[MS-OCEXUM]:
Call Control for Exchange Unified Messaging Protocol Extensions

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Revision Summary

Date	Revision History	Revision Class	Comments
04/04/2008	0.1		Initial version
04/25/2008	0.2		Revised and edited technical content
06/27/2008	1.0		Revised and edited technical content
08/15/2008	1.01		Revised and edited technical content
12/12/2008	2.0		Revised and edited technical content
02/13/2009	2.01		Revised and edited technical content
03/13/2009	2.02		Revised and edited technical content
07/13/2009	2.03	Major	Revised and edited the technical content
08/28/2009	2.04	Editorial	Revised and edited the technical content
11/06/2009	2.05	Editorial	Revised and edited the technical content
02/19/2010	2.06	Editorial	Revised and edited the technical content
03/31/2010	2.07	Major	Updated and revised the technical content
04/30/2010	2.08	Editorial	Revised and edited the technical content
06/07/2010	2.09	Editorial	Revised and edited the technical content
06/29/2010	2.10	Editorial	Changed language and formatting in the technical content.
07/23/2010	2.10	No change	No changes to the meaning, language, or formatting of the technical content.
09/27/2010	3.0	Major	Significantly changed the technical content.
11/15/2010	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
12/17/2010	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
03/18/2011	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
06/10/2011	3.0	No change	No changes to the meaning, language, or formatting of the technical content.
01/20/2012	4.0	Major	Significantly changed the technical content.
04/11/2012	4.0	No change	No changes to the meaning, language, or formatting of the technical content.

Date	Revision History	Revision Class	Comments
07/16/2012	4.0	No change	No changes to the meaning, language, or formatting of the technical content.
10/08/2012	4.0.1	Editorial	Changed language and formatting in the technical content.

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1 Introduction

The Call Control for Exchange Unified Messaging Protocol Extensions, which consist of proprietary extensions to the Session Initiation Protocol (SIP), is used to play voice messages and to manage the unified messaging mailbox using voice commands. **SIP** is used to establish, modify, and terminate multimedia sessions or calls. These protocol extensions are used to integrate with other telephony networks or systems, such as a private branch exchange (PBX).

Sections 1.8, 2, and 3 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. Sections 1.5 and 1.9 are also normative but cannot contain those terms. 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)
authentication
server
Transmission Control Protocol (TCP)

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

automaton
endpoint
INVITE
Session Initiation Protocol (SIP)
SIP message
Transport Layer Security (TLS)
Uniform Resource Identifier (URI)
user agent client (UAC)

The following terms are specific to this document:

Exchange Web Service (EWS): A service that is provided by Microsoft® Exchange Server and that enables clients to access mailbox content.

personal identification number (PIN): A number that is used by Exchange Unified Messaging to authenticate a user.

subscriber access: The ability of a user to gain access to features of a Unified Messaging server, such as using a phone to listen to telephony voice messages or email messages.

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 Specifications documentation do not include a publishing year because links are to the latest version of the technical 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.

[MS-EUMR] Microsoft Corporation, "Routing to Exchange Unified Messaging Extensions".

[MS-OXWUMS] Microsoft Corporation, "Voice Mail Settings Web Service Protocol Specification".

[MS-SIPRE] Microsoft Corporation, "Session Initiation Protocol (SIP) Routing Extensions".

[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

[RFC3261] Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M., and Schooler, E., "SIP: Session Initiation Protocol", RFC 3261, June 2002, http://www.ietf.org/rfc/rfc3261.txt

1.2.2 Informative References

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

[MS-OFCGLOS] Microsoft Corporation, "Microsoft Office Master Glossary".

[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

1.3 Overview

The unified messaging **server (2)** provides a Session Initiation Protocol (SIP) interface toward a server (2) or gateways. By default, the unified messaging server (2) requires a **personal identification number (PIN)** to be entered to access the voice mail in a user's inbox. This protocol allows previously authenticated protocol clients to bypass the PIN requirement, thus streamlining the connection with the unified messaging server (2).

This protocol is used to support calls between a protocol client and the unified messaging server (2) supported by this protocol.

There are two types of calls between a protocol client and the unified messaging server (2):

- **Call-in:** Using the protocol client user interface (UI), a user calls into the unified messaging server (2) to access the voice mail system. This is also known as **subscriber access**.
- **Dial Out (Play-On-Phone):** Upon receiving an appropriate event, the unified messaging server (2) sends a SIP **INVITE** to the client for the purpose of playing back the recorded voice message on a protocol server (2) **endpoint (5)** identified by a phone number.

This protocol can be used in Play-On-Phone scenarios to prevent a protocol server from rerouting the message back to voice mail back and call forwarding when the Play-On-Phone call is not answered by the user.

This protocol also adds the ability to specify the subject of a voice message, the importance of a call, and an indication that the endpoint (5) is not a user but an **automaton** functioning on behalf of the user.

Please refer to [MS-EUMR] for details on how the Lync Server routes the call from client to the unified messaging server.

1.4 Relationship to Other Protocols

This protocol depends on Session Initiation Protocol (SIP).

This protocol depends on all the protocols on which SIP depends.

1.5 Prerequisites/Preconditions

None.

1.6 Applicability Statement

This protocol is designed to be used to support calls between a protocol client and the unified messaging server (2) supported by this protocol.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

Messages MUST be transported over **Transmission Control Protocol (TCP)** or **Transport Layer Security (TLS)**.

2.2 Message Syntax

Messages are formatted as **SIP messages**, as specified in [RFC3261] section 7, with the custom headers and parameters described in this document.

2.2.1 Ms-Exchange-Command

The **Ms-Exchange-Command** custom Session Initiation Protocol (SIP) header is added to the INVITE method in calls originating from a protocol client. This header is used to indicate an action to be performed by the unified messaging server (2).

The syntax of this header, in the **Augmented Backus-Naur Form (ABNF)** notation, as defined in [RFC5234], is as follows:

```
Ms-Exchange-Command header = "Ms-Exchange-Command" HCOLON param
param = "skip-pin"
```

The only supported action is specified by the valueless parameter, **skip-pin**, which indicates to the unified messaging server (2) not to prompt the user for a personal identification number (PIN). Before this parameter can be set, the protocol client MUST be authenticated by the SIP server (2), and the additional level of **authentication (2)** in the form of a PIN is not needed for the INVITE transaction.

The syntax of the **Ms-Exchange-Command** header with the **skip-pin** parameter is illustrated as follows:

```
INVITE ... SIP/2.0
From: ...
To: ...
Ms-Exchange-Command: skip-pin
```

2.2.2 Ms-Sensitivity

The **Ms-Sensitivity** custom Session Initiation Protocol (SIP) header, as specified in [MS-SIPRE], is used to instruct a protocol server (2) not to reroute the call back to the voice mail server (2) and to prevent call forwarding. When the value of this header is set to "private-no-diversion", a protocol server (2) does not reroute the message back to voice mail when a Play-On-Phone call is not answered by the user.

The syntax of this header, in the Augmented Backus-Naur Form (ABNF) notation, as defined in [RFC5234], is as follows:

```
Ms-Sensitivity header = "Ms-Sensitivity"  HCOLON privacy
privacy="private-no-diversion"
```

The syntax of the **Ms-Sensitivity** header is illustrated as follows:

```
INVITE ... SIP/2.0
From: ...
To: ...
Ms-Sensitivity: private-no-diversion
```

3 Protocol Details

3.1 Ms-Exchange-Command Details

The **Ms-Exchange-Command** header with the **skip-pin** parameter is used when the protocol client uses subscriber access to the voice mail system, and to provide a better user experience, requires the voice mail server (2) to skip the personal identification number (PIN) prompt. When the voice mail server (2) receives this command, it MUST skip the PIN prompt, provided that the INVITE is received over a trusted transport, such as a Transport Layer Security (TLS) transport, to the voice mail server (2). The assumption here is that the voice mail system trusts the authentication (2) mechanism for requests that are received by it over the trusted transport.

Protocol Client Behavior

A **user agent client (UAC)** accessing the subscriber access feature of the voice mail system over a trusted transport SHOULD provide a **Ms-Exchange-Command** header with the **skip-pin** parameter to provide a better user experience.

Unified Messaging Server Behavior

If a voice mail server receives a SIP INVITE over a trusted transport with a **Ms-Exchange-Command** header containing the **skip-pin** parameter, it MUST skip personal identification number (PIN) prompt.

3.1.1 Abstract Data Model

None.

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

None.

3.1.6 Timer Events

None.

3.1.7 Other Local Events

None.

3.2 Ms-Sensitivity Details

The **Ms-Sensitivity** header, as specified in [MS-SIPRE], SHOULD be used in Dial Out (Play-On-Phone), scenarios when the user requests a voice mail message to be played on the phone from an application. In such a scenario, the unified messaging server (2) sends an INVITE to the user and uses this header to indicate to the protocol server (2) that the call MUST NOT be rerouted back to voice mail and call forwarding when the Play-On-Phone call is not answered by the user. In this case, unanswered call forwarding or immediate call forwarding MUST NOT be applied. The unified messaging server (2) sends such an INVITE through the **Exchange Web Service (EWS)**, as specified in [MS-OXWUMS]. The trigger point for this is an event sent by EWS.<1>

The unified messaging server (2) supported by this protocol uses the **Ms-Sensitivity** header with the **private-no-diversion** parameter, as specified in section 2.2.2.

Use of other parameters, as specified in [MS-SIPRE], is out of the scope of this extension.

Note that in Play-On-Phone INVITEs that originate from the unified messaging server (2), the **URIs** in the **From** header and the **To** header MUST match. This is because the protocol clients have special logic that checks for this condition and allows the protocol client to ring for Play-On-Phone calls, even if the user has manually set himself or herself to the "Appear Offline" presence state.

Unified Messaging Server Behavior

A unified messaging server SHOULD send a **Ms-Sensitivity** header with the **private-no-diversion** parameter in Dial Out or Play-On-Phone scenarios.

Protocol Server Behavior

If a SIP INVITE contains a **Ms-Sensitivity** header with the **private-no-diversion** parameter, unanswered call forwarding or immediate call forwarding MUST NOT be applied.

3.2.1 Abstract Data Model

None.

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

None.

3.2.6 Timer Events

None.

3.2.7 Other Local Events

None.

4 Protocol Examples

4.1 Ms-Exchange-Command

The **Ms-Exchange-Command** header can be used to skip pin verification for previously authenticated protocol clients.

The following figure shows the flow of the Session Initiation Protocol (SIP) INVITE transaction for subscriber access to voice mail.

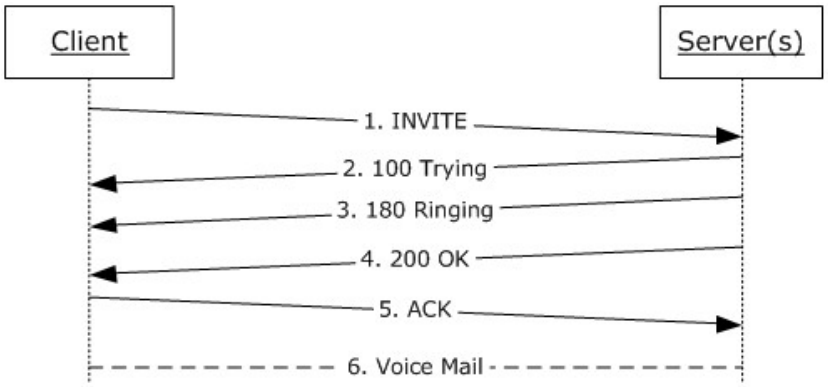

Figure 1: Subscriber access flow

The INVITE message carries the **Ms-Exchange-Command** header with the **skip-pin** parameter, as shown in the following example.

```
INVITE sip:alice@contoso.com;opaque=app:voicemail SIP/2.0
Via: SIP/2.0/TLS 10.56.65.37:33876
Max-Forwards: 70
From: <sip:alice@contoso.com>;tag=01742a55e6;epid=6b5d10e663
To: <sip:alice@contoso.com;opaque=app:voicemail>
Call-ID: f7c2efff9240413cb6e5125fdca4b63a
CSeq: 1 INVITE
Contact: <sip:alice@contoso.com;opaque=user:epid:ihclvAI6-FmKSGLKr_2rtAAA;gruu>
Ms-Exchange-Command: skip-pin
… SDP SNIPPED …
```

4.2 Ms-Sensitivity

The following figure shows the flow for the **Ms-Sensitivity** header that is added by the unified messaging server (2) when dialing out to the protocol client.

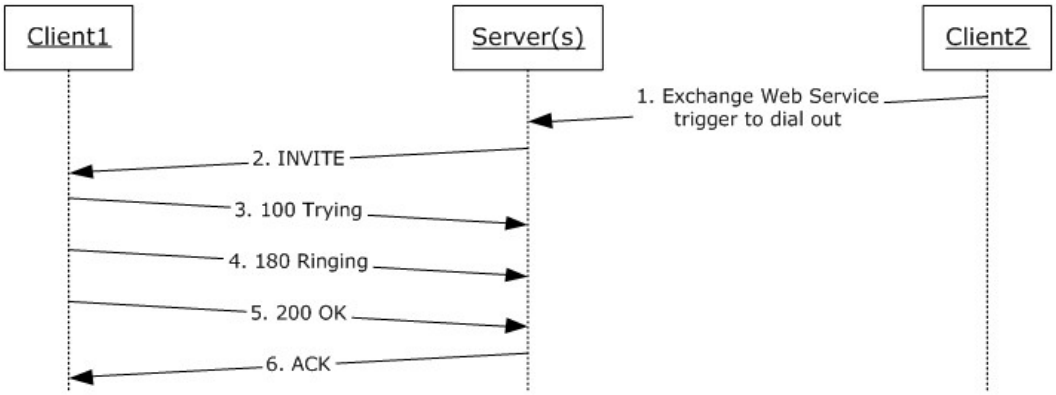

Figure 2: Play-On-Phone dial out

The INVITE message in step 2 of the preceding figure is shown in the following example.

```
INVITE sip:172.19.58.98:2280;transport=tls;ms-opaque=ce5f21cc9d;ms-received-cid=D0A300
SIP/2.0
Max-Forwards: 68
Content-Length: 317
From: <sip:alice@contoso.com>;epid=1944B98832;tag=7534fa434
To: <sip:alice@contoso.com>;epid=d793aff63a
CSeq: 5 INVITE
Call-ID: 7a7378c9-7b3c-4cec-b6da-ec27d752e904
Contact: <sip: exchange.contoso.com:5066;transport=Tls;ms-opaque=a752506cbee22182>;automata
User-Agent: RTCC/3.0.0.0
Content-Type: application/sdp
Allow: UPDATE
Ms-Sensitivity: private-no-diversion
Allow: Ack, Cancel, Bye,Invite,Message,Info,Service,Options,BeNotify
…SDP SNIPPED…
```

5 Security

5.1 Security Considerations for Implementers

None.

5.2 Index of Security Parameters

None.

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 2007 Service Pack 1 (SP1)
- Microsoft® Exchange Server 2010
- Microsoft® Lync® 2013
- Microsoft® Lync® Server 2013
- Microsoft® Lync® 2010
- Microsoft® Lync® Server 2010
- Microsoft® Office Communications Server 2007
- Microsoft® Office Communications Server 2007 R2
- Microsoft® Office Communicator 2007
- Microsoft® Office Communicator 2007 R2
- Microsoft® Exchange Server 2013

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.

<1> Section 3.2: Office Outlook 2007, Office Outlook 2007 SP1, Outlook 2010 supports Play-On-Phone as an option. Any of these clients can be used to raise the event.

7 Change Tracking

This section identifies changes that were made to the [MS-OCEXUM] protocol document between the July 2012 and October 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.

- 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
1.3 Overview	Changed the name from 'Protocol Overview (Synopsis)' to 'Overview'.	N	Content updated for template compliance.

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