[MS-XLOGIN]:
Simple Mail Transfer Protocol (SMTP) AUTH LOGIN Extension

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Revision Summary

Date	Revision History	Revision Class	Comments
04/04/2008	0.1		Initial Availability.
06/27/2008	1.0		Initial Release.
08/06/2008	1.01		Revised and edited technical content.
09/03/2008	1.02		Updated references.
12/03/2008	1.03		Updated IP notice.
04/10/2009	2.0		Updated applicable product releases.
07/15/2009	3.0	Major	Revised and edited for technical content.
11/04/2009	4.0.0	Major	Updated and revised the technical content.
02/10/2010	4.1.0	Minor	Updated the technical content.
05/05/2010	4.1.1	Editorial	Revised and edited the technical content.
08/04/2010	5.0	Major	Significantly changed the technical content.

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Contents

1 Introduction 5
1.1 Glossary 5
1.2 References 5
1.2.1 Normative References 5
1.2.2 Informative References 5
1.3 Overview 6
1.4 Relationship to Other Protocols 6
1.5 Prerequisites/Preconditions 6
1.6 Applicability Statement 6
1.7 Versioning and Capability Negotiation 6
1.8 Vendor-Extensible Fields 6
1.9 Standards Assignments 6

2 Messages 7
2.1 Transport 7
2.2 Message Syntax 7
2.2.1 EHLO Response 7
2.2.2 Command and Response ABNF Grammar 7

3 Protocol Details 8
3.1 Client Details 8
3.1.1 Abstract Data Model 8
3.1.2 Timers 10
3.1.3 Initialization 10
3.1.4 Higher-Layer Triggered Events 10
3.1.5 Message Processing Events and Sequencing Rules 10
3.1.5.1 Sending EHLO 10
3.1.5.2 Requesting Simple Login Authentication 10
3.1.5.3 Requesting Login Authentication with Username 11
3.1.6 Timer Events 11
3.1.7 Other Local Events 11
3.2 Server Details 11
3.2.1 Abstract Data Model 11
3.2.2 Timers 14
3.2.3 Initialization 14
3.2.4 Higher-Layer Triggered Events 14
3.2.5 Message Processing Events and Sequencing Rules 14
3.2.5.1 Processing EHLO 14
3.2.5.2 Processing AUTH LOGIN 14
3.2.5.3 Processing Username Response 14
3.2.5.4 Processing Password Response 14
3.2.6 Timer Events 15
3.2.7 Other Local Events 15

4 Protocol Example 16

5 Security 17
5.1 Security Considerations for Implementers 17
5.2 Index of Security Parameters 17

6 Appendix A: Product Behavior 18

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7 Change Tracking.....19

8 Index 23

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1 Introduction

This document specifies an authentication mechanism that is provided through the **SMTP** Service Extension for Authentication [RFC4954] called AUTH LOGIN.

1.1 Glossary

The following terms are defined in [MS-OXGLOS]:

Augmented Backus-Naur Form (ABNF)
base64 encoding
Secure Sockets Layer (SSL)
Simple Mail Transfer Protocol (SMTP)
Transport Layer Security (TLS)

The following terms are specific to this document:

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624, as an additional source.

[RFC2045] Freed, N., and Borenstein, N., "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", RFC 2045, November 1996, http://www.ietf.org/rfc/rfc2045.txt

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, http://www.ietf.org/rfc/rfc2119.txt

[RFC2821] Klensin, J., Ed., "Simple Mail Transfer Protocol", RFC 2821, April 2001, http://www.ietf.org/rfc/rfc2821.txt

[RFC4954] Siemborski, R., and Melnikov, A., Eds., "SMTP Service Extension for Authentication", RFC 4954, July 2007, ftp://ftp.rfc-editor.org/in-notes/rfc4954.txt

[RFC5234] Crocker, D., Ed., and Overell, P., "Augmented BNF for Syntax Specifications: ABNF", STD 68, RFC 5234, January 2008, http://www.ietf.org/rfc/rfc5234.txt

1.2.2 Informative References

[MS-OXGLOS] Microsoft Corporation, "Exchange Server Protocols Master Glossary", April 2008.

[RFC4346] Dierks, T., and Rescorla, E., "The Transport Layer Security (TLS) Protocol Version 1.1", RFC 4346, April 2006, http://www.ietf.org/rfc/rfc4346.txt

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1.3 Overview

Client applications that connect to the SMTP service can use a number of different authentication mechanisms. The SMTP Service Extension for Authentication [RFC4954] defines a service extension to SMTP as specified in [RFC2821], where a client specifies an authentication method to the server. AUTH LOGIN is one such authentication protocol for SMTP.

1.4 Relationship to Other Protocols

This specification defines an implementation of a protocol using [RFC4954].

1.5 Prerequisites/Preconditions

All prerequisites and preconditions are specified in [RFC2821] and [RFC4954].

1.6 Applicability Statement

This protocol extension does not change the way that [RFC4954] is used.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

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2 Messages

The following sections specify the AUTH LOGIN message syntax and how they are transported.

2.1 Transport

This protocol extension does not change the base transport specified by [RFC2821] or its extension specified by [RFC4954].

2.2 Message Syntax

2.2.1 EHLO Response

Server support for the AUTH LOGIN extension is identified in the AUTH EHLO keyword in the EHLO response, as specified in [RFC4954] section 3. In the following example, "C:" and "S:" indicate lines sent by the client and server respectively.

```
S: 220 SMTP.example.com
C: EHLO client.example.com
S: 250-smtp.example.com  Hello client.example.com
S: 250 AUTH LOGIN
```

The server response of AUTH LOGIN as part of the responses to EHLO indicates support for AUTH LOGIN.

2.2.2 Command and Response ABNF Grammar

This section uses **Augmented Backus-Naur Form (ABNF)** (as specified in [RFC5234]) to define the format of commands and responses used by this document. Note that the values of *username* and *password* are encoded using **base64 encoding** as specified in [RFC2045] before being transmitted.

```
CR                              = %x0D
LF                              = %x0A
SP                              = %x20

username                        = 1*CHAR                        ; Base64-encoded username
password                        = 1*CHAR                        ; Base64-encoded password

auth_login_command              = "AUTH LOGIN" CR LF
auth_login_command_user         = "AUTH LOGIN" SP username CR LF
auth_login_username_challenge   = "334 VXNlcm5hbWU6" CR LF
auth_login_username_response    = username CR LF
auth_login_password_challenge   = "334 UGFzc3dvcmQ6" CR LF
auth_login_password_response    = password CR LF
```


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3 Protocol Details

The following sections specify details of the AUTH LOGIN protocol extension, including abstract data models and message processing rules.

3.1 Client Details

3.1.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

The abstract data model shown below represents the sequence of messages relative to the client.

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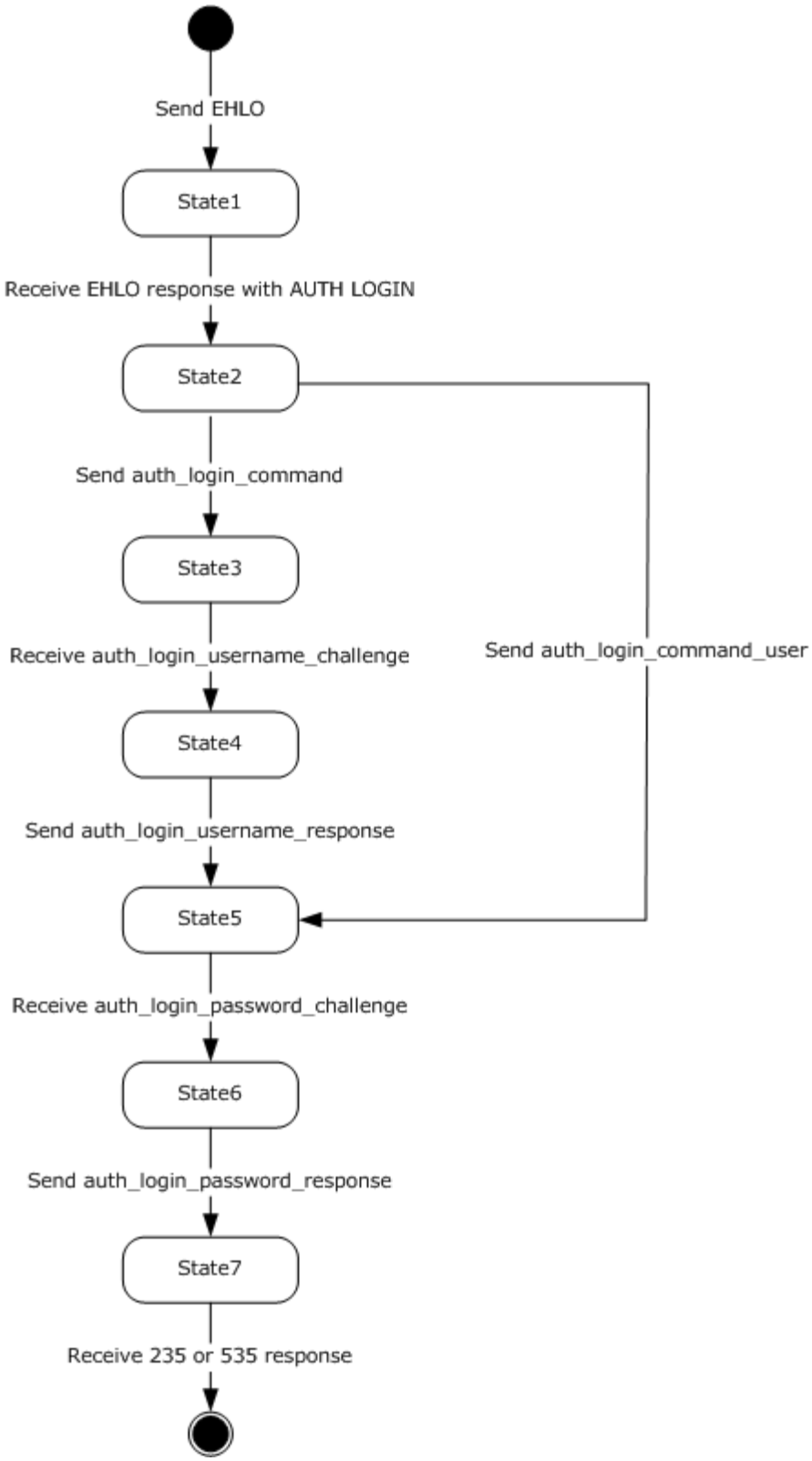

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Figure 1: Client abstract data model

3.1.2 Timers

None.

3.1.3 Initialization

None.

3.1.4 Higher-Layer Triggered Events

None.

3.1.5 Message Processing Events and Sequencing Rules

This protocol does not change message processing events or sequencing rules of messages specified in [RFC4954]. Clients SHOULD ignore any enhanced status codes returned by the server.

3.1.5.1 Sending EHLO

Before requesting authentication, the client SHOULD send an EHLO command and examine the response. If the response does not contain the AUTH LOGIN keyword specified in section 2.2.1, the client SHOULD NOT attempt to use LOGIN authentication.

3.1.5.2 Requesting Simple Login Authentication

To request LOGIN authentication, the client issues the AUTH command with the parameter LOGIN (*auth_login_command* as specified in section 2.2.2).

```
AUTH LOGIN<CR><LF>
```

If AUTH LOGIN is not supported, then the server responds with a 504 error message as specified in [RFC4954] section 4.

If AUTH LOGIN is supported on the server, then the server responds with *auth_login_username_challenge* (as specified in section 2.2.2).

```
334 VXNlcm5hbWU6<CR><LF>
```

The client then responds with *auth_login_username_response* (as specified in section 2.2.2) with the user name to be used for authentication, base64 encoded as specified in [RFC2045]. For example, if the client's user name is "Charlie", then the client responds with the following:

```
Q2hhcmxpZQ==<CR><LF>
```

The server then responds with *auth_login_password_challenge* (as specified in section 2.2.2).

```
334 UGFzc3dvcmQ6<CR><LF>
```


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The client then responds with *auth_login_password_response* (as specified in section 2.2.2) with the password to be used for authentication, base64 encoded. For example, if the client's password was "password", then the client would respond with the following:

```
cGFzc3dvcmQ=<CR><LF>
```

If the authentication is complete, then the server issues a 235 reply for success or a 535 reply for failure as specified in [RFC4954].

3.1.5.3 Requesting Login Authentication with Username

To request LOGIN authentication, the client issues the AUTH command with the parameter LOGIN and the user name to be used for authentication, base64 encoded as specified in [RFC2045]. For example, if the client's user name was "Charlie", then the client would initiate AUTH LOGIN as follows (*auth_login_command_user* as specified in section 2.2.2):

```
AUTH LOGIN Q2hhcmxpZQ==<CR><LF>
```

If AUTH LOGIN is not supported, then the server responds with a 504 error message as specified in [RFC4954] section 4.

If AUTH LOGIN is supported on the server, then the server responds with *auth_login_password_challenge* (as specified in section 2.2.2).

```
334 UGFzc3dvcmQ6<CR><LF>
```

The client then responds with *auth_login_password_response* (as specified in section 2.2.2) with the password to be used for authentication, base64 encoded. For example, if the client's password was "password", then the client would respond with the following:

```
cGFzc3dvcmQ=<CR><LF>
```

If the authentication is complete, then the server issues a 235 reply for success or a 535 reply for failure as specified in [RFC4954].

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

3.2 Server Details

3.2.1 Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations

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adhere to this model as long as their external behavior is consistent with that described in this document.

The abstract data model shown below represents the sequence of messages relative to the server.

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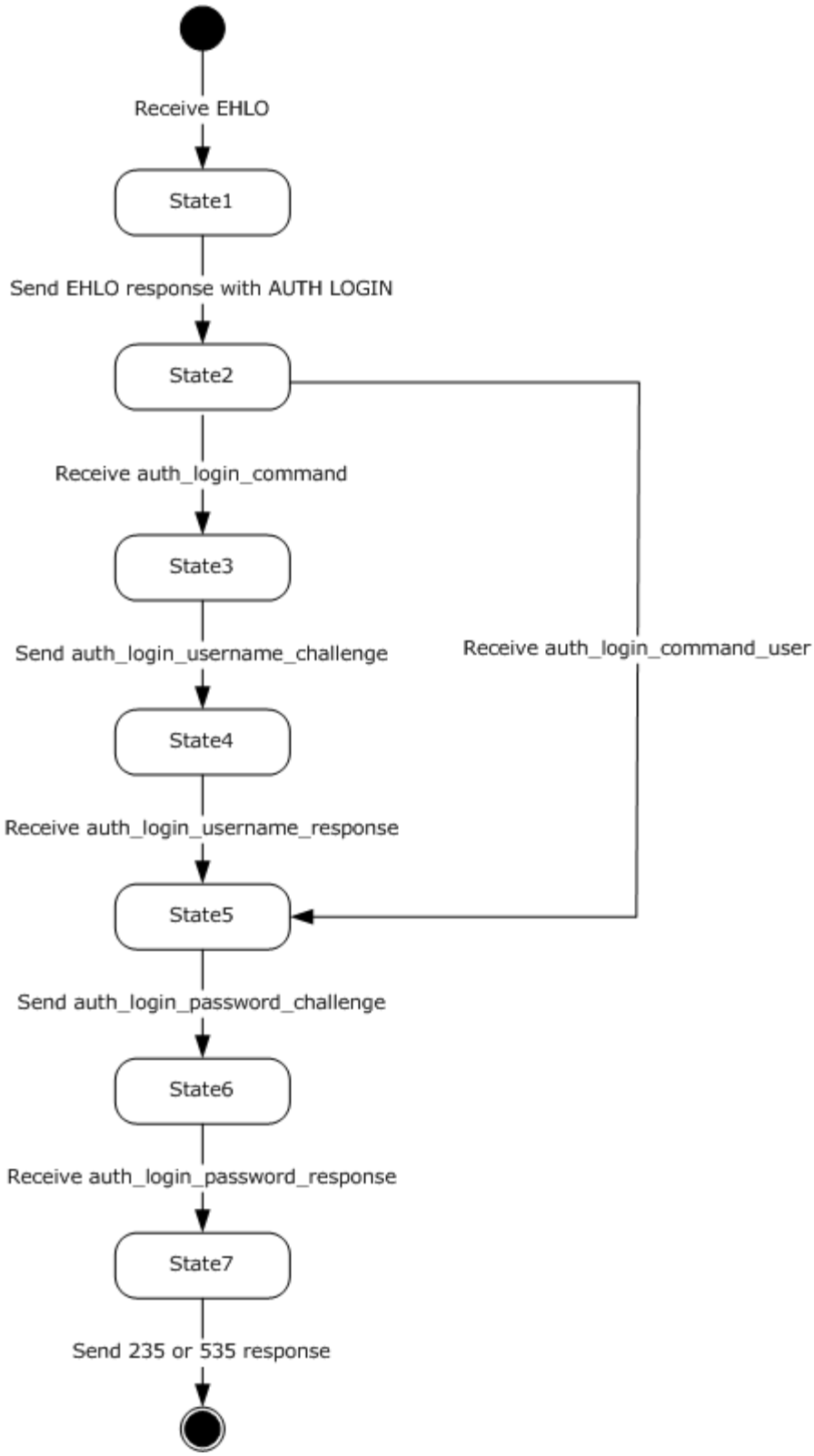

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Figure 2: Server abstract data model

3.2.2 Timers

None.

3.2.3 Initialization

None.

3.2.4 Higher-Layer Triggered Events

None.

3.2.5 Message Processing Events and Sequencing Rules

3.2.5.1 Processing EHLO

If the server supports AUTH LOGIN, it MUST include the AUTH keyword with the LOGIN parameter in its response to the EHLO command, as specified in section 2.2.1.

3.2.5.2 Processing AUTH LOGIN

If the server supports AUTH LOGIN, it MUST respond to the *auth_login_command* request with an *auth_login_username_challenge* response, and it MUST respond to the *auth_login_command_user* request with an *auth_login_password_challenge* response.

If the server does not support AUTH LOGIN, it SHOULD respond with a 504 error message as specified in [RFC4954] section 4.

3.2.5.3 Processing Username Response

In order to process an *auth_login_username_response* request, the server MUST have sent an *auth_login_username_challenge* response. If the server receives an *auth_login_username_response* request without having sent an *auth_login_username_challenge* response, the server SHOULD respond with a 500 error message.

If the server receives *auth_login_username_response* request after sending a *auth_login_username_challenge* response, the server SHOULD defer validating the username and SHOULD always send a *auth_login_password_challenge* response.

3.2.5.4 Processing Password Response

In order to process an *auth_login_password_response* request, the server MUST have sent an *auth_login_password_challenge* response. If the server receives an *auth_login_password_response* request without having sent an *auth_login_password_challenge* response, the server SHOULD respond with a 500 error message.

The server SHOULD check that the user indicated by the previous *auth_login_username_response* request is a valid user and that the password sent in the *auth_login_password_response* request is a valid password for that user. If the user and password are valid, then the server SHOULD respond with a 235 response. If the user or password are invalid, then the server SHOULD respond with a 535 response.

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3.2.6 Timer Events

None.

3.2.7 Other Local Events

None.

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4 Protocol Example

The following is an example of the use of the AUTH LOGIN protocol extension. The example demonstrates SMTP authentication using the AUTH LOGIN protocol.

```
S: 220 SMTP.example.com
C: EHLO client.example.com
S: 250-smtp.example.com  Hello client.example.com
S: 250 AUTH LOGIN
C: AUTH LOGIN
S: 334 VXNlcm5hbWU6
C: Q2hhcmxpZQ==
S: 334 UGFzc3dvcmQ6
C: cGFzc3dvcmQ=
S: 235 authentication successful
```

In this example, a client connects to an SMTP server. The initial response by the server ("220 SMTP.example.com") is the greeting by the server. The client responds with the EHLO command, which is required to activate the extended command set. The server responds with, among other things, an indication of support for AUTH LOGIN. The client then issues the AUTH LOGIN command. The server responds with the first base64-encoded challenge. The client responds with "Q2hhcmxpZQ==", which is the base64-encoded name "Charlie". The server then issues the second base64-encoded challenge, and the client responds with "cGFzc3dvcmQ=", which is the base64-encoded password "password". Successful authentication then results in a server response of "235".

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5 Security

5.1 Security Considerations for Implementers

This protocol offers no inherent security mechanisms to protect the user credentials during authentication. Because of this, it is extremely important to only use this protocol when also using a secure communication channel such as **Secure Sockets Layer (SSL)** or **Transport Layer Security (TLS)**. Even when using SSL or TLS, the authentication credentials are available to the SMTP server, where it is possible that they could be recorded for future use. The recommendation, therefore, is to not use this protocol except in circumstances where no other option is available.

In environments where the use of TLS or other external security is mandated, it is strongly recommended that the AUTH LOGIN advertisement be suppressed until a secure channel is negotiated. TLS in particular exhibits this behavior where the SMTP session is restarted after TLS is negotiated. For more information, see [RFC4346].

5.2 Index of Security Parameters

None.

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6 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products:

- Microsoft® Office Outlook® 2003
- Microsoft® Exchange Server 2003
- Microsoft® Office Outlook® 2007
- Microsoft® Exchange Server 2007
- Microsoft® Outlook® 2010
- Microsoft® Exchange Server 2010

Exceptions, if any, are noted below. If a service pack number appears with the product version, behavior changed in that service pack. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that product does not follow the prescription.

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7 Change Tracking

This section identifies changes that were made to the [MS-XLOGIN] protocol document between the May 2010 and August 2010 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements or functionality.
- An extensive rewrite, addition, or deletion of major portions of content.
- The removal of a document from the documentation set.
- Changes made for template compliance.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the language and formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical or language changes were introduced. The technical content of the document is identical to the last released version, but minor editorial and formatting changes, as well as updates to the header and footer information, and to the revision summary, may have been made.

Major and minor changes can be described further using the following change types:

- New content added.
- Content updated.
- Content removed.
- New product behavior note added.
- Product behavior note updated.
- Product behavior note removed.
- New protocol syntax added.
- Protocol syntax updated.
- Protocol syntax removed.
- New content added due to protocol revision.
- Content updated due to protocol revision.
- Content removed due to protocol revision.
- New protocol syntax added due to protocol revision.

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- Protocol syntax updated due to protocol revision.
- Protocol syntax removed due to protocol revision.
- New content added for template compliance.
- Content updated for template compliance.
- Content removed for template compliance.
- Obsolete document removed.

Editorial changes are always classified with the change type "Editorially updated."

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.
- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact protocol@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
1.1 Glossary	56243 Added "base64 encoding" to the list of terms defined in [MS-OXGLOS].	N	New content added.
1.1 Glossary	55217 Added " Augmented Backus-Naur Form (ABNF)" to the list of terms defined in [MS-OXGLOS].	N	New content added.
1.2.1 Normative References	55751 Moved [MS-OXGLOS] from Normative References section to Informative References section.	N	Content update.
1.2.1 Normative References	56243 Removed [RFC4648] and added [RFC2045].	N	New content added.
1.2.1 Normative References	57623 Removed [X509] from list of references.	N	Content update.
1.2.2 Informative References	55921 Changed reference name from "[SSL]" to "[SSL3]".	N	Content update.
1.2.2 Informative References	57623 Removed [SSL3] from list of references.	N	Content update.
2.1 Transport	55237 Added reference to [RFC2821] for base	N	Content update.

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
	transport.		
2.2.1 EHLO Response	55236 Revised content to clarify reference to [RFC4954].	N	Content update.
2.2.2 Command and Response ABNF Grammar	55217 Renamed section and replaced content with complete ABNF grammar for commands and responses.	Y	Content update.
3.1 Client Details	55217 Renamed topic.	N	Editorially updated.
3.1.1 Abstract Data Model	55235 Clarified description of image to specify that it is describing the client's actions.	N	Content update.
3.1.1 Abstract Data Model	55217 Revised state diagram to include EHLO command.	N	Content update.
3.1.1 Abstract Data Model	56842 Revised content.	N	Content update.
3.1.5 Message Processing Events and Sequencing Rules	55662 Added guidance for clients to ignore enhanced status codes.	N	Content update.
3.1.5.1 Sending EHLO	55217 Created new topic for client guidance on sending EHLO command.	Y	New content added.
3.1.5.2 Requesting Simple Login Authentication	55217 Created new topic for client guidance on requesting Simple Login Authentication.	Y	New content added.
3.1.5.3 Requesting Login Authentication with Username	55217 Created new topic for client guidance on requesting Login Authentication with Username.	Y	New content added.
3.2 Server Details	55217 Added new section for server details.	Y	New content added.
3.2.1 Abstract Data Model	55217 Added new topic for server abstract data model.	Y	New content added.
3.2.2 Timers	55217 Added new topic for server timers.	Y	New content added.
3.2.3 Initialization	55217 Added new topic for server initialization.	Y	New content added.

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Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
3.2.4 Higher-Layer Triggered Events	55217 Added new topic for server higher-layer triggered events.	Y	New content added.
3.2.5 Message Processing Events and Sequencing Rules	55217 Added new topic for server message processing events and sequencing rules.	Y	New content added.
3.2.5.1 Processing EHLO	55217 Added new topic for server guidance on processing EHLO.	Y	New content added.
3.2.5.2 Processing AUTH LOGIN	55217 Added new topic for server guidance on processing AUTH LOGIN.	Y	New content added.
3.2.5.3 Processing Username Response	55217 Added new topic for server guidance on processing username response.	Y	New content added.
3.2.5.4 Processing Password Response	55217 Added new topic for server guidance on processing password response.	Y	New content added.
3.2.6 Timer Events	55217 Added new topic for server timer events.	Y	New content added.
3.2.7 Other Local Events	55217 Added new topic for server other local events.	Y	New content added.
7 Change Tracking	55217 Removed sections 2.2.3, 2.2.3.1, and 2.2.3.2.	N	Content removed.

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8 Index

A

Applicability 6

C

Change tracking 19

E

Examples
  overview 16

G

Glossary 5

I

Implementer - security considerations 17
Informative references 5
Introduction 5

M

Messages
  overview 7
  transport 7

N

Normative references 5

O

Overview (synopsis) 6

P

Preconditions 6
Prerequisites 6
Product behavior 18

R

References
  informative 5
  normative 5
Relationship to other protocols 6

S

Security
  overview 17
Security - implementer considerations 17
Tracking changes 19
Transport 7

T

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