all header fetches, except in the case of a message which has no body and no blank line.

The MIME part specifier refers to the [MIME-IMB] header for this part.

The TEXT part specifier refers to the text body of the message, omitting the [RFC-2822] header.

Here is an example of a complex message with some of its part specifiers:

```
HEADER     ([RFC-2822] header of the message)
TEXT       ([RFC-2822] text body of the message) MULTIPART/MIXED
1          TEXT/PLAIN
2          APPLICATION/OCTET-STREAM
3          MESSAGE/RFC822
3.HEADER   ([RFC-2822] header of the message)
3.TEXT     ([RFC-2822] text body of the message) MULTIPART/MIXED
3.1        TEXT/PLAIN
3.2        APPLICATION/OCTET-STREAM
4          MULTIPART/MIXED
4.1        IMAGE/GIF
4.1.MIME   ([MIME-IMB] header for the IMAGE/GIF)
4.2        MESSAGE/RFC822
4.2.HEADER ([RFC-2822] header of the message)
4.2.TEXT   ([RFC-2822] text body of the message) MULTIPART/MIXED
4.2.1      TEXT/PLAIN
4.2.2      MULTIPART/ALTERNATIVE
4.2.2.1    TEXT/PLAIN
4.2.2.2    TEXT/RICHTEXT
```

It is possible to fetch a substring of the designated text. This is done by appending an open angle bracket ("<"), the octet position of the first desired octet, a period, the maximum number of octets desired, and a close angle bracket (">") to the part specifier. If the starting octet is beyond the end of the text, an empty string is returned.

Any partial fetch that attempts to read beyond the end of the text is truncated as appropriate. A partial fetch that starts at octet 0 is returned as a partial fetch, even if this truncation happened.

Note: This means that BODY[]<0.2048> of a 1500-octet message will return BODY[]<0> with a literal of size 1500, not BODY[].

Note: A substring fetch of a HEADER.FIELDS or HEADER.FIELDS.NOT part specifier is calculated after subsetting the header.

The \Seen flag is implicitly set; if this causes the flags to change, they SHOULD be included as part of the FETCH responses.

BODY.PEEK[<section>]<<partial>>
An alternate form of BODY[<section>] that does not implicitly set the \Seen flag.

BODYSTRUCTURE
The [MIME-IMB] body structure of the message. This is computed by the server by parsing the [MIME-IMB] header fields in the [RFC-2822] header and [MIME-IMB] headers.

ENVELOPE
The envelope structure of the message. This is computed by the server by parsing the [RFC-2822] header into the component parts, defaulting various fields as necessary.

FLAGS
The flags that are set for this message.

INTERNALDATE
The internal date of the message.

RFC822
Functionally equivalent to BODY[], differing in the syntax of the resulting untagged FETCH data (RFC822 is returned).

RFC822.HEADER
Functionally equivalent to BODY.PEEK[HEADER], differing in the syntax of the resulting untagged FETCH data (RFC822.HEADER is returned).

RFC822.SIZE
The [RFC-2822] size of the message.

RFC822.TEXT
Functionally equivalent to BODY[TEXT], differing in the syntax of the resulting untagged FETCH data (RFC822.TEXT is returned).

UID
The unique identifier for the message.

Example: C: A654 FETCH 2:4 (FLAGS BODY[HEADER.FIELDS (DATE FROM)])
S: * 2 FETCH ....
S: * 3 FETCH ....
S: * 4 FETCH ....
S: A654 OK FETCH completed

6.4.6. STORE Command

Arguments: sequence set
message data item name
value for message data item

Responses: untagged responses: FETCH

Result: OK - store completed
NO - store error: can't store that data
BAD - command unknown or arguments invalid

The STORE command alters data associated with a message in the mailbox. Normally, STORE will return the updated value of the data with an untagged FETCH response. A suffix of ".SILENT" in the data item name prevents the untagged FETCH, and the server SHOULD assume that the client has determined the updated value itself or does not care about the updated value.

> Note: Regardless of whether or not the ".SILENT" suffix was used, the server SHOULD send an untagged FETCH response if a change to a message's flags from an external source is observed. The intent is that the status of the flags is determinate without a race condition.

The currently defined data items that can be stored are:

FLAGS <flag list>
Replace the flags for the message (other than \Recent) with the argument. The new value of the flags is returned as if a FETCH of those flags was done.

FLAGS.SILENT <flag list>
Equivalent to FLAGS, but without returning a new value.

+FLAGS <flag list>
Add the argument to the flags for the message. The new value of the flags is returned as if a FETCH of those flags was done.

+FLAGS.SILENT <flag list>
Equivalent to +FLAGS, but without returning a new value.

-FLAGS <flag list>
Remove the argument from the flags for the message. The new value of the flags is returned as if a FETCH of those flags was done.

-FLAGS.SILENT <flag list>
Equivalent to -FLAGS, but without returning a new value.

```
Example:    C: A003 STORE 2:4 +FLAGS (\Deleted)
            S: * 2 FETCH (FLAGS (\Deleted \Seen))
            S: * 3 FETCH (FLAGS (\Deleted))
            S: * 4 FETCH (FLAGS (\Deleted \Flagged \Seen))
            S: A003 OK STORE completed
```

6.4.7. COPY Command

```
Arguments:  sequence set
            mailbox name

Responses:  no specific responses for this command

Result:     OK - copy completed
            NO - copy error: can’t copy those messages or to that
                 name
            BAD - command unknown or arguments invalid
```

The COPY command copies the specified message(s) to the end of the specified destination mailbox. The flags and internal date of the message(s) SHOULD be preserved, and the Recent flag SHOULD be set, in the copy.

If the destination mailbox does not exist, a server SHOULD return an error. It SHOULD NOT automatically create the mailbox. Unless it is certain that the destination mailbox can not be created, the server MUST send the response code "[TRYCREATE]" as the prefix of the text of the tagged NO response. This gives a hint to the client that it can attempt a CREATE command and retry the COPY if the CREATE is successful.

If the COPY command is unsuccessful for any reason, server implementations MUST restore the destination mailbox to its state before the COPY attempt.

Example: C: A003 COPY 2:4 MEETING
S: A003 OK COPY completed

6.4.8. UID Command

Arguments: command name
command arguments

Responses: untagged responses: FETCH, SEARCH

Result: OK - UID command completed
NO - UID command error
BAD - command unknown or arguments invalid

The UID command has two forms. In the first form, it takes as its arguments a COPY, FETCH, or STORE command with arguments appropriate for the associated command. However, the numbers in the sequence set argument are unique identifiers instead of message sequence numbers. Sequence set ranges are permitted, but there is no guarantee that unique identifiers will be contiguous.

A non-existent unique identifier is ignored without any error message generated. Thus, it is possible for a UID FETCH command to return an OK without any data or a UID COPY or UID STORE to return an OK without performing any operations.

In the second form, the UID command takes a SEARCH command with SEARCH command arguments. The interpretation of the arguments is the same as with SEARCH; however, the numbers returned in a SEARCH response for a UID SEARCH command are unique identifiers instead

of message sequence numbers. For example, the command UID SEARCH 1:100 UID 443:557 returns the unique identifiers corresponding to the intersection of two sequence sets, the message sequence number range 1:100 and the UID range 443:557.

> Note: in the above example, the UID range 443:557 appears. The same comment about a non-existent unique identifier being ignored without any error message also applies here. Hence, even if neither UID 443 or 557 exist, this range is valid and would include an existing UID 495.
>
> Also note that a UID range of 559:* always includes the UID of the last message in the mailbox, even if 559 is higher than any assigned UID value. This is because the contents of a range are independent of the order of the range endpoints. Thus, any UID range with * as one of the endpoints indicates at least one message (the message with the highest numbered UID), unless the mailbox is empty.

The number after the "*" in an untagged FETCH response is always a message sequence number, not a unique identifier, even for a UID command response. However, server implementations MUST implicitly include the UID message data item as part of any FETCH response caused by a UID command, regardless of whether a UID was specified as a message data item to the FETCH.

Note: The rule about including the UID message data item as part of a FETCH response primarily applies to the UID FETCH and UID STORE commands, including a UID FETCH command that does not include UID as a message data item. Although it is unlikely that the other UID commands will cause an untagged FETCH, this rule applies to these commands as well.

```
Example:    C: A999 UID FETCH 4827313:4828442 FLAGS
            S: * 23 FETCH (FLAGS (\Seen) UID 4827313)
            S: * 24 FETCH (FLAGS (\Seen) UID 4827943)
            S: * 25 FETCH (FLAGS (\Seen) UID 4828442)
            S: A999 OK UID FETCH completed
```

6.5. Client Commands - Experimental/Expansion

6.5.1. X<atom> Command

Arguments: implementation defined

Responses: implementation defined

Result: OK - command completed
NO - failure
BAD - command unknown or arguments invalid

Any command prefixed with an X is an experimental command. Commands which are not part of this specification, a standard or standards-track revision of this specification, or an IESG-approved experimental protocol, MUST use the X prefix.

Any added untagged responses issued by an experimental command MUST also be prefixed with an X. Server implementations MUST NOT send any such untagged responses, unless the client requested it by issuing the associated experimental command.

Example: C: a441 CAPABILITY
S: * CAPABILITY IMAP4rev1 XPIG-LATIN
S: a441 OK CAPABILITY completed
C: A442 XPIG-LATIN
S: * XPIG-LATIN ow-nay eaking-spay ig-pay atin-lay
S: A442 OK XPIG-LATIN ompleted-cay

7. Server Responses

Server responses are in three forms: status responses, server data, and command continuation request. The information contained in a server response, identified by "Contents:" in the response descriptions below, is described by function, not by syntax. The precise syntax of server responses is described in the Formal Syntax section.

The client MUST be prepared to accept any response at all times.

Status responses can be tagged or untagged. Tagged status responses indicate the completion result (OK, NO, or BAD status) of a client command, and have a tag matching the command.

Some status responses, and all server data, are untagged. An untagged response is indicated by the token "*" instead of a tag. Untagged status responses indicate server greeting, or server status

that does not indicate the completion of a command (for example, an impending system shutdown alert). For historical reasons, untagged server data responses are also called "unsolicited data", although strictly speaking, only unilateral server data is truly "unsolicited".

Certain server data MUST be recorded by the client when it is received; this is noted in the description of that data. Such data conveys critical information which affects the interpretation of all subsequent commands and responses (e.g., updates reflecting the creation or destruction of messages).

Other server data SHOULD be recorded for later reference; if the client does not need to record the data, or if recording the data has no obvious purpose (e.g., a SEARCH response when no SEARCH command is in progress), the data SHOULD be ignored.

An example of unilateral untagged server data occurs when the IMAP connection is in the selected state. In the selected state, the server checks the mailbox for new messages as part of command execution. Normally, this is part of the execution of every command; hence, a NOOP command suffices to check for new messages. If new messages are found, the server sends untagged EXISTS and RECENT responses reflecting the new size of the mailbox. Server implementations that offer multiple simultaneous access to the same mailbox SHOULD also send appropriate unilateral untagged FETCH and EXPUNGE responses if another agent changes the state of any message flags or expunges any messages.

Command continuation request responses use the token "+" instead of a tag. These responses are sent by the server to indicate acceptance of an incomplete client command and readiness for the remainder of the command.

7.1. Server Responses - Status Responses

Status responses are OK, NO, BAD, PREAUTH and BYE. OK, NO, and BAD can be tagged or untagged. PREAUTH and BYE are always untagged.

Status responses MAY include an OPTIONAL "response code". A response code consists of data inside square brackets in the form of an atom, possibly followed by a space and arguments. The response code contains additional information or status codes for client software beyond the OK/NO/BAD condition, and are defined when there is a specific action that a client can take based upon the additional information.

The currently defined response codes are:

ALERT

The human-readable text contains a special alert that MUST be presented to the user in a fashion that calls the user's attention to the message.

BADCHARSET

Optionally followed by a parenthesized list of charsets. A SEARCH failed because the given charset is not supported by this implementation. If the optional list of charsets is given, this lists the charsets that are supported by this implementation.

CAPABILITY

Followed by a list of capabilities. This can appear in the initial OK or PREAUTH response to transmit an initial capabilities list. This makes it unnecessary for a client to send a separate CAPABILITY command if it recognizes this response.

PARSE

The human-readable text represents an error in parsing the [RFC-2822] header or [MIME-IMB] headers of a message in the mailbox.

PERMANENTFLAGS

Followed by a parenthesized list of flags, indicates which of the known flags the client can change permanently. Any flags that are in the FLAGS untagged response, but not the PERMANENTFLAGS list, can not be set permanently. If the client attempts to STORE a flag that is not in the PERMANENTFLAGS list, the server will either ignore the change or store the state change for the remainder of the current session only. The PERMANENTFLAGS list can also include the special flag *, which indicates that it is possible to create new keywords by attempting to store those flags in the mailbox.

READ-ONLY

The mailbox is selected read-only, or its access while selected has changed from read-write to read-only.

READ-WRITE

The mailbox is selected read-write, or its access while selected has changed from read-only to read-write.

TRYCREATE

An APPEND or COPY attempt is failing because the target mailbox does not exist (as opposed to some other reason). This is a hint to the client that the operation can succeed if the mailbox is first created by the CREATE command.

UIDNEXT

Followed by a decimal number, indicates the next unique identifier value. Refer to section 2.3.1.1 for more information.

UIDVALIDITY

Followed by a decimal number, indicates the unique identifier validity value. Refer to section 2.3.1.1 for more information.

UNSEEN

Followed by a decimal number, indicates the number of the first message without the \Seen flag set.

Additional response codes defined by particular client or server implementations SHOULD be prefixed with an "X" until they are added to a revision of this protocol. Client implementations SHOULD ignore response codes that they do not recognize.

7.1.1. OK Response

Contents: OPTIONAL response code
human-readable text

The OK response indicates an information message from the server. When tagged, it indicates successful completion of the associated command. The human-readable text MAY be presented to the user as an information message. The untagged form indicates an

information-only message; the nature of the information MAY be indicated by a response code.

The untagged form is also used as one of three possible greetings at connection startup. It indicates that the connection is not yet authenticated and that a LOGIN command is needed.

```
Example:    S: * OK IMAP4rev1 server ready
            C: A001 LOGIN fred blurdybloop
            S: * OK [ALERT] System shutdown in 10 minutes
            S: A001 OK LOGIN Completed
```

7.1.2. NO Response

```
Contents:   OPTIONAL response code
            human-readable text
```

The NO response indicates an operational error message from the server. When tagged, it indicates unsuccessful completion of the associated command. The untagged form indicates a warning; the command can still complete successfully. The human-readable text describes the condition.

```
Example:    C: A222 COPY 1:2 owatagusiam
            S: * NO Disk is 98% full, please delete unnecessary data
            S: A222 OK COPY completed
            C: A223 COPY 3:200 blurdybloop
            S: * NO Disk is 98% full, please delete unnecessary data
            S: * NO Disk is 99% full, please delete unnecessary data
            S: A223 NO COPY failed: disk is full
```

7.1.3. BAD Response

```
Contents:   OPTIONAL response code
            human-readable text
```

The BAD response indicates an error message from the server. When tagged, it reports a protocol-level error in the client's command; the tag indicates the command that caused the error. The untagged form indicates a protocol-level error for which the associated command can not be determined; it can also indicate an internal server failure. The human-readable text describes the condition.

```
Example:    C: ...very long command line...
            S: * BAD Command line too long
            C: ...empty line...
            S: * BAD Empty command line
            C: A443 EXPUNGE
            S: * BAD Disk crash, attempting salvage to a new disk!
            S: * OK Salvage successful, no data lost
            S: A443 OK Expunge completed
```

7.1.4. PREAUTH Response

```
Contents:   OPTIONAL response code
            human-readable text
```

The PREAUTH response is always untagged, and is one of three possible greetings at connection startup. It indicates that the connection has already been authenticated by external means; thus no LOGIN command is needed.

```
Example:    S: * PREAUTH IMAP4rev1 server logged in as Smith
```

7.1.5. BYE Response

```
Contents:   OPTIONAL response code
            human-readable text
```

The BYE response is always untagged, and indicates that the server is about to close the connection. The human-readable text MAY be displayed to the user in a status report by the client. The BYE response is sent under one of four conditions:

1) as part of a normal logout sequence. The server will close the connection after sending the tagged OK response to the LOGOUT command.

2) as a panic shutdown announcement. The server closes the connection immediately.

3) as an announcement of an inactivity autologout. The server closes the connection immediately.

4) as one of three possible greetings at connection startup, indicating that the server is not willing to accept a connection from this client. The server closes the connection immediately.

The difference between a BYE that occurs as part of a normal LOGOUT sequence (the first case) and a BYE that occurs because of a failure (the other three cases) is that the connection closes immediately in the failure case. In all cases the client SHOULD continue to read response data from the server until the connection is closed; this will ensure that any pending untagged or completion responses are read and processed.

Example: S: * BYE Autologout; idle for too long

7.2. Server Responses - Server and Mailbox Status

These responses are always untagged. This is how server and mailbox status data are transmitted from the server to the client. Many of these responses typically result from a command with the same name.

7.2.1. CAPABILITY Response

Contents: capability listing

The CAPABILITY response occurs as a result of a CAPABILITY command. The capability listing contains a space-separated listing of capability names that the server supports. The capability listing MUST include the atom "IMAP4rev1".

In addition, client and server implementations MUST implement the STARTTLS, LOGINDISABLED, and AUTH=PLAIN (described in [IMAP-TLS]) capabilities. See the Security Considerations section for important information.

A capability name which begins with "AUTH=" indicates that the server supports that particular authentication mechanism.

The LOGINDISABLED capability indicates that the LOGIN command is disabled, and that the server will respond with a tagged NO response to any attempt to use the LOGIN command even if the user name and password are valid. An IMAP client MUST NOT issue the LOGIN command if the server advertises the LOGINDISABLED capability.

Other capability names indicate that the server supports an extension, revision, or amendment to the IMAP4rev1 protocol. Server responses MUST conform to this document until the client issues a command that uses the associated capability.

Capability names MUST either begin with "X" or be standard or standards-track IMAP4rev1 extensions, revisions, or amendments registered with IANA. A server MUST NOT offer unregistered or

non-standard capability names, unless such names are prefixed with an "X".

Client implementations SHOULD NOT require any capability name other than "IMAP4rev1", and MUST ignore any unknown capability names.

A server MAY send capabilities automatically, by using the CAPABILITY response code in the initial PREAUTH or OK responses, and by sending an updated CAPABILITY response code in the tagged OK response as part of a successful authentication. It is unnecessary for a client to send a separate CAPABILITY command if it recognizes these automatic capabilities.

Example: S: * CAPABILITY IMAP4rev1 STARTTLS AUTH=GSSAPI XPIG-LATIN

7.2.2. LIST Response

Contents: name attributes
hierarchy delimiter
name

The LIST response occurs as a result of a LIST command. It returns a single name that matches the LIST specification. There can be multiple LIST responses for a single LIST command.

Four name attributes are defined:

\Noinferiors
It is not possible for any child levels of hierarchy to exist under this name; no child levels exist now and none can be created in the future.

\Noselect
It is not possible to use this name as a selectable mailbox.

\Marked
The mailbox has been marked "interesting" by the server; the mailbox probably contains messages that have been added since the last time the mailbox was selected.

\Unmarked
The mailbox does not contain any additional messages since the last time the mailbox was selected.

If it is not feasible for the server to determine whether or not the mailbox is "interesting", or if the name is a \Noselect name, the server SHOULD NOT send either \Marked or \Unmarked.

The hierarchy delimiter is a character used to delimit levels of hierarchy in a mailbox name. A client can use it to create child mailboxes, and to search higher or lower levels of naming hierarchy. All children of a top-level hierarchy node MUST use the same separator character. A NIL hierarchy delimiter means that no hierarchy exists; the name is a "flat" name.

The name represents an unambiguous left-to-right hierarchy, and MUST be valid for use as a reference in LIST and LSUB commands. Unless \Noselect is indicated, the name MUST also be valid as an argument for commands, such as SELECT, that accept mailbox names.

Example: S: * LIST (\Noselect) "/" ~/Mail/foo

7.2.3. LSUB Response

Contents: name attributes
hierarchy delimiter
name

The LSUB response occurs as a result of an LSUB command. It returns a single name that matches the LSUB specification. There can be multiple LSUB responses for a single LSUB command. The data is identical in format to the LIST response.

Example: S: * LSUB () "." #news.comp.mail.misc

7.2.4 STATUS Response

Contents: name
status parenthesized list

The STATUS response occurs as a result of an STATUS command. It returns the mailbox name that matches the STATUS specification and the requested mailbox status information.

Example: S: * STATUS blurdybloop (MESSAGES 231 UIDNEXT 44292)

7.2.5. SEARCH Response

Contents: zero or more numbers

The SEARCH response occurs as a result of a SEARCH or UID SEARCH command. The number(s) refer to those messages that match the search criteria. For SEARCH, these are message sequence numbers; for UID SEARCH, these are unique identifiers. Each number is delimited by a space.

Example: S: * SEARCH 2 3 6

7.2.6. FLAGS Response

Contents: flag parenthesized list

The FLAGS response occurs as a result of a SELECT or EXAMINE command. The flag parenthesized list identifies the flags (at a minimum, the system-defined flags) that are applicable for this mailbox. Flags other than the system flags can also exist, depending on server implementation.

The update from the FLAGS response MUST be recorded by the client.

Example: S: * FLAGS (\Answered \Flagged \Deleted \Seen \Draft)

7.3. Server Responses - Mailbox Size

These responses are always untagged. This is how changes in the size of the mailbox are transmitted from the server to the client. Immediately following the "*" token is a number that represents a message count.

7.3.1. EXISTS Response

Contents: none

The EXISTS response reports the number of messages in the mailbox. This response occurs as a result of a SELECT or EXAMINE command, and if the size of the mailbox changes (e.g., new messages).

The update from the EXISTS response MUST be recorded by the client.

Example: S: * 23 EXISTS

7.3.2. RECENT Response

Contents: none

The RECENT response reports the number of messages with the \Recent flag set. This response occurs as a result of a SELECT or EXAMINE command, and if the size of the mailbox changes (e.g., new messages).

> Note: It is not guaranteed that the message sequence numbers of recent messages will be a contiguous range of the highest n messages in the mailbox (where n is the value reported by the RECENT response). Examples of situations in which this is not the case are: multiple clients having the same mailbox open (the first session to be notified will see it as recent, others will probably see it as non-recent), and when the mailbox is re-ordered by a non-IMAP agent.
>
> The only reliable way to identify recent messages is to look at message flags to see which have the \Recent flag set, or to do a SEARCH RECENT.

The update from the RECENT response MUST be recorded by the client.

Example: S: * 5 RECENT

7.4. Server Responses - Message Status

These responses are always untagged. This is how message data are transmitted from the server to the client, often as a result of a command with the same name. Immediately following the "*" token is a number that represents a message sequence number.

7.4.1. EXPUNGE Response

Contents: none

The EXPUNGE response reports that the specified message sequence number has been permanently removed from the mailbox. The message sequence number for each successive message in the mailbox is immediately decremented by 1, and this decrement is reflected in message sequence numbers in subsequent responses (including other untagged EXPUNGE responses).

The EXPUNGE response also decrements the number of messages in the mailbox; it is not necessary to send an EXISTS response with the new value.

As a result of the immediate decrement rule, message sequence numbers that appear in a set of successive EXPUNGE responses depend upon whether the messages are removed starting from lower numbers to higher numbers, or from higher numbers to lower numbers. For example, if the last 5 messages in a 9-message mailbox are expunged, a "lower to higher" server will send five untagged EXPUNGE responses for message sequence number 5, whereas a "higher to lower server" will send successive untagged EXPUNGE responses for message sequence numbers 9, 8, 7, 6, and 5.

An EXPUNGE response MUST NOT be sent when no command is in progress, nor while responding to a FETCH, STORE, or SEARCH command. This rule is necessary to prevent a loss of synchronization of message sequence numbers between client and server. A command is not "in progress" until the complete command has been received; in particular, a command is not "in progress" during the negotiation of command continuation.

> Note: UID FETCH, UID STORE, and UID SEARCH are different commands from FETCH, STORE, and SEARCH. An EXPUNGE response MAY be sent during a UID command.

The update from the EXPUNGE response MUST be recorded by the client.

Example: S: * 44 EXPUNGE

7.4.2. FETCH Response

Contents: message data

The FETCH response returns data about a message to the client. The data are pairs of data item names and their values in parentheses. This response occurs as the result of a FETCH or STORE command, as well as by unilateral server decision (e.g., flag updates).

The current data items are:

BODY
: A form of BODYSTRUCTURE without extension data.

BODY[<section>]<<origin octet>>
A string expressing the body contents of the specified section. The string SHOULD be interpreted by the client according to the content transfer encoding, body type, and subtype.

If the origin octet is specified, this string is a substring of the entire body contents, starting at that origin octet. This means that BODY[]<0> MAY be truncated, but BODY[] is NEVER truncated.

Note: The origin octet facility MUST NOT be used by a server in a FETCH response unless the client specifically requested it by means of a FETCH of a BODY[<section>]<<partial>> data item.

8-bit textual data is permitted if a [CHARSET] identifier is part of the body parameter parenthesized list for this section. Note that headers (part specifiers HEADER or MIME, or the header portion of a MESSAGE/RFC822 part), MUST be 7-bit; 8-bit characters are not permitted in headers. Note also that the [RFC-2822] delimiting blank line between the header and the body is not affected by header line subsetting; the blank line is always included as part of header data, except in the case of a message which has no body and no blank line.

Non-textual data such as binary data MUST be transfer encoded into a textual form, such as BASE64, prior to being sent to the client. To derive the original binary data, the client MUST decode the transfer encoded string.

BODYSTRUCTURE
A parenthesized list that describes the [MIME-IMB] body structure of a message. This is computed by the server by parsing the [MIME-IMB] header fields, defaulting various fields as necessary.

For example, a simple text message of 48 lines and 2279 octets can have a body structure of: ("TEXT" "PLAIN" ("CHARSET" "US-ASCII") NIL NIL "7BIT" 2279 48)

Multiple parts are indicated by parenthesis nesting. Instead of a body type as the first element of the parenthesized list, there is a sequence of one or more nested body structures. The second element of the parenthesized list is the multipart subtype (mixed, digest, parallel, alternative, etc.).

For example, a two part message consisting of a text and a BASE64-encoded text attachment can have a body structure of: (("TEXT" "PLAIN" ("CHARSET" "US-ASCII") NIL NIL "7BIT" 1152 23)("TEXT" "PLAIN" ("CHARSET" "US-ASCII" "NAME" "cc.diff") "<960723163407.20117h@cac.washington.edu>" "Compiler diff" "BASE64" 4554 73) "MIXED")

Extension data follows the multipart subtype. Extension data is never returned with the BODY fetch, but can be returned with a BODYSTRUCTURE fetch. Extension data, if present, MUST be in the defined order. The extension data of a multipart body part are in the following order:

body parameter parenthesized list
   A parenthesized list of attribute/value pairs [e.g., ("foo" "bar" "baz" "rag") where "bar" is the value of "foo", and "rag" is the value of "baz"] as defined in [MIME-IMB].

body disposition
   A parenthesized list, consisting of a disposition type string, followed by a parenthesized list of disposition attribute/value pairs as defined in [DISPOSITION].

body language
   A string or parenthesized list giving the body language value as defined in [LANGUAGE-TAGS].

body location
   A string list giving the body content URI as defined in [LOCATION].

Any following extension data are not yet defined in this version of the protocol. Such extension data can consist of zero or more NILs, strings, numbers, or potentially nested parenthesized lists of such data. Client implementations that do a BODYSTRUCTURE fetch MUST be prepared to accept such extension data. Server implementations MUST NOT send such extension data until it has been defined by a revision of this protocol.

The basic fields of a non-multipart body part are in the following order:

body type
   A string giving the content media type name as defined in [MIME-IMB].

body subtype
A string giving the content subtype name as defined in [MIME-IMB].

body parameter parenthesized list
A parenthesized list of attribute/value pairs [e.g., ("foo" "bar" "baz" "rag") where "bar" is the value of "foo" and "rag" is the value of "baz"] as defined in [MIME-IMB].

body id
A string giving the content id as defined in [MIME-IMB].

body description
A string giving the content description as defined in [MIME-IMB].

body encoding
A string giving the content transfer encoding as defined in [MIME-IMB].

body size
A number giving the size of the body in octets. Note that this size is the size in its transfer encoding and not the resulting size after any decoding.

A body type of type MESSAGE and subtype RFC822 contains, immediately after the basic fields, the envelope structure, body structure, and size in text lines of the encapsulated message.

A body type of type TEXT contains, immediately after the basic fields, the size of the body in text lines. Note that this size is the size in its content transfer encoding and not the resulting size after any decoding.

Extension data follows the basic fields and the type-specific fields listed above. Extension data is never returned with the BODY fetch, but can be returned with a BODYSTRUCTURE fetch. Extension data, if present, MUST be in the defined order.

The extension data of a non-multipart body part are in the following order:

body MD5
A string giving the body MD5 value as defined in [MD5].

body disposition
A parenthesized list with the same content and function as the body disposition for a multipart body part.

body language
A string or parenthesized list giving the body language value as defined in [LANGUAGE-TAGS].

body location
A string list giving the body content URI as defined in [LOCATION].

Any following extension data are not yet defined in this version of the protocol, and would be as described above under multipart extension data.

ENVELOPE
A parenthesized list that describes the envelope structure of a message. This is computed by the server by parsing the [RFC-2822] header into the component parts, defaulting various fields as necessary.

The fields of the envelope structure are in the following order: date, subject, from, sender, reply-to, to, cc, bcc, in-reply-to, and message-id. The date, subject, in-reply-to, and message-id fields are strings. The from, sender, reply-to, to, cc, and bcc fields are parenthesized lists of address structures.

An address structure is a parenthesized list that describes an electronic mail address. The fields of an address structure are in the following order: personal name, [SMTP] at-domain-list (source route), mailbox name, and host name.

[RFC-2822] group syntax is indicated by a special form of address structure in which the host name field is NIL. If the mailbox name field is also NIL, this is an end of group marker (semi-colon in RFC 822 syntax). If the mailbox name field is non-NIL, this is a start of group marker, and the mailbox name field holds the group name phrase.

If the Date, Subject, In-Reply-To, and Message-ID header lines are absent in the [RFC-2822] header, the corresponding member of the envelope is NIL; if these header lines are present but empty the corresponding member of the envelope is the empty string.

Note: some servers may return a NIL envelope member in the "present but empty" case. Clients SHOULD treat NIL and empty string as identical.

Note: [RFC-2822] requires that all messages have a valid Date header. Therefore, the date member in the envelope can not be NIL or the empty string.

Note: [RFC-2822] requires that the In-Reply-To and Message-ID headers, if present, have non-empty content. Therefore, the in-reply-to and message-id members in the envelope can not be the empty string.

If the From, To, cc, and bcc header lines are absent in the [RFC-2822] header, or are present but empty, the corresponding member of the envelope is NIL.

If the Sender or Reply-To lines are absent in the [RFC-2822] header, or are present but empty, the server sets the corresponding member of the envelope to be the same value as the from member (the client is not expected to know to do this).

Note: [RFC-2822] requires that all messages have a valid From header. Therefore, the from, sender, and reply-to members in the envelope can not be NIL.

FLAGS
A parenthesized list of flags that are set for this message.

INTERNALDATE
A string representing the internal date of the message.

RFC822
Equivalent to BODY[].

RFC822.HEADER
Equivalent to BODY[HEADER]. Note that this did not result in \Seen being set, because RFC822.HEADER response data occurs as a result of a FETCH of RFC822.HEADER. BODY[HEADER] response data occurs as a result of a FETCH of BODY[HEADER] (which sets \Seen) or BODY.PEEK[HEADER] (which does not set \Seen).

RFC822.SIZE
A number expressing the [RFC-2822] size of the message.

RFC822.TEXT
Equivalent to BODY[TEXT].

UID
A number expressing the unique identifier of the message.

Example: S: * 23 FETCH (FLAGS (\Seen) RFC822.SIZE 44827)

7.5. Server Responses - Command Continuation Request

The command continuation request response is indicated by a "+" token instead of a tag. This form of response indicates that the server is ready to accept the continuation of a command from the client. The remainder of this response is a line of text.

This response is used in the AUTHENTICATE command to transmit server data to the client, and request additional client data. This response is also used if an argument to any command is a literal.

The client is not permitted to send the octets of the literal unless the server indicates that it is expected. This permits the server to process commands and reject errors on a line-by-line basis. The remainder of the command, including the CRLF that terminates a command, follows the octets of the literal. If there are any additional command arguments, the literal octets are followed by a space and those arguments.

```
Example:    C: A001 LOGIN {11}
            S: + Ready for additional command text
            C: FRED FOOBAR {7}
            S: + Ready for additional command text
            C: fat man
            S: A001 OK LOGIN completed
            C: A044 BLURDYBLOOP {102856}
            S: A044 BAD No such command as "BLURDYBLOOP"
```

8. Sample IMAP4rev1 connection

The following is a transcript of an IMAP4rev1 connection. A long line in this sample is broken for editorial clarity.

```
S:   * OK IMAP4rev1 Service Ready
C:   a001 login mrc secret
S:   a001 OK LOGIN completed
C:   a002 select inbox
S:   * 18 EXISTS
S:   * FLAGS (\Answered \Flagged \Deleted \Seen \Draft)
S:   * 2 RECENT
S:   * OK [UNSEEN 17] Message 17 is the first unseen message
S:   * OK [UIDVALIDITY 3857529045] UIDs valid
S:   a002 OK [READ-WRITE] SELECT completed
C:   a003 fetch 12 full
S:   * 12 FETCH (FLAGS (\Seen) INTERNALDATE "17-Jul-1996 02:44:25 -0700"
      RFC822.SIZE 4286 ENVELOPE ("Wed, 17 Jul 1996 02:23:25 -0700 (PDT)"
      "IMAP4rev1 WG mtg summary and minutes"
      (("Terry Gray" NIL "gray" "cac.washington.edu"))
      (("Terry Gray" NIL "gray" "cac.washington.edu"))
      (("Terry Gray" NIL "gray" "cac.washington.edu"))
      ((NIL NIL "imap" "cac.washington.edu"))
      ((NIL NIL "minutes" "CNRI.Reston.VA.US")
      ("John Klensin" NIL "KLENSIN" "MIT.EDU")) NIL NIL
      "<B27397-0100000@cac.washington.edu>")
       BODY ("TEXT" "PLAIN" ("CHARSET" "US-ASCII") NIL NIL "7BIT" 3028
       92))
S:   a003 OK FETCH completed
C:   a004 fetch 12 body[header]
S:   * 12 FETCH (BODY[HEADER] {342}
S:   Date: Wed, 17 Jul 1996 02:23:25 -0700 (PDT)
S:   From: Terry Gray <gray@cac.washington.edu>
S:   Subject: IMAP4rev1 WG mtg summary and minutes
S:   To: imap@cac.washington.edu
S:   cc: minutes@CNRI.Reston.VA.US, John Klensin <KLENSIN@MIT.EDU>
S:   Message-Id: <B27397-0100000@cac.washington.edu>
S:   MIME-Version: 1.0
S:   Content-Type: TEXT/PLAIN; CHARSET=US-ASCII
S:
S:   )
S:   a004 OK FETCH completed
C:   a005 store 12 +flags \deleted
S:   * 12 FETCH (FLAGS (\Seen \Deleted))
S:   a005 OK +FLAGS completed
C:   a006 logout
S:   * BYE IMAP4rev1 server terminating connection
S:   a006 OK LOGOUT completed
```

9. Formal Syntax

The following syntax specification uses the Augmented Backus-Naur Form (ABNF) notation as specified in [ABNF].

In the case of alternative or optional rules in which a later rule overlaps an earlier rule, the rule which is listed earlier MUST take priority. For example, "\Seen" when parsed as a flag is the \Seen flag name and not a flag-extension, even though "\Seen" can be parsed as a flag-extension. Some, but not all, instances of this rule are noted below.

> Note: [ABNF] rules MUST be followed strictly; in particular:
>
> (1) Except as noted otherwise, all alphabetic characters are case-insensitive. The use of upper or lower case characters to define token strings is for editorial clarity only. Implementations MUST accept these strings in a case-insensitive fashion.
>
> (2) In all cases, SP refers to exactly one space. It is NOT permitted to substitute TAB, insert additional spaces, or otherwise treat SP as being equivalent to LWSP.
>
> (3) The ASCII NUL character, %x00, MUST NOT be used at any time.

```
address         = "(" addr-name SP addr-adl SP addr-mailbox SP
                  addr-host ")"

addr-adl        = nstring
                    ; Holds route from [RFC-2822] route-addr if
                    ; non-NIL

addr-host       = nstring
                    ; NIL indicates [RFC-2822] group syntax.
                    ; Otherwise, holds [RFC-2822] domain name

addr-mailbox    = nstring
                    ; NIL indicates end of [RFC-2822] group; if
                    ; non-NIL and addr-host is NIL, holds
                    ; [RFC-2822] group name.
                    ; Otherwise, holds [RFC-2822] local-part
                    ; after removing [RFC-2822] quoting
```

```
addr-name       = nstring
                    ; If non-NIL, holds phrase from [RFC-2822]
                    ; mailbox after removing [RFC-2822] quoting

append          = "APPEND" SP mailbox [SP flag-list] [SP date-time] SP
                  literal

astring         = 1*ASTRING-CHAR / string

ASTRING-CHAR   = ATOM-CHAR / resp-specials

atom            = 1*ATOM-CHAR

ATOM-CHAR       = <any CHAR except atom-specials>

atom-specials   = "(" / ")" / "{" / SP / CTL / list-wildcards /
                  quoted-specials / resp-specials

authenticate    = "AUTHENTICATE" SP auth-type *(CRLF base64)

auth-type       = atom
                    ; Defined by [SASL]

base64          = *(4base64-char) [base64-terminal]

base64-char     = ALPHA / DIGIT / "+" / "/"
                    ; Case-sensitive

base64-terminal = (2base64-char "==") / (3base64-char "=")

body            = "(" (body-type-1part / body-type-mpart) ")"

body-extension  = nstring / number /
                   "(" body-extension *(SP body-extension) ")"
                    ; Future expansion.  Client implementations
                    ; MUST accept body-extension fields.  Server
                    ; implementations MUST NOT generate
                    ; body-extension fields except as defined by
                    ; future standard or standards-track
                    ; revisions of this specification.

body-ext-1part  = body-fld-md5 [SP body-fld-dsp [SP body-fld-lang
                  [SP body-fld-loc *(SP body-extension)]]]
                    ; MUST NOT be returned on non-extensible
                    ; "BODY" fetch
```

```
body-ext-mpart  = body-fld-param [SP body-fld-dsp [SP body-fld-lang
                  [SP body-fld-loc *(SP body-extension)]]]
                    ; MUST NOT be returned on non-extensible
                    ; "BODY" fetch

body-fields     = body-fld-param SP body-fld-id SP body-fld-desc SP
                  body-fld-enc SP body-fld-octets

body-fld-desc   = nstring

body-fld-dsp    = "(" string SP body-fld-param ")" / nil

body-fld-enc    = (DQUOTE ("7BIT" / "8BIT" / "BINARY" / "BASE64"/
                  "QUOTED-PRINTABLE") DQUOTE) / string

body-fld-id     = nstring

body-fld-lang   = nstring / "(" string *(SP string) ")"

body-fld-loc    = nstring

body-fld-lines  = number

body-fld-md5    = nstring

body-fld-octets = number

body-fld-param  = "(" string SP string *(SP string SP string) ")" / nil

body-type-1part = (body-type-basic / body-type-msg / body-type-text)
                  [SP body-ext-1part]

body-type-basic = media-basic SP body-fields
                    ; MESSAGE subtype MUST NOT be "RFC822"

body-type-mpart = 1*body SP media-subtype
                  [SP body-ext-mpart]

body-type-msg   = media-message SP body-fields SP envelope
                  SP body SP body-fld-lines

body-type-text  = media-text SP body-fields SP body-fld-lines

capability      = ("AUTH=" auth-type) / atom
                    ; New capabilities MUST begin with "X" or be
                    ; registered with IANA as standard or
                    ; standards-track
```

```
capability-data = "CAPABILITY" *(SP capability) SP "IMAP4rev1"
                  *(SP capability)
                    ; Servers MUST implement the STARTTLS, AUTH=PLAIN,
                    ; and LOGINDISABLED capabilities
                    ; Servers which offer RFC 1730 compatibility MUST
                    ; list "IMAP4" as the first capability.

CHAR8           = %x01-ff
                    ; any OCTET except NUL, %x00

command         = tag SP (command-any / command-auth / command-nonauth /
                  command-select) CRLF
                    ; Modal based on state

command-any     = "CAPABILITY" / "LOGOUT" / "NOOP" / x-command
                    ; Valid in all states

command-auth    = append / create / delete / examine / list / lsub /
                  rename / select / status / subscribe / unsubscribe
                    ; Valid only in Authenticated or Selected state

command-nonauth = login / authenticate / "STARTTLS"
                    ; Valid only when in Not Authenticated state

command-select  = "CHECK" / "CLOSE" / "EXPUNGE" / copy / fetch / store /
                  uid / search
                    ; Valid only when in Selected state

continue-req    = "+" SP (resp-text / base64) CRLF

copy            = "COPY" SP sequence-set SP mailbox

create          = "CREATE" SP mailbox
                    ; Use of INBOX gives a NO error

date            = date-text / DQUOTE date-text DQUOTE

date-day        = 1*2DIGIT
                    ; Day of month

date-day-fixed  = (SP DIGIT) / 2DIGIT
                    ; Fixed-format version of date-day

date-month      = "Jan" / "Feb" / "Mar" / "Apr" / "May" / "Jun" /
                  "Jul" / "Aug" / "Sep" / "Oct" / "Nov" / "Dec"

date-text       = date-day "-" date-month "-" date-year
```

```
date-year       = 4DIGIT

date-time       = DQUOTE date-day-fixed "-" date-month "-" date-year
                  SP time SP zone DQUOTE

delete          = "DELETE" SP mailbox
                    ; Use of INBOX gives a NO error

digit-nz        = %x31-39
                    ; 1-9

envelope        = "(" env-date SP env-subject SP env-from SP
                  env-sender SP env-reply-to SP env-to SP env-cc SP
                  env-bcc SP env-in-reply-to SP env-message-id ")"

env-bcc         = "(" 1*address ")" / nil

env-cc          = "(" 1*address ")" / nil

env-date        = nstring

env-from        = "(" 1*address ")" / nil

env-in-reply-to = nstring

env-message-id  = nstring

env-reply-to    = "(" 1*address ")" / nil

env-sender      = "(" 1*address ")" / nil

env-subject     = nstring

env-to          = "(" 1*address ")" / nil

examine         = "EXAMINE" SP mailbox

fetch           = "FETCH" SP sequence-set SP ("ALL" / "FULL" / "FAST" /
                  fetch-att / "(" fetch-att *(SP fetch-att) ")")

fetch-att       = "ENVELOPE" / "FLAGS" / "INTERNALDATE" /
                  "RFC822" [".HEADER" / ".SIZE" / ".TEXT"] /
                  "BODY" ["STRUCTURE"] / "UID" /
                  "BODY" section ["<" number "." nz-number ">"] /
                  "BODY.PEEK" section ["<" number "." nz-number ">"]
```

```
flag            = "\Answered" / "\Flagged" / "\Deleted" /
                  "\Seen" / "\Draft" / flag-keyword / flag-extension
                    ; Does not include "\Recent"

flag-extension  = "\" atom
                    ; Future expansion.  Client implementations
                    ; MUST accept flag-extension flags.  Server
                    ; implementations MUST NOT generate
                    ; flag-extension flags except as defined by
                    ; future standard or standards-track
                    ; revisions of this specification.

flag-fetch      = flag / "\Recent"

flag-keyword    = atom

flag-list       = "(" [flag *(SP flag)] ")"

flag-perm       = flag / "\*"

greeting        = "*" SP (resp-cond-auth / resp-cond-bye) CRLF

header-fld-name = astring

header-list     = "(" header-fld-name *(SP header-fld-name) ")"

list            = "LIST" SP mailbox SP list-mailbox

list-mailbox    = 1*list-char / string

list-char       = ATOM-CHAR / list-wildcards / resp-specials

list-wildcards  = "%" / "*"

literal         = "{" number "}" CRLF *CHAR8
                    ; Number represents the number of CHAR8s

login           = "LOGIN" SP userid SP password

lsub            = "LSUB" SP mailbox SP list-mailbox
```

```
mailbox         = "INBOX" / astring
                    ; INBOX is case-insensitive.  All case variants of
                    ; INBOX (e.g., "iNbOx") MUST be interpreted as INBOX
                    ; not as an astring.  An astring which consists of
                    ; the case-insensitive sequence "I" "N" "B" "O" "X"
                    ; is considered to be INBOX and not an astring.
                    ;  Refer to section 5.1 for further
                    ; semantic details of mailbox names.

mailbox-data    =  "FLAGS" SP flag-list / "LIST" SP mailbox-list /
                   "LSUB" SP mailbox-list / "SEARCH" *(SP nz-number) /
                   "STATUS" SP mailbox SP "(" [status-att-list] ")" /
                   number SP "EXISTS" / number SP "RECENT"

mailbox-list    = "(" [mbx-list-flags] ")" SP
                   (DQUOTE QUOTED-CHAR DQUOTE / nil) SP mailbox

mbx-list-flags  = *(mbx-list-oflag SP) mbx-list-sflag
                  *(SP mbx-list-oflag) /
                  mbx-list-oflag *(SP mbx-list-oflag)

mbx-list-oflag  = "\Noinferiors" / flag-extension
                    ; Other flags; multiple possible per LIST response

mbx-list-sflag  = "\Noselect" / "\Marked" / "\Unmarked"
                    ; Selectability flags; only one per LIST response

media-basic     = ((DQUOTE ("APPLICATION" / "AUDIO" / "IMAGE" /
                  "MESSAGE" / "VIDEO") DQUOTE) / string) SP
                  media-subtype
                    ; Defined in [MIME-IMT]

media-message   = DQUOTE "MESSAGE" DQUOTE SP DQUOTE "RFC822" DQUOTE
                    ; Defined in [MIME-IMT]

media-subtype   = string
                    ; Defined in [MIME-IMT]

media-text      = DQUOTE "TEXT" DQUOTE SP media-subtype
                    ; Defined in [MIME-IMT]

message-data    = nz-number SP ("EXPUNGE" / ("FETCH" SP msg-att))

msg-att         = "(" (msg-att-dynamic / msg-att-static)
                   *(SP (msg-att-dynamic / msg-att-static)) ")"

msg-att-dynamic = "FLAGS" SP "(" [flag-fetch *(SP flag-fetch)] ")"
                    ; MAY change for a message
```

```
msg-att-static  = "ENVELOPE" SP envelope / "INTERNALDATE" SP date-time /
                  "RFC822" [".HEADER" / ".TEXT"] SP nstring /
                  "RFC822.SIZE" SP number /
                  "BODY" ["STRUCTURE"] SP body /
                  "BODY" section ["<" number ">"] SP nstring /
                  "UID" SP uniqueid
                    ; MUST NOT change for a message

nil             = "NIL"

nstring         = string / nil

number          = 1*DIGIT
                    ; Unsigned 32-bit integer
                    ; (0 <= n < 4,294,967,296)

nz-number       = digit-nz *DIGIT
                    ; Non-zero unsigned 32-bit integer
                    ; (0 < n < 4,294,967,296)

password        = astring

quoted          = DQUOTE *QUOTED-CHAR DQUOTE

QUOTED-CHAR     = <any TEXT-CHAR except quoted-specials> /
                  "\" quoted-specials

quoted-specials = DQUOTE / "\"

rename          = "RENAME" SP mailbox SP mailbox
                    ; Use of INBOX as a destination gives a NO error

response        = *(continue-req / response-data) response-done

response-data   = "*" SP (resp-cond-state / resp-cond-bye /
                  mailbox-data / message-data / capability-data) CRLF

response-done   = response-tagged / response-fatal

response-fatal  = "*" SP resp-cond-bye CRLF
                    ; Server closes connection immediately

response-tagged = tag SP resp-cond-state CRLF

resp-cond-auth  = ("OK" / "PREAUTH") SP resp-text
                    ; Authentication condition
```

```
resp-cond-bye   = "BYE" SP resp-text

resp-cond-state = ("OK" / "NO" / "BAD") SP resp-text
                    ; Status condition

resp-specials   = "]"

resp-text       = ["[" resp-text-code "]" SP] text

resp-text-code  = "ALERT" /
                  "BADCHARSET" [SP "(" astring *(SP astring) ")" ] /
                  capability-data / "PARSE" /
                  "PERMANENTFLAGS" SP "("
                  [flag-perm *(SP flag-perm)] ")" /
                  "READ-ONLY" / "READ-WRITE" / "TRYCREATE" /
                  "UIDNEXT" SP nz-number / "UIDVALIDITY" SP nz-number /
                  "UNSEEN" SP nz-number /
                  atom [SP 1*<any TEXT-CHAR except "]">]

search          = "SEARCH" [SP "CHARSET" SP astring] 1*(SP search-key)
                    ; CHARSET argument to MUST be registered with IANA

search-key      = "ALL" / "ANSWERED" / "BCC" SP astring /
                  "BEFORE" SP date / "BODY" SP astring /
                  "CC" SP astring / "DELETED" / "FLAGGED" /
                  "FROM" SP astring / "KEYWORD" SP flag-keyword /
                  "NEW" / "OLD" / "ON" SP date / "RECENT" / "SEEN" /
                  "SINCE" SP date / "SUBJECT" SP astring /
                  "TEXT" SP astring / "TO" SP astring /
                  "UNANSWERED" / "UNDELETED" / "UNFLAGGED" /
                  "UNKEYWORD" SP flag-keyword / "UNSEEN" /
                    ; Above this line were in [IMAP2]
                  "DRAFT" / "HEADER" SP header-fld-name SP astring /
                  "LARGER" SP number / "NOT" SP search-key /
                  "OR" SP search-key SP search-key /
                  "SENTBEFORE" SP date / "SENTON" SP date /
                  "SENTSINCE" SP date / "SMALLER" SP number /
                  "UID" SP sequence-set / "UNDRAFT" / sequence-set /
                  "(" search-key *(SP search-key) ")"

section         = "[" [section-spec] "]"

section-msgtext = "HEADER" / "HEADER.FIELDS" [".NOT"] SP header-list /
                  "TEXT"
                    ; top-level or MESSAGE/RFC822 part

section-part    = nz-number *("." nz-number)
                    ; body part nesting
```

```
section-spec    = section-msgtext / (section-part ["." section-text])

section-text    = section-msgtext / "MIME"
                    ; text other than actual body part (headers, etc.)

select          = "SELECT" SP mailbox

seq-number      = nz-number / "*"
                    ; message sequence number (COPY, FETCH, STORE
                    ; commands) or unique identifier (UID COPY,
                    ; UID FETCH, UID STORE commands).
                    ; * represents the largest number in use.  In
                    ; the case of message sequence numbers, it is
                    ; the number of messages in a non-empty mailbox.
                    ; In the case of unique identifiers, it is the
                    ; unique identifier of the last message in the
                    ; mailbox or, if the mailbox is empty, the
                    ; mailbox's current UIDNEXT value.
                    ; The server should respond with a tagged BAD
                    ; response to a command that uses a message
                    ; sequence number greater than the number of
                    ; messages in the selected mailbox.  This
                    ; includes "*" if the selected mailbox is empty.

seq-range       = seq-number ":" seq-number
                    ; two seq-number values and all values between
                    ; these two regardless of order.
                    ; Example: 2:4 and 4:2 are equivalent and indicate
                    ; values 2, 3, and 4.
                    ; Example: a unique identifier sequence range of
                    ; 3291:* includes the UID of the last message in
                    ; the mailbox, even if that value is less than 3291.

sequence-set    = (seq-number / seq-range) *("," sequence-set)
                    ; set of seq-number values, regardless of order.
                    ; Servers MAY coalesce overlaps and/or execute the
                    ; sequence in any order.
                    ; Example: a message sequence number set of
                    ; 2,4:7,9,12:* for a mailbox with 15 messages is
                    ; equivalent to 2,4,5,6,7,9,12,13,14,15
                    ; Example: a message sequence number set of *:4,5:7
                    ; for a mailbox with 10 messages is equivalent to
                    ; 10,9,8,7,6,5,4,5,6,7 and MAY be reordered and
                    ; overlap coalesced to be 4,5,6,7,8,9,10.

status          = "STATUS" SP mailbox SP
                  "(" status-att *(SP status-att) ")"
```

```
status-att      = "MESSAGES" / "RECENT" / "UIDNEXT" / "UIDVALIDITY" /
                  "UNSEEN"

status-att-list =  status-att SP number *(SP status-att SP number)

store           = "STORE" SP sequence-set SP store-att-flags

store-att-flags = (["+" / "-"] "FLAGS" [".SILENT"]) SP
                  (flag-list / (flag *(SP flag)))

string          = quoted / literal

subscribe       = "SUBSCRIBE" SP mailbox

tag             = 1*<any ASTRING-CHAR except "+">

text            = 1*TEXT-CHAR

TEXT-CHAR       = <any CHAR except CR and LF>

time            = 2DIGIT ":" 2DIGIT ":" 2DIGIT
                    ; Hours minutes seconds

uid             = "UID" SP (copy / fetch / search / store)
                    ; Unique identifiers used instead of message
                    ; sequence numbers

uniqueid        = nz-number
                    ; Strictly ascending

unsubscribe     = "UNSUBSCRIBE" SP mailbox

userid          = astring

x-command       = "X" atom <experimental command arguments>

zone            = ("+" / "-") 4DIGIT
                    ; Signed four-digit value of hhmm representing
                    ; hours and minutes east of Greenwich (that is,
                    ; the amount that the given time differs from
                    ; Universal Time).  Subtracting the timezone
                    ; from the given time will give the UT form.
                    ; The Universal Time zone is "+0000".
```

10. Author's Note

This document is a revision or rewrite of earlier documents, and supercedes the protocol specification in those documents: RFC 2060, RFC 1730, unpublished IMAP2bis.TXT document, RFC 1176, and RFC 1064.

11. Security Considerations

IMAP4rev1 protocol transactions, including electronic mail data, are sent in the clear over the network unless protection from snooping is negotiated. This can be accomplished either by the use of STARTTLS, negotiated privacy protection in the AUTHENTICATE command, or some other protection mechanism.

11.1. STARTTLS Security Considerations

The specification of the STARTTLS command and LOGINDISABLED capability in this document replaces that in [IMAP-TLS]. [IMAP-TLS] remains normative for the PLAIN [SASL] authenticator.

IMAP client and server implementations MUST implement the TLS_RSA_WITH_RC4_128_MD5 [TLS] cipher suite, and SHOULD implement the TLS_DHE_DSS_WITH_3DES_EDE_CBC_SHA [TLS] cipher suite. This is important as it assures that any two compliant implementations can be configured to interoperate. All other cipher suites are OPTIONAL. Note that this is a change from section 2.1 of [IMAP-TLS].

During the [TLS] negotiation, the client MUST check its understanding of the server hostname against the server's identity as presented in the server Certificate message, in order to prevent man-in-the-middle attacks. If the match fails, the client SHOULD either ask for explicit user confirmation, or terminate the connection and indicate that the server's identity is suspect. Matching is performed according to these rules:

> The client MUST use the server hostname it used to open the connection as the value to compare against the server name as expressed in the server certificate. The client MUST NOT use any form of the server hostname derived from an insecure remote source (e.g., insecure DNS lookup). CNAME canonicalization is not done.
>
> If a subjectAltName extension of type dNSName is present in the certificate, it SHOULD be used as the source of the server's identity.
>
> Matching is case-insensitive.

A "*" wildcard character MAY be used as the left-most name component in the certificate. For example, *.example.com would match a.example.com, foo.example.com, etc. but would not match example.com.

If the certificate contains multiple names (e.g., more than one dNSName field), then a match with any one of the fields is considered acceptable.

Both the client and server MUST check the result of the STARTTLS command and subsequent [TLS] negotiation to see whether acceptable authentication or privacy was achieved.

11.2. Other Security Considerations

A server error message for an AUTHENTICATE command which fails due to invalid credentials SHOULD NOT detail why the credentials are invalid.

Use of the LOGIN command sends passwords in the clear. This can be avoided by using the AUTHENTICATE command with a [SASL] mechanism that does not use plaintext passwords, by first negotiating encryption via STARTTLS or some other protection mechanism.

A server implementation MUST implement a configuration that, at the time of authentication, requires:

(1) The STARTTLS command has been negotiated.

OR

(2) Some other mechanism that protects the session from password snooping has been provided.

OR

(3) The following measures are in place:

(a) The LOGINDISABLED capability is advertised, and [SASL] mechanisms (such as PLAIN) using plaintext passwords are NOT advertised in the CAPABILITY list.

AND

(b) The LOGIN command returns an error even if the password is correct.

AND

(c) The AUTHENTICATE command returns an error with all [SASL] mechanisms that use plaintext passwords, even if the password is correct.

A server error message for a failing LOGIN command SHOULD NOT specify that the user name, as opposed to the password, is invalid.

A server SHOULD have mechanisms in place to limit or delay failed AUTHENTICATE/LOGIN attempts.

Additional security considerations are discussed in the section discussing the AUTHENTICATE and LOGIN commands.

12. IANA Considerations

IMAP4 capabilities are registered by publishing a standards track or IESG approved experimental RFC. The registry is currently located at:

http://www.iana.org/assignments/imap4-capabilities

As this specification revises the STARTTLS and LOGINDISABLED extensions previously defined in [IMAP-TLS], the registry will be updated accordingly.

Appendices

A. Normative References

The following documents contain definitions or specifications that are necessary to understand this document properly:

[ABNF] Crocker, D. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", RFC 2234, November 1997.

[ANONYMOUS] Newman, C., "Anonymous SASL Mechanism", RFC 2245, November 1997.

[CHARSET] Freed, N. and J. Postel, "IANA Character Set Registration Procedures", RFC 2978, October 2000.

[DIGEST-MD5] Leach, P. and C. Newman, "Using Digest Authentication as a SASL Mechanism", RFC 2831, May 2000.

[DISPOSITION] Troost, R., Dorner, S. and K. Moore, "Communicating Presentation Information in Internet Messages: The Content-Disposition Header", RFC 2183, August 1997.

[IMAP-TLS] Newman, C., "Using TLS with IMAP, POP3 and ACAP", RFC 2595, June 1999.

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[LANGUAGE-TAGS] Alvestrand, H., "Tags for the Identification of Languages", BCP 47, RFC 3066, January 2001.

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[TLS] Dierks, T. and C. Allen, "The TLS Protocol Version 1.0", RFC 2246, January 1999.

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The following documents describe quality-of-implementation issues that should be carefully considered when implementing this protocol:

[IMAP-IMPLEMENTATION] Leiba, B., "IMAP Implementation Recommendations", RFC 2683, September 1999.

[IMAP-MULTIACCESS] Gahrns, M., "IMAP4 Multi-Accessed Mailbox Practice", RFC 2180, July 1997.

A.1 Informative References

The following documents describe related protocols:

[IMAP-DISC] Austein, R., "Synchronization Operations for Disconnected IMAP4 Clients", Work in Progress.

[IMAP-MODEL] Crispin, M., "Distributed Electronic Mail Models in IMAP4", RFC 1733, December 1994.

[ACAP] Newman, C. and J. Myers, "ACAP -- Application Configuration Access Protocol", RFC 2244, November 1997.

[SMTP] Klensin, J., "Simple Mail Transfer Protocol", STD 10, RFC 2821, April 2001.

The following documents are historical or describe historical aspects of this protocol:

[IMAP-COMPAT] Crispin, M., "IMAP4 Compatibility with IMAP2bis", RFC 2061, December 1996.

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[IMAP-OBSOLETE] Crispin, M., "Internet Message Access Protocol - Obsolete Syntax", RFC 2062, December 1996.

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

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

B. Changes from RFC 2060

1) Clarify description of unique identifiers and their semantics.

2) Fix the SELECT description to clarify that UIDVALIDITY is required in the SELECT and EXAMINE responses.

3) Added an example of a failing search.

4) Correct store-att-flags: "#flag" should be "1#flag".

5) Made search and section rules clearer.

6) Correct the STORE example.

7) Correct "BASE645" misspelling.

8) Remove extraneous close parenthesis in example of two-part message with text and BASE64 attachment.

9) Remove obsolete "MAILBOX" response from mailbox-data.

10) A spurious "<" in the rule for mailbox-data was removed.

11) Add CRLF to continue-req.

12) Specifically exclude "]" from the atom in resp-text-code.

13) Clarify that clients and servers should adhere strictly to the protocol syntax.

14) Emphasize in 5.2 that EXISTS can not be used to shrink a mailbox.

15) Add NEWNAME to resp-text-code.

16) Clarify that the empty string, not NIL, is used as arguments to LIST.

17) Clarify that NIL can be returned as a hierarchy delimiter for the empty string mailbox name argument if the mailbox namespace is flat.

18) Clarify that addr-mailbox and addr-name have RFC-2822 quoting removed.

19) Update UTF-7 reference.

20) Fix example in 6.3.11.

21) Clarify that non-existent UIDs are ignored.

22) Update DISPOSITION reference.

23) Expand state diagram.

24) Clarify that partial fetch responses are only returned in response to a partial fetch command.

25) Add UIDNEXT response code. Correct UIDVALIDITY definition reference.

26) Further clarification of "can" vs. "MAY".

27) Reference RFC-2119.

28) Clarify that superfluous shifts are not permitted in modified UTF-7.

29) Clarify that there are no implicit shifts in modified UTF-7.

30) Clarify that "INBOX" in a mailbox name is always INBOX, even if it is given as a string.

31) Add missing open parenthesis in media-basic grammar rule.

32) Correct attribute syntax in mailbox-data.

33) Add UIDNEXT to EXAMINE responses.

34) Clarify UNSEEN, PERMANENTFLAGS, UIDVALIDITY, and UIDNEXT responses in SELECT and EXAMINE. They are required now, but weren't in older versions.

35) Update references with RFC numbers.

36) Flush text-mime2.

37) Clarify that modified UTF-7 names must be case-sensitive and that violating the convention should be avoided.

38) Correct UID FETCH example.

39) Clarify UID FETCH, UID STORE, and UID SEARCH vs. untagged EXPUNGE responses.

40) Clarify the use of the word "convention".

41) Clarify that a command is not "in progress" until it has been fully received (specifically, that a command is not "in progress" during command continuation negotiation).

42) Clarify envelope defaulting.

43) Clarify that SP means one and only one space character.

44) Forbid silly states in LIST response.

45) Clarify that the ENVELOPE, INTERNALDATE, RFC822*, BODY*, and UID for a message is static.

46) Add BADCHARSET response code.

47) Update formal syntax to [ABNF] conventions.

48) Clarify trailing hierarchy delimiter in CREATE semantics.

49) Clarify that the "blank line" is the [RFC-2822] delimiting blank line.

50) Clarify that RENAME should also create hierarchy as needed for the command to complete.

51) Fix body-ext-mpart to not require language if disposition present.

52) Clarify the RFC822.HEADER response.

53) Correct missing space after charset astring in search.

54) Correct missing quote for BADCHARSET in resp-text-code.

55) Clarify that ALL, FAST, and FULL preclude any other data items appearing.

56) Clarify semantics of reference argument in LIST.

57) Clarify that a null string for SEARCH HEADER X-FOO means any message with a header line with a field-name of X-FOO regardless of the text of the header.

58) Specifically reserve 8-bit mailbox names for future use as UTF-8.

59) It is not an error for the client to store a flag that is not in the PERMANENTFLAGS list; however, the server will either ignore the change or make the change in the session only.

60) Correct/clarify the text regarding superfluous shifts.

61) Correct typographic errors in the "Changes" section.

62) Clarify that STATUS must not be used to check for new messages in the selected mailbox

63) Clarify LSUB behavior with "%" wildcard.

64) Change AUTHORIZATION to AUTHENTICATE in section 7.5.

65) Clarify description of multipart body type.

66) Clarify that STORE FLAGS does not affect \Recent.

67) Change "west" to "east" in description of timezone.

68) Clarify that commands which break command pipelining must wait for a completion result response.

69) Clarify that EXAMINE does not affect \Recent.

70) Make description of MIME structure consistent.

71) Clarify that date searches disregard the time and timezone of the INTERNALDATE or Date: header. In other words, "ON 13-APR-2000" means messages with an INTERNALDATE text which starts with "13-APR-2000", even if timezone differential from the local timezone is sufficient to move that INTERNALDATE into the previous or next day.

72) Clarify that the header fetches don't add a blank line if one isn't in the [RFC-2822] message.

73) Clarify (in discussion of UIDs) that messages are immutable.

74) Add an example of CHARSET searching.

75) Clarify in SEARCH that keywords are a type of flag.

76) Clarify the mandatory nature of the SELECT data responses.

77) Add optional CAPABILITY response code in the initial OK or PREAUTH.

78) Add note that server can send an untagged CAPABILITY command as part of the responses to AUTHENTICATE and LOGIN.

79) Remove statement about it being unnecessary to issue a CAPABILITY command more than once in a connection. That statement is no longer true.

80) Clarify that untagged EXPUNGE decrements the number of messages in the mailbox.

81) Fix definition of "body" (concatenation has tighter binding than alternation).

82) Add a new "Special Notes to Implementors" section with reference to [IMAP-IMPLEMENTATION].

83) Clarify that an untagged CAPABILITY response to an AUTHENTICATE command should only be done if a security layer was not negotiated.

84) Change the definition of atom to exclude "]". Update astring to include "]" for compatibility with the past. Remove resp-text-atom.

85) Remove NEWNAME. It can't work because mailbox names can be literals and can include "]". Functionality can be addressed via referrals.

86) Move modified UTF-7 rationale in order to have more logical paragraph flow.

87) Clarify UID uniqueness guarantees with the use of MUST.

88) Note that clients should read response data until the connection is closed instead of immediately closing on a BYE.

89) Change RFC-822 references to RFC-2822.

90) Clarify that RFC-2822 should be followed instead of RFC-822.

91) Change recommendation of optional automatic capabilities in LOGIN and AUTHENTICATE to use the CAPABILITY response code in the tagged OK. This is more interoperable than an unsolicited untagged CAPABILITY response.

92) STARTTLS and AUTH=PLAIN are mandatory to implement; add recommendations for other [SASL] mechanisms.

93) Clarify that a "connection" (as opposed to "server" or "command") is in one of the four states.

94) Clarify that a failed or rejected command does not change state.

95) Split references between normative and informative.

96) Discuss authentication failure issues in security section.

97) Clarify that a data item is not necessarily of only one data type.

98) Clarify that sequence ranges are independent of order.

99) Change an example to clarify that superfluous shifts in Modified-UTF7 can not be fixed just by omitting the shift. The entire string must be recalculated.

100) Change Envelope Structure definition since [RFC-2822] uses "envelope" to refer to the [SMTP] envelope and not the envelope data that appears in the [RFC-2822] header.

101) Expand on RFC822.HEADER response data vs. BODY[HEADER].

102) Clarify Logout state semantics, change ASCII art.

103) Security changes to comply with IESG requirements.

104) Add definition for body URI.

105) Break sequence range definition into three rules, with rewritten descriptions for each.

106) Move STARTTLS and LOGINDISABLED here from [IMAP-TLS].

107) Add IANA Considerations section.

108) Clarify valid client assumptions for new message UIDs vs. UIDNEXT.

109) Clarify that changes to permanentflags affect concurrent sessions as well as subsequent sessions.

110) Clarify that authenticated state can be entered by the CLOSE command.

111) Emphasize that SELECT and EXAMINE are the exceptions to the rule that a failing command does not change state.

112) Clarify that newly-appended messages have the Recent flag set.

113) Clarify that newly-copied messages SHOULD have the Recent flag set.

114) Clarify that UID commands always return the UID in FETCH responses.

C. Key Word Index

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