

# [MS-CVWREST]:

## Unified Communications Call Via Work Protocol

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## Revision Summary

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# 1 Introduction

The Unified Communications for Business Call Via Work REST Protocol defines how an application can create a PSTN phone call between a desktop or mobile phone and a remote party.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

## 1.1 Glossary

This document uses the following terms:

**byte order mark:** A Unicode character that is used to indicate that text is encoded in UTF-8, UTF-16, or UTF-32.

**Hypertext Transfer Protocol (HTTP):** An application-level protocol for distributed, collaborative, hypermedia information systems (text, graphic images, sound, video, and other multimedia files) on the World Wide Web.

**Hypertext Transfer Protocol Secure (HTTPS):** An extension of HTTP that securely encrypts and decrypts web page requests. In some older protocols, "Hypertext Transfer Protocol over Secure Sockets Layer" is still used (Secure Sockets Layer has been deprecated). For more information, see [\[SSL3\]](#) and [\[RFC5246\]](#).

**Representational State Transfer (REST):** A software architecture implementation for distributed hypermedia systems, such as the World Wide Web.

**Uniform Resource Identifier (URI):** A string that identifies a resource. The URI is an addressing mechanism defined in Internet Engineering Task Force (IETF) Uniform Resource Identifier (URI): Generic Syntax [\[RFC3986\]](#).

**Uniform Resource Locator (URL):** A string of characters in a standardized format that identifies a document or resource on the World Wide Web. The format is as specified in [\[RFC1738\]](#).

**UTC (Coordinated Universal Time):** A high-precision atomic time standard that approximately tracks Universal Time (UT). It is the basis for legal, civil time all over the Earth. Time zones around the world are expressed as positive and negative offsets from UTC. In this role, it is also referred to as Zulu time (Z) and Greenwich Mean Time (GMT). In these specifications, all references to UTC refer to the time at UTC-0 (or GMT).

**XML namespace:** A collection of names that is used to identify elements, types, and attributes in XML documents identified in a URI reference [\[RFC3986\]](#). A combination of XML namespace and local name allows XML documents to use elements, types, and attributes that have the same names but come from different sources. For more information, see [\[XMLNS-2ED\]](#).

**XML namespace prefix:** An abbreviated form of an **XML namespace**, as described in [\[XML\]](#).

**XML schema:** A description of a type of XML document that is typically expressed in terms of constraints on the structure and content of documents of that type, in addition to the basic syntax constraints that are imposed by XML itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

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

## 1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the [Errata](#).

### 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](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information.

[MS-OCDISCWS] Microsoft Corporation, "[Lync Autodiscover Web Service Protocol](#)".

[MS-OCSMP] Microsoft Corporation, "[Microsoft Online Conference Scheduling and Management Protocol](#)".

[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>

[RFC2616] Fielding, R., Gettys, J., Mogul, J., et al., "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999, <http://www.rfc-editor.org/rfc/rfc2616.txt>

[RFC2818] Rescorla, E., "HTTP Over TLS", RFC 2818, May 2000, <http://www.rfc-editor.org/rfc/rfc2818.txt>

[RFC3966] Schulzrinne, H., "The tel URI for Telephone Numbers", RFC 3966, December 2004, <http://www.rfc-editor.org/rfc/rfc3966.txt>

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

[XMLSCHEMA1/2] Thompson, H., Beech, D., Maloney, M., and Mendelsohn, N., Eds., "XML Schema Part 1: Structures Second Edition", W3C Recommendation, October 2004, <http://www.w3.org/TR/2004/REC-xmlschema-1-20041028/>

[XMLSCHEMA2/2] Biron, P., and Malhotra, A., Eds., "XML Schema Part 2: Datatypes Second Edition", W3C Recommendation, October 2004, <http://www.w3.org/TR/2004/REC-xmlschema-2-20041028/>

### 1.2.2 Informative References

[MS-ECREST] Microsoft Corporation, "[Unified Communications Event Channel Protocol](#)".

[MS-OCAUTHWS] Microsoft Corporation, "[OC Authentication Web Service Protocol](#)".

## 1.3 Overview

This protocol is used to create and manage phone audio in conversations.

A typical scenario for this protocol is to hear the audio of a conversation on a desktop phone instead of the computer speaker or headphones.

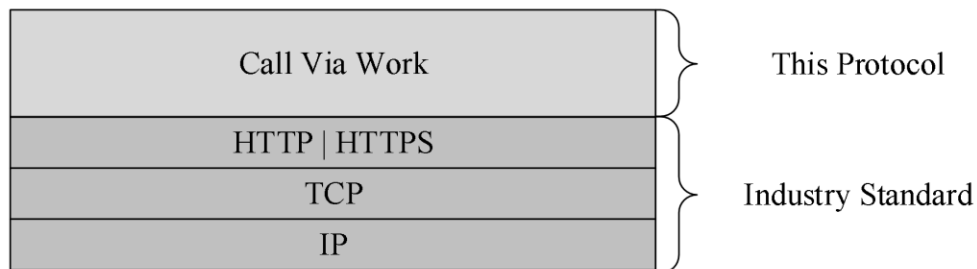
## 1.4 Relationship to Other Protocols

This protocol transmits request and response messages by using **HTTP**, as described in [\[RFC2616\]](#), or **Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)**, as described in [\[RFC2818\]](#).

Access to this protocol is discovered through the Lync Autodiscover Web Service. The discovery service protocol is described in the [\[MS-OCDISCWS\]](#) document.

This protocol is accessible only to authenticated users, either directly via a client application or indirectly via a trusted server application. The authentication service protocols are described in the [\[MS-OCAUTHWS\]](#) document.

The following diagram shows the underlying messaging and transport stack used by the protocol:



**Figure 1: This protocol in relation to other protocols**

### 1.5 Prerequisites/Preconditions

This protocol operates against a protocol server that is configured to listen for **HTTP** or **HTTPS** requests and a protocol client that knows the Request-URI of the protocol server.

In addition, the server needs to be configured with a mediation server deployed, and users with enterprise voice enabled.

### 1.6 Applicability Statement

This protocol is applicable for the following scenarios:

- Starting a new conversation with phone audio
- Stopping phone audio in a conversation.

### 1.7 Versioning and Capability Negotiation

This document covers versioning issues in the area of supported transports. This protocol can use **HTTP** or **HTTPS** as a transport. For more information, see section [2.1](#).

### 1.8 Vendor-Extensible Fields

None.

### 1.9 Standards Assignments

None.



## 2 Messages

### 2.1 Transport

This protocol is based on **Representational State Transfer (REST)** architecture principals. As such, messages are transported using **HTTP**, as specified in [\[RFC2616\]](#), or **HTTPS**, as specified in [\[RFC2818\]](#). The service SHOULD be served on ports 80 and 443 respectively, but MAY be served on other ports. For specific port information, please contact your service provider.

Protocol messages are text-based and MUST be UTF-8 encoded. Messages MUST NOT contain a **byte order mark**. The byte order mark is a Unicode character used to signal the byte order of a text file or stream.

### 2.2 Common Data Types

#### 2.2.1 Namespaces

This specification defines and references various **XML namespaces** using the mechanisms specified in [\[XMLNS\]](#). Although this specification associates a specific **XML namespace prefix** for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

Prefix	Namespace URI	Reference
xs	<a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a>	<a href="#">[XMLSCHEMA1/2]</a> <a href="#">[XMLSCHEMA2/2]</a>

#### 2.2.2 Custom HTTP Headers

The following headers are defined in this specification:

Header	Description
X-MS-RequiresMinResourceVersion	Specifies the minimum required version of a resource.

#### 2.2.3 Complex Types

The following table summarizes the set of common **XML schema** complex type definitions defined or referenced by this specification. XML schema complex type definitions that are specific to a particular operation are described with the operation.

Complex Type	Description
CollectionType	Represents a collection type. Described in <a href="#">[MS-OCSMP]</a> section <a href="#">2.2.4.1</a> .
InputType	Represents the type that captures the format of input data supplied in HTTP POST requests, as specified in <a href="#">[RFC2616]</a> . Described in <a href="#">[MS-OCSMP]</a> section <a href="#">2.2.4.2</a> .

Complex Type	Description
ErrorType	Represents the type that captures the format of body in HTTP error responses, as specified in [RFC2616]. Described [MS-OCSMP] section <a href="#">2.2.4.4</a> .
LinkType	Represents the type that captures a reference to another resource. Described in [MS-OCSMP] section <a href="#">2.2.4.5</a> .
PropertyType	Represents the type that captures a property name and value. Described in [MS-OCSMP] section <a href="#">2.2.4.6</a> .
ResourceType	Represents the type that captures the format of a resource. Described in [MS-OCSMP] section <a href="#">2.2.4.7</a> .

## 2.2.4 Simple Types

The following table summarizes the set of common **XML schema** simple type definitions defined by this specification. XML schema simple type definitions that are specific to a particular operation are described with the operation.

Simple Type	Description
AudienceMessaging	An enumeration indicating the enabled state of the audience messaging feature.
AudienceMuteLock	An enumeration indicating the enabled state of the audience mute lock.
CallState	An enumeration representing the call states.
ConversationModality	An enumeration representing the conversation modalities.
ConversationState	An enumeration representing conversation states.
Direction	An enumeration representing invitation directions.
Importance	An enumeration representing conversation importance.
InvitationState	An enumeration representing invitation states.
MessageFormat	An enumeration representing the supported message formats.
ModalityType	An enumeration representing the modality types.
Role	An enumeration representing the participants' role in a conversation.
SourceNetwork	An enumeration representing where a participant is joined to the conversation from.
GenericPolicy	An enumeration representing whether an option is enabled.

### 2.2.4.1 AudienceMessaging

The following table summarizes the values of the **AudienceMessaging** enumeration.

Value	Description
Unknown	The property is not set or is unknown.

Value	Description
Enabled	Messaging is enabled for all members of the conversation.
Disabled	Messaging is disabled for all members of the conversation.

#### 2.2.4.2 AudienceMuteLock

The following table summarizes the values of the **AudienceMuteLock** enumeration.

Value	Description
Unknown	The property is not set or is unknown.
Enabled	Mute lock is enabled.
Disabled	Mute lock is disabled.

#### 2.2.4.3 CallState

The following table summarizes the values of the **CallState** enumeration.

Value	Description
Disconnected	The call is disconnected.
Connecting	The call is connecting.
Connected	The call is connected.
Transferring	The call is transferring.
Disconnecting	The call is disconnecting.

#### 2.2.4.4 ConversationModality

The following table summarizes the values of the **ConversationModality** enumeration.

Value	Description
Audio	The conversation modality is audio.
Video	The conversation modality is video.
ApplicationSharing	The conversation modality is application sharing.
Messaging	The conversation modality is messaging.
DataCollaboration	The conversation modality is data collaboration.

#### 2.2.4.5 ConversationState

The following table summarizes the values of the **ConversationState** enumeration.

Value	Description
Disconnected	The conversation is disconnected.
Incoming	The conversation is incoming.
Connecting	The conversation is connecting.
Connected	The conversation is connected.
InLobby	The conversation is in the conference lobby.
Conferencing	The conversation is connecting to a conference.
Conferenced	The conversation is in a conference.
Disconnecting	The conversation is disconnecting.

#### 2.2.4.6 Direction

The following table summarizes the values of the **Direction** enumeration.

Value	Description
Incoming	The direction is incoming.
Outgoing	The direction is outgoing.

#### 2.2.4.7 Importance

The following table summarizes the values of the **Importance** enumeration.

Value	Description
Normal	The importance is normal.
Urgent	The importance is urgent.

#### 2.2.4.8 InvitationState

The following table summarizes the values of the **InvitationState** enumeration.

Value	Description
Connecting	The outgoing call is in the connecting state.
Alerting	The outgoing call is in the alerting state.

Value	Description
Forwarded	The outgoing call was forwarded.
TeamRing	The outgoing call is in the team-ringing state.
Connected	The outgoing call connected.
Cancelled	The outgoing call was cancelled.
Declined	The outgoing call was declined.
Failed	The outgoing call establishment failed.

#### 2.2.4.9 MessageFormat

The following table summarizes the values of the **MessageFormat** enumeration.

Value	Description
Plain	Plain text.
Html	Html text.

#### 2.2.4.10 ModalityType

The following table summarizes the values of the **ModalityType** enumeration.

Value	Description
Audio	Audio.
Video	Video.
PhoneAudio	Phone audio.
ApplicationSharing	Application sharing.
Messaging	Instant messaging.
Data Collaboration	Data collaboration.

#### 2.2.4.11 Role

The following table summarizes the values of the **Role** enumeration.

Value	Description
Unknown	The participant's role is unknown.
Attendee	The participant is an attendee.
Leader	The participant is a leader.

### 2.2.4.12 SourceNetwork

The following table summarizes the values of the **SourceNetwork** enumeration.

Value	Description
SameEnterprise	The participant is from the same enterprise the conference is hosted in.
Unknown	Not initialized or unknown.
Federated	The participant is from federated or external company.
PublicCloud	The participant is from a public hosted provider (such as MSN or Yahoo).
Everyone	Combination of SameEnterprise, Federated and PublicCloud values.

### 2.2.4.13 GenericPolicy

The following table summarizes the values of the **GenericPolicy** enumeration.

Value	Description
None	The default, uninitialized value.
Disabled	The policy is disabled.
Enabled	The policy is enabled.

### 2.2.5 Attributes

The following table summarizes the set of common **XML schema** attribute definitions defined by this specification. XML schema attributes that are specific to a particular operation are described with the operation.

Attribute	Type	Description
rel	xs:string ([XMLSCHEMA2/2]section 3.2.1)	Identifies the semantics of the link.
name	xs:string	The name of a CollectionType ([MS-OCSMP] section 2.2.4.1) or PropertyType ([MS-OCSMP] section 2.2.4.6)
href	xs:anyURI ([XMLSCHEMA2/2]section 3.2.17)	A <b>URL</b> that is relative to the host name of the service.

## 2.2.6 Common Data Structures

The following table summarizes the set of common data structures defined by this specification.

Data structure	Description
CommunicationResource	The dashboard for communications capabilities.
ConversationsResource	The factory and list of active conversations.
ConversationResource	The applications perspective of a multi-party multi-modal conversation.
InvitationResource	Represents information common to all invitation types.
PhoneAudioInvitationsResource	Information specific to phone audio invitation.
CallResource	Represents information common to all call resources.
PhoneAudioResource	Represents phone audio modality in a conversation.
ParticipantResource	Represents a participant in a conversation.
StartPhoneAudioInputType	Represents properties that can be configured when starting a new conversation with phone audio.
StopPhoneAudioInputType	Represents properties for the stop phone audio resource.

### 2.2.6.1 Communication Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section 2.2.4.7) containing the properties of the communication dashboard resource.

Property name	Type	Description
phoneNumber	xs:string ( <a href="#">[XMLSCHEMA2/2]</a> section 3.2.1)	The phone number of the device the user wants to be reached on.
supportedModalities	CollectionType of ModalityType (section <a href="#">2.2.4.10</a> )	The modalities that are supported.

Link relationship	Description
self	A reference to the parent resource containing this link.
conversations	A reference to the conversations factory resource.
startPhoneAudio	A reference to the start phone audio resource.
startMessaging	A reference to the start messaging resource.

### 2.2.6.2 Conversations Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section [2.2.4.7](#)) containing a collection of **Conversation** structures.

Property name	Type	Description
None.		There are no properties in a ResourceType structure.

Link relationship	Description
self	A reference to the parent resource containing this link.

### 2.2.6.3 Conversation Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section 2.2.4.7) containing the properties of an existing conversation.

Property name	Type	Description
threadId	xs:string ( <a href="#">[XMLSCHEMA2/2]</a> section 3.2.1)	An id identifying the discussion thread in a conversation.
subject	xs:string	The subject of the conversation.
activeModalities	CollectionType of ConversationModality (section <a href="#">2.2.4.4</a> )	List of modalities active in the conversation.
state	ConversationState (section <a href="#">2.2.4.5</a> )	The conversation state.
importance	Importance (section <a href="#">2.2.4.7</a> )	The conversation importance.
participantCount	xs:int ([XMLSCHEMA2/2] section 3.3.17)	The number of participants in the conference.
audienceMute	AudienceMuteLock (section <a href="#">2.2.4.2</a> )	The current mute lock setting.
recording	xs:boolean ([XMLSCHEMA2/2] section 3.2.2)	Boolean indicating if recording is taking place on the conversation (True) or not (False).
expirationTime	xs:string	The expiration time of the conversation expressed in <b>UTC (Coordinated Universal Time)</b> time format.
readLocally	xs:boolean	Boolean indicating if the conference of the conversation were read locally (True) or not (False).
created	xs:string	The creation time of the conversation, expressed in UTC (Coordinated Universal Time) format.
audienceMessaging	AudienceMessaging (section <a href="#">2.2.4.1</a> )	The current audience messaging setting.
videoScreenSharing	GenericPolicy (section <a href="#">2.2.4.13</a> )	Whether video screen sharing is enabled for the conversation.
rdpSupport	GenericPolicy (section 2.2.4.13)	Whether Remote Desktop Protocol (RDP) is enabled for the conversation.



Link relationship	Description
self	A reference to the parent resource containing this link.
phoneAudio	A reference to the phone audio resource.

#### 2.2.6.4 Invitation Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section 2.2.4.7) containing the properties of a conversation invitation.

Property name	Type	Description
direction	Direction (section <a href="#">2.2.4.6</a> )	Direction of the invitation.
operationId	xs:string ( <a href="#">[XMLSCHEMA2/2]</a> section 3.2.1)	Application supplied id corresponding to the operation that started the invitation.
sessionContext	xs:string	The session context.
anonymousDisplayName	xs:string	The display name to use for anonymous participants.
from	ParticipantResource (section <a href="#">2.2.6.8</a> )	The participant that sent the invitation.
to	xs:string	The destination for an outgoing invitation.
acceptedByParticipant	ParticipantResource	The participant that accepted the invitation.
subject	xs:string	The subject for the conversation.
importance	Importance (section <a href="#">2.2.4.7</a> )	The importance of the conversation.
threadId	xs:string	The thread id of the conversation.
state	InvitationState (section <a href="#">2.2.4.8</a> )	The state of the invitation.
phoneNumber	xs:string	The phone number.
availableModalities	CollectionType of ConversationModality (section <a href="#">2.2.4.4</a> )	A collection of the available modalities.

Link relationship	Description
self	A reference to the parent resource containing this link.

#### 2.2.6.5 Phone Audio Invitation Resource

An **InvitationResource** structure (section [2.2.6.4](#)) containing the properties of a phone audio invitation.

This resource currently doesn't have any additional properties other than those of the **InvitationResource**.

### 2.2.6.6 Call Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section [2.2.4.7](#)) containing the properties of an existing call.

Property name	Type	Description
state	CallState (section <a href="#">2.2.4.3</a> )	The state of the call.

Link relationship	Description
self	A reference to the parent resource containing this link.

### 2.2.6.7 Phone Audio Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section [2.2.4.7](#)) containing the properties of an existing phone audio call.

Property name	Type	Description
None.		The PhoneAudioResource does not have any additional properties other than from CallResource

Link relationship	Description
self	A reference to the parent resource containing this link.
stopPhoneAudio	A reference to the stopPhoneAudioResource

### 2.2.6.8 Participant Resource

A **ResourceType** structure ([\[MS-OCSMP\]](#) section [2.2.4.7](#)) containing the properties of an existing participant.

Property name	Type	Description
workPhoneNumber	xs:string ( <a href="#">[XMLSCHEMA2/2]</a> section 3.2.1)	The work phone number.
otherPhoneNumber	xs:string	An alternate phone number.
Uri	xs:string	<b>URI</b> of the participant.
name	xs:string	Name of the participant.
sourceNetwork	SourceNetwork (section <a href="#">2.2.4.12</a> )	Network location the participant has joined from.

Property name	Type	Description
role	Role (section <a href="#">2.2.4.11</a> )	The role of the participant.
organizer	xs:boolean ([XMLSCHEMA2/2] section 3.2.2)	Is the participant the organizer (True) or not (False).
anonymous	xs:boolean	Is the participant anonymous (True) or not (False).

Link relationship	Description
self	A reference to the parent resource containing this link.

### 2.2.6.9 Start Phone Audio Input Type

An **InputType** structure ([\[MS-OCSMP\]](#) section 2.2.4.2) containing the properties to start a conversation with phone audio media.

Property name	Type	Description
phoneNumber	xs:string ( <a href="#">[XMLSCHEMA2/2]</a> section 3.2.1)	The user's desktop or mobile phone number to call.
to	xs:string	The destination phone number to call.
operationId	xs:string	Application supplied value to identify the operation.
subject	xs:string	The subject of the conversation.
importance	Importance (section <a href="#">2.2.4.7</a> )	The importance of the conversation.
threadId	xs:string	The conversation thread Id.

### 2.2.6.10 Stop Phone Audio Input Type

An **InputType** structure ([\[MS-OCSMP\]](#) section [2.2.4.2](#)) containing the properties required when removing phone audio from a conversation, possibly ending the conversation.

Property name	Type	Description
None		Stop phone audio currently has no input properties.

## 3 Protocol Details

### 3.1 Server Details

The basic unit for operations in this protocol is a Resource. Applications will be able to discover available Resources as well as the Properties of a Resource thus allowing applications to create a UI that is dynamically adjustable. The entirety of this protocol will be accessible via the **HTTP** protocol. This protocol is exposed via Unified Communications Web API (UCWA) web component of the protocol server.

#### 3.1.1 Abstract Data Model

This protocol is structured in the same way as that described in [\[MS-OCSMP\]](#) except for how navigating the protocol is performed.

##### 3.1.1.1 Navigating the Protocol

Navigating the hierarchy of this protocol is made possible by the information that is contained in the response to an HTTP request on the href of a resource. The response contains a set of properties, and a set of hypermedia links to related resources.

An application resource provides hypermedia links that contain hrefs to a number of related resources, including the **communication** and **events** resources. The events resource is described in [\[MS-ECREST\]](#).

The **communication** resource provides hypermedia links to its related resources, including **startPhoneAudio** (section [3.1.5.8](#)), and **conversations** (section [3.1.5.4](#)) among others. Similarly, a **conversation** (section [3.1.5.5](#)) resource provides access to the **phoneAudio** resource. The **phoneAudio** resource provides hrefs to the **stopPhoneAudio** (section [3.1.5.9](#)) resource when **phoneAudio** is active.

Using the hypermedia links that are served with a given resource, you can traverse from one resource to whatever resource you need.

This protocol can use link navigation to find the conversation for conversations initiated by the application. Conversations can also be discovered initially through notifications from the event channel for conversations initiated remotely.

##### 3.1.1.2 API Versioning

When a link that the application wishes to use contains a revision attribute that is not one (the default), then the application SHOULD include the `X-MS-RequiresMinResourceVersion` header in requests when using that resource.

Note: Applications SHOULD extract links for resources with revisions that have been tested. If the link with the expected revision is not available, the app SHOULD NOT automatically copy the revision into the header and attempt the request anyway. Instead, it would be better to disable the functionality and alert the customer that an upgraded version of the application will be required.

The protocol examples section demonstrates how the request can be used.

### 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

Resource	Description
application	Represents one instance of an application that is run by a user on a specific device.
applications	Represents a factory in which individual application resources are created.
batch	Represents a batched request handler to which multiple, independent HTTP requests packaged into a single multipart request can be sent.
conversations	Represents a collection of conversation (section <a href="#">2.2.6.2</a> ) resources.
conversation	Represents a conversation between two or more participants.
phoneAudioInvitation	Represents an invitation to join phone audio media in a conversation.
phoneAudio	Represents the phone audio media in a conversation.
startPhoneAudio	Represents an operation to start phone audio in a new conversation.
stopPhoneAudio	Represents an operation to stop phone audio media in a conversation.

#### 3.1.5.1 applications

The applications resource is specified in [\[MS-OCSMP\]](#) section 3.1.5.2.

#### 3.1.5.2 application

The application resource is specified in [\[MS-OCSMP\]](#) section 3.1.5.1.

#### 3.1.5.3 batch

The batch resource is specified in [\[MS-OCSMP\]](#) section 3.1.5.3.

#### 3.1.5.4 conversations

The following operations are allowed to be performed on this resource.

Operation	Description
GET	Gets the conversations currently active for the conversation.

### 3.1.5.4.1 Get conversations

Token	Media types	HTTP method
conversations	application/xml application/json	GET

#### 3.1.5.4.1.1 Request Body

Request header	Usage	Value
Accept	Response content-type negotiation.	application/xml application/json

#### 3.1.5.4.1.2 Response Body

Response header	Usage	Value
Content-type	Response content-type.	application/xml application/json

The response body will be the conversations resource.

The response to this operation can result in the following status codes.

Status code	Description
200	Request was successful.
410	The requested resource is no longer available at the server and no forwarding address is known
404	The requested resource is no longer available.

### 3.1.5.5 conversation

The following operations are allowed to be performed on this resource.

Operation	Description
GET	Gets the conversation identified by the supplied URL in the request.

#### 3.1.5.5.1 Get conversation

Token	Media types	HTTP method
conversation	application/xml application/json	GET

### 3.1.5.5.1.1 Request Body

Request header	Usage	Value
Accept	Response content-type negotiation.	application/xml application/json

### 3.1.5.5.1.2 Response Body

Response header	Usage	Value
Content-type	Response content-type.	application/xml application/json

The response body will be the conversation resource.

The response to this operation can result in the following status codes.

Status code	Description
200	Request was successful.
410	The requested resource is no longer available at the server and no forwarding address is known
404	The requested resource is no longer available.

### 3.1.5.6 phoneAudioInvitation

The following operations are allowed to be performed on this resource.

Operation	Description
GET	Get the phone audio invitation.

#### 3.1.5.6.1 Get phone audio invitation

Token	Media types	HTTP method
phoneAudioInvitation	application/xml application/json	GET

### 3.1.5.6.1.1 Request Body

Request header	Usage	Value
Accept	Response content-type negotiation.	application/xml application/json

### 3.1.5.6.1.2 Response Body

Response header	Usage	Value
Content-type	Response content-type.	application/xml application/json

The response body will be the phone audio invitation resource.

The response to this operation can result in the following status codes.

Status code	Description
200	Request was successful.
410	The requested resource is no longer available at the server and no forwarding address is known
404	The requested resource is no longer available.

### 3.1.5.7 phoneAudio

The following operations are allowed to be performed on this resource.

Operation	Description
GET	Get the phone audio resource.

#### 3.1.5.7.1 Get phone audio



Token	Media types	HTTP method
phoneAudio	application/xml application/json	GET

### 3.1.5.7.1.1 Request Body

Request header	Usage	Value
Accept	Response content-type negotiation.	application/xml application/json

### 3.1.5.7.1.2 Response Body

Response header	Usage	Value
Content-type	Response content-type.	application/xml application/json

The response body will be the phone audio resource.

The response to this operation can result in the following status codes.

Status code	Description
200	Request was successful.
410	The requested resource is no longer available at the server and no forwarding address is known
404	The requested resource is no longer available.

### 3.1.5.8 startPhoneAudio

The following operations are allowed to be performed on this resource.

Operation	Description
POST	Start a conversation with phone audio.

#### 3.1.5.8.1 Post start phone audio

Token	Media types	HTTP method
startPhoneAudio	application/xml application/json	POST

### 3.1.5.8.1.1 Request Body

Request header	Usage	Value
Accept	Response content-type negotiation.	application/xml application/json

The request body SHOULD contain a **StartPhoneAudioInput** (section [2.2.6.9](#)) data structure.

### 3.1.5.8.1.2 Response Body

Response header	Usage	Value
Content-type	Response content-type.	application/xml application/json

The response body will be the phone audio invitation resource.

The response to this operation can result in the following status codes.

Status code	Description
201	Request was successful.
410	The requested resource is no longer available at the server and no forwarding address is known
404	The requested resource is no longer available.

### 3.1.5.9 stopPhoneAudio

Token	Media types	HTTP method
stopPhoneAudio	application/xml application/json	POST

#### 3.1.5.9.1 Post stop phone audio

Token	Media types	HTTP method
stopPhoneAudio	application/xml application/json	POST

### 3.1.5.9.1.1 Request Body

Request header	Usage	Value
Accept	Response content-type negotiation.	application/xml application/json

The request body can be empty.

### 3.1.5.9.1.2 Response Body

Response header	Usage	Value
Content-type	Response content-type.	application/xml application/json

The response body will be empty.

The response to this operation can result in the following status codes.

Status code	Description
204	Request was successful.
410	The requested resource is no longer available at the server and no forwarding address is known
404	The requested resource is no longer available.

### 3.1.6 Timer Events

None.

### 3.1.7 Other Local Events

None.

## 4 Protocol Examples

This section will show a few examples of how the protocol works.

### 4.1 Creating an Application

The following example illustrates the exchange of messages required for a client to create an application resource in order to successfully use the a server implementing this protocol.

The client application POSTs a request to create an application instance on the server implementing this protocol. The URI to which the request is addressed is obtained from the auto-discovery response ([\[MS-OCDISCWS\]](#) section 4.1.)

#### 4.1.1 HTTP Request

The body of the request includes the culture of the application, an endpointId that is unique to the client application, and the userAgent string for the client.

```
POST https://ext.vdomain.com:4443/ucwa/oauth/v1/applications HTTP/1.1
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAAFFQAAAPmQRuRgha2wB2cEg...
Accept: application/xml
Content-Type: application/xml
Host: ext.vdomain.com:4443
Content-Length: 316
Expect: 100-continue

<?xml version="1.0" encoding="utf-8"?>
<input xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">
<property name="culture">en-US</property>
<property name="endpointId">e80dc357-19bb-418d-93bf-1ecb5135d43f</property>
<property name="userAgent">UcwaClient/1.0</property>
<property name="type">Phone</property>
</input>
```

#### 4.1.2 HTTP Response

The client application parses the response to find the embedded resource with the "rel" equal to events to retrieve events related to application activity.

In addition, the application will find the embedded resource with the "rel" equal to communication to retrieve the resources to available to start conversations. This embedded resource contains links to all other resources associated with starting and maintaining conversations. These links will be needed in order to perform future requests. It is advisable that links be cached but not persisted because they are only valid for the lifetime of the application instance.

When looking for resources identified by a "rel" attribute, it is advisable to determine the resource version the application was written to support. If no "revision" attribute is available, the revision is assumed to be 1.

```
HTTP/1.1 201 Created
Cache-Control: private
Via: 1.1 accessproxy.vdomain.com RtcExt
Content-Length: 5063
Content-Type: application/xml; charset=utf-8
Expires: Thu, 22 Jan 2015 06:43:24 GMT
ETag: "766942815"
X-MS-Server-Fqdn: SERVER.vdomain.com
```

```
X-MS-Correlation-Id: 2147483652
client-request-id: 13efd9fe-d041-4729-af67-9f97abb81a18
X-MS-Correlation-Id: 2147483679
client-request-id: bfca11b-6cb2-44f2-9f56-6569e15c643b
Strict-Transport-Security: max-age=31536000; includeSubDomains
Date: Wed, 21 Jan 2015 22:43:23 GMT
```

```
<?xml version="1.0" encoding="utf-8"?>
<resource rel="application" href="/ucwa/oauth/v1/applications/211177894191"
xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">

<link rel="events" href="/ucwa/oauth/v1/applications/211177894191/events?ack=1" />

<property name="culture">en-US</property>
<property name="userAgent">UcwaClient/1.0</property>
<property name="type">Phone</property><property name="etag">766942815</property>
<resource rel="communication"
href="/ucwa/oauth/v1/applications/211177894191/communication">
<link rel="startPhoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations" />
<link rel="conversations"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations?filter=active" />
<link rel="startMessaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/messagingInvitations" />
<link rel="startAudioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/audioVideoInvitations" />
<link rel="startScreenSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/applicationSharingInvitations" />
</resource>
```

(output abbreviated for readability)

```
</resource>
```

### 4.1.3 Preparing to receive events

Using the **URI** for the **events** resource in the response, issue a request to get event information for the application:

```
GET
https://ext.vdomain.com:4443/ucwa/oauth/v1/applications/211177894191/events?ack=1&time
out=900 HTTP/1.1
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAFAFFQAAAPmQRuRgha2wB2cEg...
Accept: multipart/related; type="application/xml", multipart/related,
multipart/alternative, multipart/batching
Host: ext.vdomain.com:4443
```

You can append the timeout parameter (see [\[MS-ECREST\]](#) section 2.2.2) to the URI before issuing the request, but it is not advisable to make any assumptions about the format of the URI.

This request will be blocked until there are events to return or until the timeout parameter value is reached. For this reason, it is not advisable to issue this request in any queue where other requests are posted.

## 4.2 Starting a Phone Audio Conversation

A client application can initiate a phone audio conversation by using the startPhoneAudio API.

### 4.2.1 Phone Number Normalization

When supplying a phone number in an input field, the phone number is validated at the server against the configured normalization rules to see if the phone number is valid. If the phone number does not match any rules, the request will be rejected with 400 Bad request, with a subcode of NormalizationFailed.

The best practice for specifying phone numbers is to specify them in tel uri format according to [\[RFC3966\]](#).

Working with phone audio often requires specifying a phone number, which has to pass normalization checks.

### 4.2.2 HTTP Request

For a client application to initiate a new conversation using phone audio, it issues a post request on the resource **URI** identified by the "rel" value of startPhoneAudio and the current revision 1:

```
POST
https://ext.vdomain.com:4443/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations HTTP/1.1
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAFAFFQAAAPmQRuRgha2wB2cEg...
Accept: application/xml
Content-Type: application/xml
Host: ext.vdomain.com:4443
Content-Length: 390
Expect: 100-continue
```

```
<?xml version="1.0" encoding="utf-8"?>
<input xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">
  <property name="to">sip:Ucwa0VBvtUser2@ucwatenant.com</property>
  <property name="operationId">8eb90e4aa1874134b89dac298d458d20</property>
  <property name="subject">OV Call</property>
  <property name="importance">Normal</property>
  <property name="phoneNumber">tel:+14257078488</property>
</input>
```

The request initiates an asynchronous processing a job identified by the application specified operationId. The operationId can be used to identify status of the processing in the event information returned.

### 4.2.3 HTTP Response

```
HTTP/1.1 201 Created
Cache-Control: no-cache
Via: 1.1 accessproxy.vdomain.com RtcExt
Content-Length: 0
Location:
/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations/aa91df7425864b94b25aaf1206f1e795
X-MS-Server-Fqdn: SERVER.vdomain.com
X-MS-Correlation-Id: 2147483808
client-request-id: e17c53ce-064b-4b2e-8bdc-115ea79d09ca
X-MS-Correlation-Id: 2147483673
client-request-id: fcc2528c-8175-46d4-b504-c449b834ca69
Strict-Transport-Security: max-age=31536000; includeSubDomains
Date: Wed, 21 Jan 2015 22:43:23 GMT
```

## 4.2.4 Processing Events

The event channel will start returning a stream of events about the status of the conversation and call that is connecting.

### 4.2.4.1 Initial events

The first set of events give you information about created resources and initial status:

```
HTTP/1.1 200 OK
Cache-Control: no-cache
Via: 1.1 accessproxy.vdomain.com RtcExt
Content-Length: 4145
Content-Type: multipart/related; type="application/xml"; charset=utf-8;
boundary=3c589cb8-79df-4104-a39c-f4e03d2f2993
X-MS-Server-Fqdn: SERVER.vdomain.com
X-MS-Correlation-Id: 2147483653
client-request-id: 270cdbcf-da3a-4230-ad44-e880cfe2f58a
X-MS-Correlation-Id: 2147483680
client-request-id: 4a98d3e3-a561-4a07-acf9-89289788f33d
Strict-Transport-Security: max-age=31536000; includeSubDomains
Date: Wed, 21 Jan 2015 22:43:25 GMT

--3c589cb8-79df-4104-a39c-f4e03d2f2993
Content-Type: application/xml; charset=utf-8

<?xml version="1.0" encoding="utf-8"?>
<events href="/ucwa/oauth/v1/applications/211177894191/events?ack=1"
xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">
  <link rel="next" href="/ucwa/oauth/v1/applications/211177894191/events?ack=2" />
  <sender rel="communication"
href="/ucwa/oauth/v1/applications/211177894191/communication">
    <started rel="phoneAudioInvitation"
href="/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations/aa9
1df7425864b94b25aaf1206f1e795">
      <resource rel="phoneAudioInvitation"
href="/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations/aa9
1df7425864b94b25aaf1206f1e795">
        <link rel="from"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-a1a2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com"
title="UcwaOVbvtUser5" />
          <link rel="to"
href="/ucwa/oauth/v1/applications/211177894191/people/ucwaovbvtuser2@ucwatenant.com"
/>
            <link rel="cancel"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-a1a2-e99178f0056f/phoneAudio/terminate" />
              <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-a1a2-e99178f0056f" />
                <link rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-a1a2-e99178f0056f/phoneAudio" />
                  <property name="direction">Outgoing</property><property
name="importance">Normal</property>
                    <property name="threadId">AdA1y6o9qIkpVdAlDE6j6U1YN46JpA==</property>
                    <property name="state">Connecting</property>
                    <property
name="operationId">8eb90e4aa1874134b89dac298d458d20</property>
                    <property name="subject">OV Call</property>
```

```

        </resource>
      </started>
      <added rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
        <resource rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
          <link rel="applicationSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/applicationSharing" />
          <link rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo" />
          <link rel="dataCollaboration"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/dataCollaboration" />
          <link rel="messaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/messaging" />
          <link rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio" />
          <property name="state">Disconnected</property><property
name="threadId">AdAly6o9qIkpVdAlDE6j6U1YN46JpA==</property>
          <property name="subject">OV Call</property>
          <propertyList name="activeModalities" />
          <property name="importance">Normal</property>
          <property name="recording">False</property>
        </resource>
      </added>
    </sender>
    <sender rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
      <added rel="localParticipant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com"
title="UcwaOVBvtUser5">
        <resource rel="localParticipant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com">
          <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
          <link rel="me" href="/ucwa/oauth/v1/applications/211177894191/me" />
          <property name="sourceNetwork">SameEnterprise</property>
          <property name="anonymous">False</property>
          <property name="local">True</property>
          <property name="name">UcwaOVBvtUser5</property>
          <property name="uri">sip:UcwaOVBvtUser5@ucwatenant.com</property>
        </resource>
      </added>
    </sender>
  </events>
--3c589cb8-79df-4104-a39c-f4e03d2f2993--

```

From this notification, you can see that your request is in state Connecting, a conversation has been added, and participants have been added to the conversation. After processing the event information, issue a new HTTP GET request to retrieve your next set of events by using the **URI** given in the **next** link specified:



```
GET
https://ext.vdomain.com:4443/ucwa/oauth/v1/applications/211177894191/events?ack=2&time
out=900 HTTP/1.1
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAFFQAAAPmQRuRgha2wB2cEg...
Accept: multipart/related; type="application/xml", multipart/related,
multipart/alternative, multipart/batching
Host: ext.vdomain.com:4443
```

Posting another HTTP GET using the next link after processing the events occurs each time event data is returned, and is assumed from now on in the protocol sample.

#### 4.2.4.2 Intermediate status events

Sometime later, you will get additional events describing the progress of your phone call:

```
<?xml version="1.0" encoding="utf-8"?>
<events href="/ucwa/oauth/v1/applications/211177894191/events?ack=2"
xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">
  <link rel="next" href="/ucwa/oauth/v1/applications/211177894191/events?ack=3" />
  <sender rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
    <updated rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio">
      <resource rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio">
        <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
        <link rel="stopPhoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio/terminate" />
        <property name="state">Connecting</property>
      </resource>
    </updated>
  </sender>
  <sender rel="communication"
href="/ucwa/oauth/v1/applications/211177894191/communication">
    <updated rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
      <resource rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
        <link rel="applicationSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/applicationSharing" />
        <link rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo" />
        <link rel="dataCollaboration"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/dataCollaboration" />
        <link rel="messaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/messaging" />
        <link rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio" />
        <property name="state">Connecting</property>
```

```

        <property
name="threadId">AdAly6o9qIkpVdAlDE6j6U1YN46JpA==</property>
        <property name="subject">OV Call</property><propertyList
name="activeModalities" />
        <property name="importance">Normal</property>
        <property name="recording">False</property>
    </resource>
</updated>
</sender>
<sender rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
    <updated rel="messaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/messaging">
        <resource rel="messaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/messaging">
            <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
            <link rel="addMessaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/messagingInvitations?conv
ersation=89938156-c927-4f1c-ala2-e99178f0056f" />
            <property name="state">Disconnected</property>
        </resource>
    </updated>
    <updated rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo">
        <resource rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo">
            <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
            <property name="state">Disconnected</property>
        </resource>
    </updated>
    <updated rel="applicationSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/applicationSharing">
        <resource rel="applicationSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/applicationSharing">
            <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
            <link rel="addScreenSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/applicationSharingInvitat
ions?conversation=89938156-c927-4f1c-ala2-e99178f0056f" />
            <property name="state">Disconnected</property></resource>
    </updated>
    <updated rel="dataCollaboration"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/dataCollaboration">
        <resource rel="dataCollaboration"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/dataCollaboration">
            <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />

```

```

        <property name="state">Disconnected</property>
      </resource>
    </updated>
  </sender>
</events>

```

The HTTP protocol and MIME encoding artifacts are now removed to improve clarity. At this point, the **phoneAudio** and conversation resources have both been updated to Connecting state, and the **phoneAudio** resource has a resource link for **stopPhoneAudio**. There are no other media types in the conversation as they are all Disconnected.

#### 4.2.4.3 Completion Events

The next batch of event information, shows the completion of the call with success:

```

<?xml version="1.0" encoding="utf-8"?>
<events href="/ucwa/oauth/v1/applications/211177894191/events?ack=3"
xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">
  <link rel="next" href="/ucwa/oauth/v1/applications/211177894191/events?ack=4" />
  <sender rel="communication"
href="/ucwa/oauth/v1/applications/211177894191/communication">
    <updated rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
      <resource rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
        <link rel="applicationSharing"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/applicationSharing" />
        <link rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo" />
        <link rel="dataCollaboration"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/dataCollaboration" />
        <link rel="messaging"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/messaging" />
        <link rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio" />
        <link rel="localParticipant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com"
title="UcwaOVBvtUser5" />
        <link rel="participants"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants" />
        <link rel="addParticipant"
href="/ucwa/oauth/v1/applications/211177894191/communication/participantInvitations?co
nversation=89938156-c927-4f1c-ala2-e99178f0056f" />
        <property name="state">Connected</property>
        <property
name="threadId">AdAly6o9qIkpVdAlDE6j6U1YN46JpA==</property>
        <property name="subject">OV Call</property>
        <propertyList name="activeModalities">
          <item>Audio</item>
        </propertyList>
        <property name="importance">Normal</property>
        <property name="recording">False</property>

```

```

        </resource>
      </updated>
    </sender>
    <sender rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f">
      <added rel="participant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser2@ucwatenant.com"
title="UcwaOVbvtUser2" />
      <added rel="participantAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser2@ucwatenant.com/audio">
      <in rel="participant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser2@ucwatenant.com"
title="UcwaOVbvtUser2" />
      </added>
      <added rel="participantAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com/audio">
      <in rel="localParticipant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com"
title="UcwaOVbvtUser5" />
      <resource rel="participantAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com/audio">
      <link rel="participant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com"
title="UcwaOVbvtUser5" />
      </resource>
    </added>
    <updated rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo">
      <resource rel="audioVideo"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/audioVideo">
      <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
      <property name="state">Disconnected</property>
    </resource>
  </updated>
  <updated rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio">
    <resource rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio">
      <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
      <link rel="transfer"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio/transfer" revision="2" />
      <link rel="stopPhoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio/terminate" />
      <property name="state">Connected</property>

```

```

        </resource>
      </updated>
      <updated rel="participant"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser2@ucwatenant.com"
title="UcwaOVBvtUser2" />
    </sender>
    <sender rel="communication"
href="/ucwa/oauth/v1/applications/211177894191/communication">
      <completed rel="phoneAudioInvitation"
href="/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations/aa9
1df7425864b94b25aaf1206f1e795">
        <status>Success</status>
        <resource rel="phoneAudioInvitation"
href="/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations/aa9
1df7425864b94b25aaf1206f1e795">
          <link rel="from"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/participants/ucwaovbvtuser5@ucwatenant.com"
title="UcwaOVBvtUser5" />
            <link rel="to"
href="/ucwa/oauth/v1/applications/211177894191/people/ucwaovbvtuser2@ucwatenant.com"
/>
              <link rel="conversation"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f" />
                <link rel="phoneAudio"
href="/ucwa/oauth/v1/applications/211177894191/communication/conversations/89938156-
c927-4f1c-ala2-e99178f0056f/phoneAudio" />
                  <property name="direction">Outgoing</property>
                  <property name="importance">Normal</property>
                  <property name="threadId">AdA1y6o9qIkpVdAlDE6j6U1YN46JpA==</property>
                  <property name="state">Connected</property>
                  <property
name="operationId">8eb90e4aa1874134b89dac298d458d20</property>
                    <property name="subject">OV Call</property>
                </resource>
            </completed>
        </sender>
    </events>

```

The **phoneAudio** resource has been updated and its state is now Connected. The **phoneAudioInvitation** has now completed its work and has a final state of Connected. The **conversation** is also in Connected state.

### 4.3 Receiving a Phone Audio Invitation

Receiving a phone audio call doesn't require any action by the application. The acceptance of the call is at the phone that was called. Events are delivered in the same manner as when an outgoing conversation was made, except that the direction properties will be Incoming.

#### 4.3.1 Processing Events

Events for an incoming phone audio conversation is the same for the outgoing case.

## 4.4 Stopping Phone Audio

A client application can stop a phone audio in a conversation by using the stopPhoneAudio API. If the conversation only has phone audio in it, it will terminate the conversation as well as the phone audio.

### 4.4.1 HTTP Request

```
POST
https://ext.vdomain.com:4443/ucwa/oauth/v1/applications/211525898501/communication/conversations/756e9863-7232-4f92-b64e-7abcefb0a3e8/phoneAudio/terminate HTTP/1.1
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAAFFQAAAPmQRuRgha2wB2cEg...
Accept: application/xml
Content-Type: text/plain
Host: ext.vdomain.com:4443
Content-Length: 0
```

### 4.4.2 HTTP Response

```
HTTP/1.1 204 No Content
Cache-Control: no-cache
Via: 1.1 accessproxy.vdomain.com RtcExt
Content-Length: 0
X-MS-Server-Fqdn: SERVER.vdomain.com
X-MS-Correlation-Id: 2147484557
client-request-id: 2c81b86a-8ec3-4799-a169-acd39c35c2fb
X-MS-Correlation-Id: 2147485111
client-request-id: 582d58c6-585c-4804-82a8-4641623f2bb7
Strict-Transport-Security: max-age=31536000; includeSubDomains
Date: Thu, 29 Jan 2015 21:56:03 GMT
```

## 4.5 Handling resource versions

When working with resources that have been versioned, it is necessary to add the `X-MS-RequiresMinResourceVersion` header to the request. This section shows how this is added into the request. In this case, the link used by the application in the example was marked with a revision of 2:

```
<link rel="myGroupMemberships"
href="/ucwa/oauth/v1/applications/211177894191/people/groupMemberships" revision="2"
/>
```

### 4.5.1 HTTP Request

```
POST
https://ext.vdomain.com:4443/ucwa/oauth/v1/applications/11543867552/people/groupMemberships?... HTTP/1.1
X-MS-RequiresMinResourceVersion: 2
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAAFFQAAAPmQRuRgha2wB2cEg...
Accept: application/json
Host: ext.vdomain.com:4443
Content-Length: 0
```

### 4.5.2 HTTP Response

```
HTTP/1.1 204 No Content
Cache-Control: no-cache
Via: 1.1 accessproxy.vdomain.com RtcExt
Content-Length: 0
X-MS-Server-Fqdn: SERVER.vdomain.com
X-MS-Correlation-Id: 2147483691
```

```
client-request-id: 48ed8c59-418e-4c12-9211-8faca8856eda
X-MS-Correlation-Id: 2147483676
client-request-id: 85d705bc-f016-4a20-ab25-e17740418895
Strict-Transport-Security: max-age=31536000; includeSubDomains
Date: Thu, 29 Jan 2015 16:20:17 GMT
```

## 4.6 Working with Asynchronous Operations

Some operations in UCWA, such as starting phone audio or another type of conversation, can take a considerable amount of time, and needs periodic status updates. These long-running operations are represented as a special type of resource, an **operation resource**.

An operation resource is created in the event channel as the result of a POST request to the URL of another kind of resource that can be thought of as an **operation factory**. One example of an operation factory resource is the **startPhoneAudio** resource. The response to the POST request will have the HTTP status code 201 Created, and the Location header will give the URL to the operation that was created.

All subsequent updates to the operation status will arrive in the event channel, until the final "completed" event.

The operation that the **startPhoneAudio** resource creates is a **phoneAudioInvitation** resource. A "started", "updated", or "completed" event includes both the embedded operation resource and a link to the same resource. This way the client can associate the outcome of the operation with the operation itself.

Because updates to operation resources arrive as a response to a separate HTTP request (the pending GET, or P-GET), in some cases the event can reach the client before the arrival of the 201 Created response (which contains the link to the operation resource). This makes it impossible to associate an event with the URL of the operation. To link events to their corresponding operations, all operation-starting resources in UCWA accept an "operationId" key-value pair in either the POST body or as a query parameter. This ID is a unique identifier that is generated by the client, that is also be included in every event about the operation, which makes it possible to match the event to the operation at all times.

Example:

Below is an example of a client application starting an operation, providing an operation ID, and tracking it on the event channel:

```
POST
https://ext.vdomain.com:4443/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations HTTP/1.1
User-Agent: UcwaClient/1.0
Authorization: Bearer cwt=AAEBHAEFAAAAAAFAFFQAAAPmQRuRgha2wB2cEg...
Accept: application/xml
Content-Type: application/xml
Host: ext.vdomain.com:4443
```

Content-Length: 390  
Expect: 100-continue

```
<?xml version="1.0" encoding="utf-8"?>
<input xmlns="http://schemas.microsoft.com/rtc/2012/03/ucwa">
  <property name="to">sip:Ucwa0VBvtUser2@ucwatanant.com</property>
  <property name="operationId">8eb90e4aa1874134b89dac298d458d20</property>
  <property name="subject">OV Call</property>
  <property name="importance">Normal</property>
  <property name="phoneNumber">tel:+14257078488</property>
</input>
```

The POST response includes the operation URL.

```
HTTP/1.1 201 Created
Cache-Control: no-cache
Via: 1.1 accessproxy.vdomain.com RtcExt
Content-Length: 0
Location:
/ucwa/oauth/v1/applications/211177894191/communication/phoneAudioInvitations/aa91df742
5864b94b25aaf1206f1e795
X-MS-Server-Fqdn: SERVER.vdomain.com
X-MS-Correlation-Id: 2147483808
client-request-id: e17c53ce-064b-4b2e-8bdc-115ea79d09ca
X-MS-Correlation-Id: 2147483673
client-request-id: fcc2528c-8175-46d4-b504-c449b834ca69
Strict-Transport-Security: max-age=31536000; includeSubDomains
Date: Wed, 21 Jan 2015 22:43:23 GMT
```



## **5 Security**

### **5.1 Security Considerations for Implementers**

None.

### **5.2 Index of Security Parameters**

None.

## 6 Appendix A: Full XML Schema

Body of requests use the InputType complex type described in [\[MS-OCSMP\]](#).

Resources are returned using the ResourceType complex type described in [MS-OCSMP].

The property names and possible values are listed for each resource or enumeration in sections [2.2.6](#) and section [2.2.4](#).

## 7 Appendix B: Common Error Responses

The errors listed in the following table apply to most resources.

Error	Description
ApplicationNotFound	The application resource does not exist.
BadRequest	Something is wrong with the entire request (malformed XML/JSON, for example).
DeserializationFailure	The request body could not be deserialized. Please check if the body confirms to allowed formats and does not have any invalid characters.
EntityTooLarge	The request is too large.
InactiveApplicationExpired	An inactive application expired.
MethodNotAllowed	The requested HTTP method is not supported for this resource.
MobileApplicationNoLongerAllowed	User is no longer authorized for mobile applications.
ParameterValidationFailure	A parameter value is not valid.
PreconditionFailed	An If-Match precondition was not met.
PreconditionRequired	The operation requires an If-Match precondition.
ResourceNotFound	The resource does not exist.
ServiceFailure	Internal Server Error.
ServiceTimeout	Internal Server Error, remote timeout.
TooManyApplications	There are too many applications for this user.
UnsupportedMediaType	The content-type is not supported.
VersionNotSupported	Requested Version is not supported.

## 8 Appendix C: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Lync Client 2013/Skype for Business
- Microsoft Skype for Business 2016
- Microsoft Skype for Business Server 2015
- Microsoft Skype for Business 2019
- Microsoft Skype for Business Server 2019

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates 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.

## 9 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

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.
- A document revision that captures changes to protocol functionality.

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 **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com).

Section	Description	Revision class
All	Updated references.	Minor
<a href="#">2.2.4.3</a> CallState	Updated the descriptions for enum values.	Minor
<a href="#">2.2.4.4</a> ConversationModality	Updated the descriptions for enum values.	Minor
<a href="#">2.2.4.5</a> ConversationState	Updated the descriptions for enum values.	Minor
<a href="#">2.2.4.6</a> Direction	Updated the descriptions for enum values.	Minor
<a href="#">2.2.4.7</a> Importance	Updated the descriptions for enum values.	Minor
<a href="#">2.2.6.3</a> Conversation Resource	Updated type for recording and readLocally properties to boolean.	Minor
<a href="#">2.2.6.8</a> Participant Resource	Updated type for organizer and anonymous properties to boolean.	Minor

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