[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.
11/03/2010	5.0	No change	No changes to the meaning, language, or formatting of the technical content.
03/18/2011	5.0	No change	No changes to the meaning, language, or formatting of the technical content.
08/05/2011	5.1	Minor	Clarified the meaning of the technical content.
10/07/2011	5.1	No change	No changes to the meaning, language, or formatting of the technical content.
01/20/2012	6.0	Major	Significantly changed the technical content.

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1 Introduction

The Simple Mail Transfer Protocol (SMTP) AUTH LOGIN Extension is an authentication mechanism that provides an easily implemented method for clients to authenticate to **SMTP** servers over a standard SMTP connection. This extension uses the SMTP Service Extension for Authentication, as described in [RFC4954], to extend SMTP.

Sections 1.8, 2, and 3 of this specification are normative and contain RFC 2119 language. Sections 1.5 and 1.9 are also normative but cannot contain RFC 2119 language. All other sections and examples in this specification are informative.

1.1 Glossary

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

Augmented Backus-Naur Form (ABNF)
NT LAN Manager (NTLM) Authentication Protocol
Secure Sockets Layer (SSL)

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

base64 encoding
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

References to Microsoft Open Specification documents do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

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://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.rfc-editor.org/rfc/rfc2119.txt

[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

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

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

[RFC5321] Klensin, J., "Simple Mail Transfer Protocol", RFC 5321, October 2008, http://www.rfc-editor.org/rfc/rfc5321.txt

1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "Windows Protocols Master Glossary".

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

1.3 Overview

Client applications use SMTP to transfer mail to a server for submission. Client applications that connect to an SMTP server can use a number of different authentication mechanisms. In some scenarios, clients can use existing authentication mechanisms to authenticate with the SMTP server, such as the **NT LAN Manager (NTLM) Authentication Protocol**. However, in other scenarios, existing authentication mechanisms are unavailable or clients may not implement them. This extension provides an authentication mechanism for SMTP clients that is simple to implement.

The SMTP Service Extension for Authentication, as described in [RFC4954], defines a service extension to SMTP, as described in [RFC5321], where a client specifies an authentication method to the server and performs an authentication protocol exchange. This extension is one such authentication method for SMTP. It allows clients to authenticate to SMTP servers over a standard SMTP connection by passing authentication information in SMTP commands and responses.

1.4 Relationship to Other Protocols

This extension uses the methods provided by the SMTP Service for Authentication, as described in [RFC4954], to extend SMTP, as described in [RFC5321], by providing a new authentication method. This extension relies on SMTP to provide the transport for the authentication commands and responses.

1.5 Prerequisites/Preconditions

This extension conforms to all of the prerequisites and preconditions of SMTP, as described in [RFC5321], and the extension to SMTP provided by the SMTP Service for Authentication, as described in [RFC4954].

1.6 Applicability Statement

This extension is used by clients to support authentication to SMTP servers that implement the AUTH LOGIN extension. This extension is used by SMTP servers to provide an authentication method to control access to the SMTP service.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

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1.9 Standards Assignments

None.

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2 Messages

2.1 Transport

This extension does not change the base transport specified by [RFC5321], or its extension specified by [RFC4954].

2.2 Message Syntax

2.2.1 EHLO Response

Server support for the AUTH LOGIN extension is identified by 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 extension. 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

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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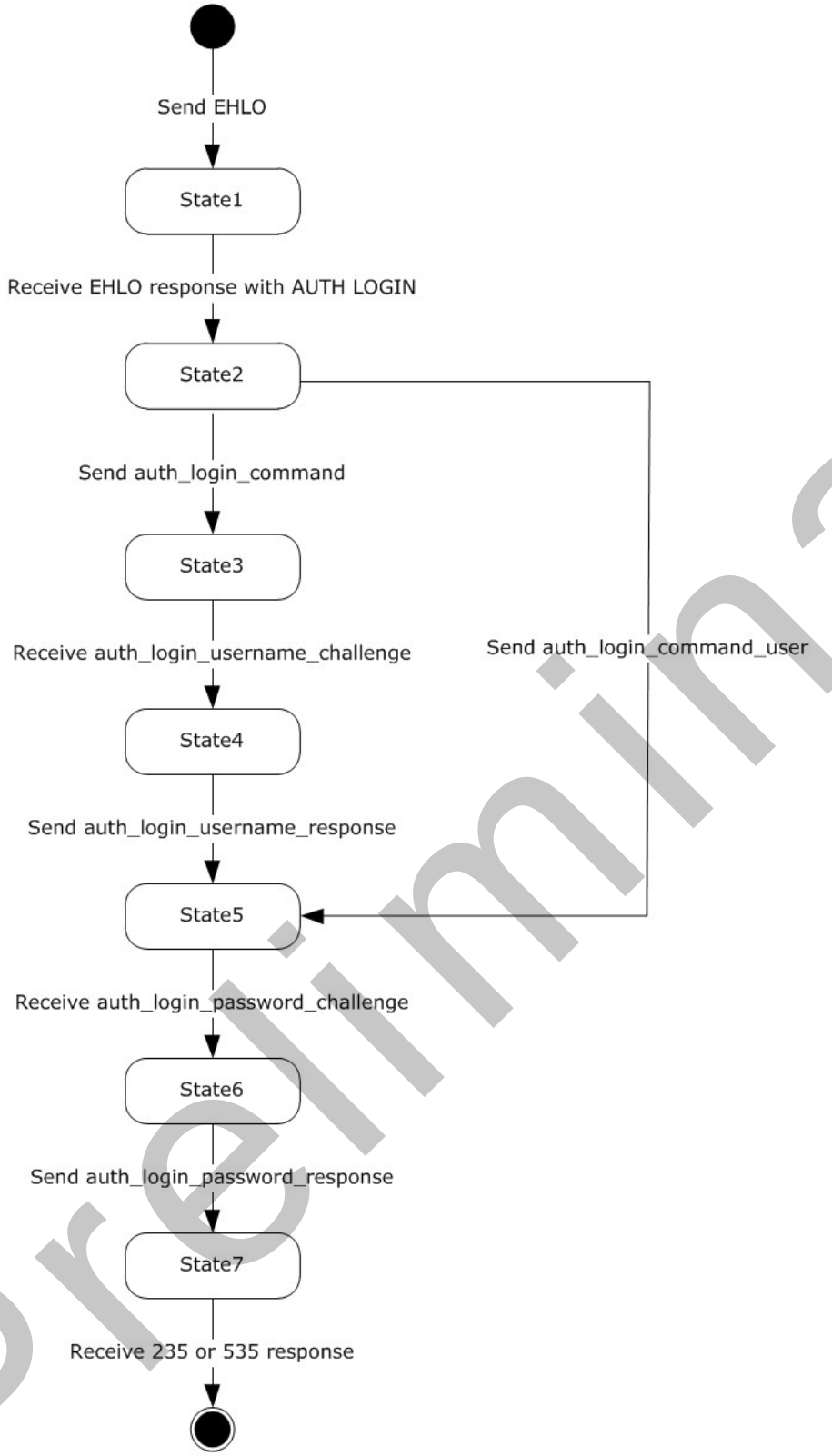

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Figure 1: Client abstract data model

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 extension does not change the 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, the server responds with a 504 error message as specified in [RFC4954] section 4.

If AUTH LOGIN is supported on the server, 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, encoded with base64 encoding, as specified in [RFC2045]. For example, if the client's user name is "Charlie", 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, encoded with base64 encoding. For example, if the client's password is "password", the client responds with the following:

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

If the authentication is complete, 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, encoded with base64 encoding, as specified in [RFC2045]. For example, if the client's user name is "Charlie", the client initiates 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, the server responds with a 504 error message as specified in [RFC4954] section 4.

If AUTH LOGIN is supported on the server, 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, encoded with base64 encoding. For example, if the client's password is "password", the client responds with the following:

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

If the authentication is complete, 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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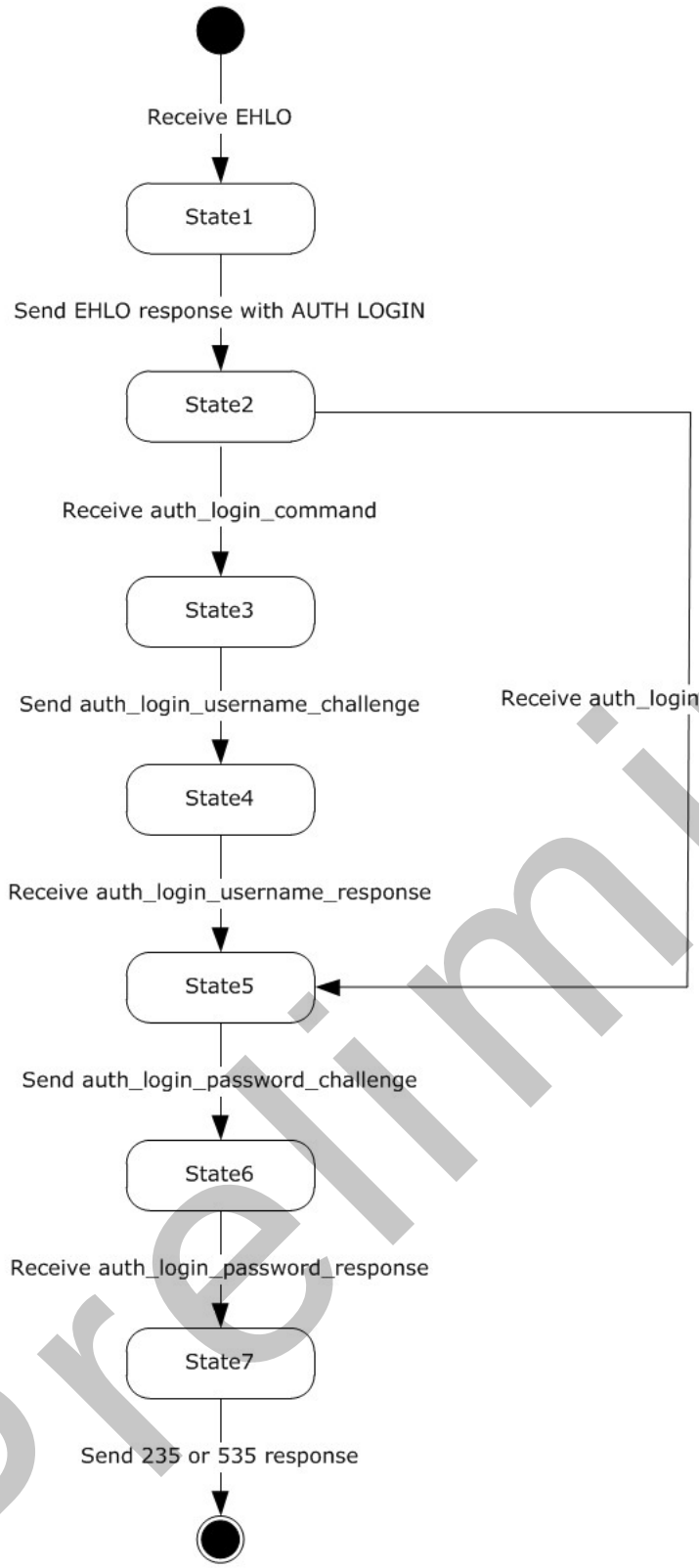

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Figure 2: Server abstract data model

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 an *auth_login_username_response* request after sending an *auth_login_username_challenge* response, the server SHOULD defer validating the username and SHOULD send an *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, the server SHOULD respond with a 235 response. If the user or password are invalid, 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 extension. The example demonstrates SMTP authentication using the AUTH LOGIN extension.

```
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 challenge, encoded with base64 encoding. The client responds with "Q2hhcmxpZQ==", which is the name "Charlie", encoded with base64 encoding. The server then issues the second challenge, encoded with base64 encoding, and the client responds with "cGFzc3dvcmQ=", which is the password "password", encoded with base64 encoding. Successful authentication then results in a server response of "235".

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5 Security

5.1 Security Considerations for Implementers

This extension offers no inherent security mechanisms to protect user credentials during authentication. Because of this, it is extremely important to only use this extension when also using a secure communication channel such as **Secure Sockets Layer (SSL)** or **Transport Layer Security (TLS)**. However, 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 only use this extension when 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 about TLS, 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 or supplemental software. References to product versions include released service packs:

- Microsoft® Exchange Server 2003
- Microsoft® Exchange Server 2007
- Microsoft® Exchange Server 2010
- Microsoft® Exchange Server 15 Technical Preview
- Microsoft® Office Outlook® 2003
- Microsoft® Office Outlook® 2007
- Microsoft® Outlook® 2010
- Microsoft® Outlook® 15 Technical Preview

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. 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 that is 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 the 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 October 2011 and January 2012 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
6 Appendix A: Product Behavior	Added Exchange 15 Technical Preview and Outlook 15 Technical Preview to the list of applicable product versions.	Y	Content updated.

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