**[MS-SIPAPP]:**

**Session Initiation Protocol (SIP) Application Protocol**

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# Introduction

This Session Initiation Protocol (SIP) Application Protocol document specifies the **ms-call-park** protocol that is used by the client to transfer a remote party of an existing two-party audio call to an inactive state with the purpose of later activation by the same or a different 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.

## Glossary

This document uses the following terms:

**address-of-record**: A [**Session Initiation Protocol (SIP)**](#gt_586971aa-3b65-4de3-be93-1a9756777d89) URI that specifies a domain with a location service that can map the URI to another URI for a user, as described in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410).

**Augmented Backus-Naur Form (ABNF)**: A modified version of Backus-Naur Form (BNF), commonly used by Internet specifications. ABNF notation balances compactness and simplicity with reasonable representational power. ABNF differs from standard BNF in its definitions and uses of naming rules, repetition, alternatives, order-independence, and value ranges. For more information, see [[RFC5234]](https://go.microsoft.com/fwlink/?LinkId=123096).

**auto-ringback**: A process in which a [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) automatically transfers a parked call from the [**parking lot**](#gt_2950c177-69ed-4b00-b314-699a66aefb9e) to the user agent who originally parked the call.

**call park service (CPS)**: A server endpoint that allows a user agent to make a call inactive without terminating that call. The call can then be reactivated by the same user agent, by using the same or a different endpoint, or a different user agent. See also [**parking lot**](#gt_2950c177-69ed-4b00-b314-699a66aefb9e).

**Content-Type header**: A message header field whose value describes the type of data that is in the body of the message.

**fallback URI**: A Uniform Resource Identifier (URI), as described in [[RFC3986]](https://go.microsoft.com/fwlink/?LinkId=90453), that specifies the user agent address to which unretrieved calls are transferred.

**Globally Routable User Agent URI (GRUU)**: A URI that identifies a user agent and is globally routable. A URI possesses a GRUU property if it is useable by any user agent client (UAC) that is connected to the Internet, routable to a specific user agent instance, and long-lived.

**Internet Protocol version 4 (IPv4)**: An Internet protocol that has 32-bit source and destination addresses. IPv4 is the predecessor of IPv6.

**Internet Protocol version 6 (IPv6)**: A revised version of the Internet Protocol (IP) designed to address growth on the Internet. Improvements include a 128-bit IP address size, expanded routing capabilities, and support for authentication and privacy.

**INVITE**: A [**Session Initiation Protocol (SIP)**](#gt_586971aa-3b65-4de3-be93-1a9756777d89) method that is used to invite a user or a service to participate in a session.

**orbit**: A number that uniquely identifies a parked call and enables a user agent to retrieve that call. The number is assigned automatically by a [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) and is sent to the user agent who parked the call.

**park**: A process in which an active call is moved to a [**parking lot**](#gt_2950c177-69ed-4b00-b314-699a66aefb9e), without terminating that call. The call can then be retrieved by the same or another user agent. See also [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d).

**parkee**: A user agent whose call is parked by another user agent, by using a [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d). The parkee's call is not terminated and can be retrieved by the user agent who parked the call or a different user agent.

**parker**: A user agent who uses a [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) to park a call. The call can then be retrieved by the same or a different user agent.

**parking lot**: A collection of one or more orbits that were configured by a [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d). Each parked call is uniquely identified by the [**orbit**](#gt_735d0008-c155-4547-b948-825ffc1b7458) that is assigned to it.

**Session Initiation Protocol (SIP)**: An application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. [**SIP**](#gt_586971aa-3b65-4de3-be93-1a9756777d89) is defined in [RFC3261].

**SIP message**: The data that is exchanged between [**Session Initiation Protocol (SIP)**](#gt_586971aa-3b65-4de3-be93-1a9756777d89) elements as part of the protocol. An SIP message is either a request or a response.

**Transmission Control Protocol (TCP)**: A protocol used with the Internet Protocol (IP) to send data in the form of message units between computers over the Internet. TCP handles keeping track of the individual units of data (called packets) that a message is divided into for efficient routing through the Internet.

**Transport Layer Security (TLS)**: A security protocol that supports confidentiality and integrity of messages in client and server applications communicating over open networks. TLS supports server and, optionally, client authentication by using X.509 certificates (as specified in [[X509]](https://go.microsoft.com/fwlink/?LinkId=90590)). TLS is standardized in the IETF TLS working group.

**XML**: The Extensible Markup Language, as described in [[XML1.0]](https://go.microsoft.com/fwlink/?LinkId=90599).

**XML attribute**: A name/value pair, separated by an equal sign (=) and included in a tagged element, that modifies features of an element. All XML attribute values are stored as strings enclosed in quotation marks.

**XML element**: An [**XML**](#gt_982b7f8e-d516-4fd5-8d5e-1a836081ed85) structure that typically consists of a start tag, an end tag, and the information between those tags. Elements can have attributes and can contain other elements.

**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**](#gt_982b7f8e-d516-4fd5-8d5e-1a836081ed85) itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

**XML schema definition (XSD)**: The World Wide Web Consortium (W3C) standard language that is used in defining XML schemas. Schemas are useful for enforcing structure and constraining the types of data that can be used validly within other XML documents. XML schema definition refers to the fully specified and currently recommended standard for use in authoring [**XML schemas**](#gt_bd0ce6f9-c350-4900-827e-951265294067).

**MAY, SHOULD, MUST, SHOULD NOT, MUST NOT:** These terms (in all caps) are used as defined in [[RFC2119]](https://go.microsoft.com/fwlink/?LinkId=90317). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

## 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](https://go.microsoft.com/fwlink/?linkid=850906).

### 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.

[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](https://go.microsoft.com/fwlink/?LinkId=90317)

[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](https://go.microsoft.com/fwlink/?LinkId=90410)

[RFC3515] Sparks, R., "The Session Initiation Protocol (SIP) Refer Method", RFC 3515, April 2003, [http://www.ietf.org/rfc/rfc3515.txt](https://go.microsoft.com/fwlink/?LinkId=90428)

[RFC3840] Rosenberg, J., Schulzrinne, H., and Kyzivat, P., "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)", RFC 3840, August 2004, [http://www.rfc-editor.org/rfc/rfc3840.txt](https://go.microsoft.com/fwlink/?LinkId=114244)

[RFC3891] Mahy, R., Biggs, B., and Dean, R., "The Session Initiation Protocol (SIP) "Replaces" Header", RFC 3891, September 2004, [http://www.rfc-editor.org/rfc/rfc3891.txt](https://go.microsoft.com/fwlink/?LinkId=114233)

[RFC4566] Handley, M., Jacobson, V., and Perkins, C., "SDP: Session Description Protocol", RFC 4566, July 2006, [http://www.ietf.org/rfc/rfc4566.txt](https://go.microsoft.com/fwlink/?LinkId=90484)

### Informative References

[MS-OCER] Microsoft Corporation, "[Client Error Reporting Protocol](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f)".

[MS-SDPEXT] Microsoft Corporation, "[Session Description Protocol (SDP) Version 2.0 Extensions](%5BMS-SDPEXT%5D.pdf#Section_cd17a549b94842a6aa6bfa707710faac)".

[MS-SIPREGE] Microsoft Corporation, "[Session Initiation Protocol (SIP) Registration Extensions](%5BMS-SIPREGE%5D.pdf#Section_21acf797984c48ce97e3c7df5c776b3d)".

[MS-SIPRE] Microsoft Corporation, "[Session Initiation Protocol (SIP) Routing Extensions](%5BMS-SIPRE%5D.pdf#Section_ab4ab24937964ed18cecf496d81a1a83)".

[MS-SIP] Microsoft Corporation, "[Session Initiation Protocol Extensions](%5BMS-SIP%5D.pdf#Section_0d72fb5512ba49f1850df0bf3110bb1f)".

[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](https://go.microsoft.com/fwlink/?LinkId=123096)

[XML10] World Wide Web Consortium, "Extensible Markup Language (XML) 1.0 (Third Edition)", February 2004, [http://www.w3.org/TR/2004/REC-xml-20040204/](https://go.microsoft.com/fwlink/?LinkId=90600)

[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/](https://go.microsoft.com/fwlink/?LinkId=191840)

[XMLSCHEMA0] Fallside, D., and Walmsley, P., Eds., "XML Schema Part 0: Primer, Second Edition", W3C Recommendation, October 2004, [http://www.w3.org/TR/2004/REC-xmlschema-0-20041028/](https://go.microsoft.com/fwlink/?LinkId=90604)

## Overview

The **ms-call-park** protocol is used by a SIP client to transfer the remote party of an existing two-party audio call to a [**parking lot**](#gt_2950c177-69ed-4b00-b314-699a66aefb9e) on the [**call park service (CPS)**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d). The CPS issues an [**orbit**](#gt_735d0008-c155-4547-b948-825ffc1b7458) to the client who [**park**](#gt_965f84b8-e42b-4a2c-acc2-2c7c03c36e1b)ed the call. This orbit is then communicated via any out-of-band social process to another user or set of users. One of these users can then initiate a SIP call to the orbit and connect to the parked client, removing the parked client from the parking lot.

## Relationship to Other Protocols

The protocols described in this document depend upon Session Initiation Protocol (SIP).

This document defines one or more [**XML schemas**](#gt_bd0ce6f9-c350-4900-827e-951265294067) that support certain SIP application protocols. For more information about [**XML**](#gt_982b7f8e-d516-4fd5-8d5e-1a836081ed85) and [**XML schema definition (XSD)**](#gt_c7e91c99-e45a-44c2-a08a-c34f137a2cae), see [[XML10]](https://go.microsoft.com/fwlink/?LinkId=90600), [[XMLNS]](https://go.microsoft.com/fwlink/?LinkId=191840), and [[XMLSCHEMA0]](https://go.microsoft.com/fwlink/?LinkId=90604).

## Prerequisites/Preconditions

This specification assumes that both client and server support SIP, and that they implement the extensions specified in the following extension specifications as needed:

* Session Initiation Protocol Extensions [[MS-SIP]](%5BMS-SIP%5D.pdf#Section_0d72fb5512ba49f1850df0bf3110bb1f)
* Session Initiation Protocol Routing Extensions [[MS-SIPRE]](%5BMS-SIPRE%5D.pdf#Section_ab4ab24937964ed18cecf496d81a1a83)
* Session Initiation Protocol Registration Extensions [[MS-SIPREGE]](%5BMS-SIPREGE%5D.pdf#Section_21acf797984c48ce97e3c7df5c776b3d)

## Applicability Statement

The protocols in this document are applicable when both client and server support SIP and intend to support one or more of the enhancements offered by these protocols.

## Versioning and Capability Negotiation

The versioning and capability negotiation for each individual protocol is described in the following subsections.

### Versioning and Capability Negotiation for ms-call-park

The ms-call-park protocol contains version information, whose significance is described in section [2.2.1.1](#Section_6a22d3d3f0ce40b98efa8e4d651d5f56), section [2.2.1.2](#Section_ced74d08be4d46e0a298c1e2ad5e144b), and section [2.2.1.3](#Section_3c8eda46c9f745c0956c7f9b29a02e0b). Subsections under section [3.1.5](#Section_716f66736b374ecd9f7d4479f965c461) describe how this versioning information is processed. There is no capability negotiation in the protocol.

## Vendor-Extensible Fields

None.

## Standards Assignments

None.

# Messages

## Transport

Each of the following subsections defines the message transport for one of the protocols within the scope of this document.

### Transport for ms-call-park

The **ms-call-park** protocol does not introduce any new underlying transport for the exchange of protocol messages. **ms-call-park** [**XML**](#gt_982b7f8e-d516-4fd5-8d5e-1a836081ed85) protocol messages MUST be carried in the body of [**SIP messages**](#gt_2690e796-e281-48f3-ba0e-1f9acdb3ba8c), as specified in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410) section 18. The [**SIP**](#gt_586971aa-3b65-4de3-be93-1a9756777d89) [**Content-Type header**](#gt_bbd24a97-f290-425c-b05d-5874f9a4ae94) MUST have a value of "application/ms-call-park+xml" for any body that is an **ms-call-park** XML message. SIP messages are transported over [**Transmission Control Protocol (TCP)**](#gt_b08d36f6-b5c6-4ce4-8d2d-6f2ab75ea4cb) or [**Transport Layer Security (TLS)**](#gt_f2bc7fed-7e02-4fa5-91b3-97f5c978563a) for [**Internet Protocol version 4 (IPv4)**](#gt_0f25c9b5-dc73-4c3e-9433-f09d1f62ea8e)/[**Internet Protocol version 6 (IPv6)**](#gt_64c29bb6-c8b2-4281-9f3a-c1eb5d2288aa)**[<1>](#Appendix_A_1" \o "Product behavior note 1)**.

## Message Syntax

Each of the following subsections defines the message syntax for one of the protocols in the scope of this document.

### Message Syntax for ms-call-park

The messages for **ms-call-park** are XML-based, and are constrained by an [**XML schema**](#gt_bd0ce6f9-c350-4900-827e-951265294067). For more information, see section [6](#Section_7f69b26430854519bd63ba6b1251293b). The top-level element for an **ms-call-park** protocol message MUST be a **park-request**, a **park-response**, or an **unpark-notification**. The syntax for each of these is defined in the following subsections, as well as that of additional elements that are not top-level.

When a client or server receives optional [**XML elements**](#gt_a364f92c-0374-4568-b7f8-40bd74437dd5) or [**XML attributes**](#gt_443ac078-f0d2-45a2-ad6b-5967d61ff506) that it does not understand, and the message is valid according to the XML schema, it MUST ignore those optional elements and attributes that it does not understand.

#### Park Request

A **Park Request** message is sent from a client to the CPS when it wishes to park a call. A park-request element MUST be of type park-request-type and it MUST appear only in the body of a SIP INVITE.

1. <xs:element name="park-request" type="tns:park-request-type"/>
2. <xs:complexType name="park-request-type">
3. <xs:sequence>
4. <xs:element name="audio" type="tns:modality-park-request-type"/>
5. <xs:any namespace="##other" processContents="lax"/>
6. </xs:sequence>
7. <xs:attribute name="version" type="xs:string" use="required"/>
8. <xs:attribute name="request-id" type="xs:string" use="required"/>
9. </xs:complexType>

**park-request Element:** The client MUST set the version attribute of the park-request to a string which indicates the major (left of dot) and minor (right of dot) **ms-call-park** protocol versions. The string’s value MUST conform to the following ABNF representation, as defined in [[RFC5234]](https://go.microsoft.com/fwlink/?LinkId=123096):

1. 1\*DIGIT "." 1\*DIGIT

The **park-request** MUST include a **request-id** attribute, whose value is an arbitrary string that will be used to correlate responses and notifications with their corresponding request in future versions of this protocol.

The park-request element MUST contain a single audio element. It MAY also contain other arbitrary media types in the same request as additional elements under the request.

**audio Element:** A single audio element MUST appear inside of a **park-request** element. The audio element MUST be of type **modality-park-request-type** and MUST contain one **dialog-info** element and one **target** element. No attributes are defined for the **audio** element.

1. <xs:complexType name="modality-park-request-type">
2. <xs:sequence>
3. <xs:element name="dialog-info" type="tns:dialog-info-type"/>
4. <xs:element name="target" type="xs:anyURI"/>
5. </xs:sequence>
6. </xs:complexType>

The purpose of the **audio** element is to encapsulate all the information necessary to locate the audio call and the client that is to be parked.

**target Element:** A single target element MUST appear inside of an audio element. Its value MUST be a URI. The purpose of this element is to specify how to find the user agent (UA) that is to be parked.

**dialog-info Element:** A single dialog-info element MUST appear inside of an audio element. A dialog-info element MUST be of type **dialog-info-type** and MUST contain one call-id element, one from-tag element, and one to-tag element. No attributes are defined for the dialog-info element.

1. <xs:complexType name="dialog-info-type">
2. <xs:sequence>
3. <xs:element name="call-id" type="xs:string"/>
4. <xs:element name="from-tag" type="xs:string"/>
5. <xs:element name="to-tag" type="xs:string"/>
6. </xs:sequence>
7. </xs:complexType>

The purpose of the **dialog-info** element is to encapsulate the three pieces that uniquely identify the call that is to be parked. These correspond to the entities of the same name as defined in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410) section 12.

**call-id Element:** A single **call-id** element MUST appear inside of a **dialog-info** element. A call-id element MUST contain a string value that corresponds to the **SIP call-id** of the call that is to be parked.

**from-tag Element:** A single from-tag element MUST appear inside of a **dialog-info** element. A **from-tag** element MUST contain a string value that corresponds to the SIP **from-tag** of the call that is to be parked.

**to-tag Element:** A single **to-tag** element MUST appear inside of a **dialog-info** element. A **to-tag** element MUST contain a string value that corresponds to the SIP **to-tag** of the call that is to be parked.

#### Park Response

A **Park Response** message is sent from the CPS to the client after a park request has been successfully fulfilled. This response message MUST contain a **park-response** element, which MUST be of type **park-response-type**. The response message MUST appear in the body of a SIP 200 OK.

1. <xs:element name="park-response" type="tns:park-response-type"/>
2. <xs:complexType name="park-response-type">
3. <xs:sequence>
4. <xs:element name="orbit" type="xs:string" />
5. <xs:element name="ms-parked-call" type="xs:string" />
6. </xs:sequence>
7. <xs:attribute name="version" type="xs:string" use="required"/>
8. <xs:attribute name="request-id" type="xs:string" use="required"/>
9. </xs:complexType>

The version and request-id attributes MUST be as defined in section [2.2.1.1](#Section_6a22d3d3f0ce40b98efa8e4d651d5f56).

**orbit Element:** A single orbit element MUST appear in a **Park** response message. Its value MUST be set to a string that a client can call to retrieve the call from the parking lot. The CPS MUST generate only orbits that conform to the following ABNF syntax:[**Augmented Backus-Naur Form (ABNF)**](#gt_24ddbbb4-b79e-4419-96ec-0fdd229c9ebf) syntax, as defined in [[RFC5234]](https://go.microsoft.com/fwlink/?LinkId=123096):

1. ORBIT = (UNPREFIXED-ORBIT / PREFIXED-ORBIT)
2. UNPREFIXED-ORBIT = 1\*9DIGIT
3. PREFIXED-ORBIT = ("\*" / "#") 1\*8DIGIT

The CPS MAY limit the orbit pool to any subset of that allowed this syntax. The CPS orbit pool SHOULD NOT overlap with any internal enterprise extensions.

**ms-parked-call Element:** A single **ms-parked-call** element MUST appear inside of a **Park** response message. It is a unique string that identifies a particular parked call. A retriever can use this to guarantee that the call being retrieved is the correct one (because orbits can be re-used over time).

#### Unpark Notification

The **unpark-notification** element is sent by the CPS to the parker to inform it of the ultimate disposition of the audio call that it parked. It MUST be of type **unpark-notification-type**. The response message MUST appear in the body of a **SIP INFO**.

1. <xs:element name="unpark-notification" type="tns:unpark-notification-type"/>
2. <xs:complexType name="unpark-notification-type">
3. <xs:sequence>
4. <xs:element name="reason" type="tns:unpark-reason-type"/>
5. <xs:element name="target" type="xs:anyURI" minOccurs="0"/>
6. </xs:sequence>
7. <xs:attribute name="version" type="xs:string" use="required"/>
8. <xs:attribute name="request-id" type="xs:string" use="required"/>
9. </xs:complexType>

The version and request-id attributes MUST be as defined in section [2.2.1.1](#Section_6a22d3d3f0ce40b98efa8e4d651d5f56).

The **unpark-notification** element MUST contain a single reason element. If the reason element contains a value of "retrieval" or "fallback", the **unpark-notification** MUST also contain a single target element. If the reason element contains a value of "ringback", the **unpark-notification** MAY contain a single **target** element. If the reason element contains a value of "hang-up" or "drop", the **target** element MUST NOT appear in the **unpark-notification**.

**reason Element:** A single **reason** element MUST appear inside of an **unpark-notification** element. The **reason** element MUST have a value from a specific set of strings that correspond to the various reasons for which a call can become unparked. The valid values for the reason element are as follows:

* **retrieval:** The parked call was retrieved because a user called the orbit and successfully retrieved the parked call.
* **hang-up:** The parked client disconnected the parked call before it was retrieved.
* **ringback:** The same SIP user who parked the call answered an [**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21) from the CPS.
* **fallback:** No user successfully retrieved the call, all attempts to perform an auto-ringback to the parker went unanswered, and the parked call was successfully sent to the provisioned fallback URI.
* **drop:** No user successfully retrieved the call, all attempts to perform an auto-ringback to the parker went unanswered, the call was not successfully sent to any fallback URI, and as a last resort, the call was disconnected by the CPS.
1. <xs:simpleType name="unpark-reason-type">
2. <xs:restriction base="xs:string">
3. <xs:enumeration value="retrieval"/>
4. <xs:enumeration value="hang-up"/>
5. <xs:enumeration value="ringback"/>
6. <xs:enumeration value="fallback"/>
7. <xs:enumeration value="drop"/>
8. </xs:restriction>
9. </xs:simpleType>

**target Element:** A single target element can also appear inside of an **unpark-notification** element. If present, the target element’s value MUST be the [**address-of-record**](#gt_bbd777fa-e9fd-4393-965f-b718a274659a) of the SIP user that has retrieved the parked call.

# Protocol Details

## ms-call-park Details

This section describes the details of the ms-call-park protocol. The following diagram illustrates the state transitions for the CPS, the events that precipitate them, and the actions taken at each. The details for each of these are defined in the subsections that follow.



Figure 1: CPS State Transitions

### Abstract Data Model

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

The CPS MUST maintain a separate instance of the following abstract data model elements for each parked call:

* **Dialog information for the parked call:** This is a requirement of SIP in general, and is not specific to this protocol.
* request-id: Thestring that was supplied by the client when the park action was initiated.
* [**Orbit**](#gt_735d0008-c155-4547-b948-825ffc1b7458)**:** The number that can be called to retrieve the parked call.
* **ms-parked-call** **string:** An additional, opaque string that can be supplied along with the retriever’s INVITE to guarantee that the call being retrieved is the same one that was parked, even if a different call is later parked on the same orbit.
* [**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21)**:** A count for the number of auto-ringback retries. This starts at zero and is incremented after each auto-ringback attempt, but not beyond the configured maximum.

The preceding data MAY be maintained in a persistent store to survive CPS restarts.

### Timers

Beyond the timers specified in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410), ms-call-park requires an [**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21) timer on the CPS. Each parked call MUST maintain its own instance of this timer. The auto-ringback **timer** allows parked calls that have gone unretrieved after a period of time to be transferred back to the parker, to a [**fallback URI**](#gt_cd29983d-0ba6-4b4e-bdbf-abc01ed051ae), or to be disconnected to prevent resource depletion. The duration for this timer is not defined by this protocol; an implementation is free to choose any appropriate duration, or to make its duration user-configurable.

### Initialization

During server restarts, any persistently stored information, as specified in section [3.1.1](#Section_8ea2c4f6dbe64f72b8153074ee476bbc), MAY be read back in order for the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) to correctly restore its state to that prior to the restart.

### Higher-Layer Triggered Events

None.

### Message Processing Events and Sequencing Rules

Unless otherwise noted, the rules for message processing and error handling specified in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410) section 13.3 and section 13.3.1.3 and [[RFC4566]](https://go.microsoft.com/fwlink/?LinkId=90484) section 5 MUST be followed. Additional processing of incoming messages is noted in the sections that follow.

#### Initiating a Request to Park a Call at the CPS

When a client attempts to park an existing call at the CPS, it MUST initiate a dialog with the CPS by sending it a **SIP INVITE** message. The **Content-Type** header MUST be set to "application/ms-call-park+xml", and the body of the **INVITE** MUST be a **park-request** element, as defined in section [2.2.1.1](#Section_6a22d3d3f0ce40b98efa8e4d651d5f56). The request dialog MUST be initiated to the Call Park Server URI as discovered by in-band provisioning, as defined in [[MS-SIPREGE]](%5BMS-SIPREGE%5D.pdf#Section_21acf797984c48ce97e3c7df5c776b3d) section 2.2.2.5.1.

The client MUST indicate a version of "1.0" in the **park-request**. The client SHOULD supply an arbitrary string for the **request-id**.

The park-request element MUST have a single **audio** element. The audio element MUST contain a **dialog-info** element with the SIP dialog information of the call that is to be parked. The client MUST set the **target** element to the [**Globally Routable User Agent URI (GRUU)**](#gt_72fbc9c5-8485-465c-8b46-64895c8d5102) of the party to that call that is to be parked at the CPS. The **park-request** element MAY have other arbitrary elements representing additional media types, but the CPS MUST ignore them.

If the CPS cannot parse or validate the body of an application/ms-call-park+xml **INVITE** according to the [**XML schema**](#gt_bd0ce6f9-c350-4900-827e-951265294067), it MUST reject the request with a SIP 415.

If the CPS receives a major version of anything other than "1", it can reject the request by replying with a SIP 488. This rejection SHOULD include an ms-diagnostics header with a value of 35008 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f).

When the server receives a syntactically valid park-request from a client, it MUST attempt to allocate an available [**orbit**](#gt_735d0008-c155-4547-b948-825ffc1b7458) from its pool. The server can use any type of algorithm to choose an available orbit from the pool, and can attempt to reduce the predictability of the orbit selection or frequent re-use of identical orbits. If no orbit can be allocated, the CPS MUST respond to the **INVITE** with a SIP 500. Such a response SHOULD include an ms-diagnostics of 35002 as defined in [MS-OCER]. The CPS MUST also generate an arbitrary **ms-parked-call** string that is unique across all calls parked on a given orbit over time.

If the orbit was successfully allocated, the CPS MUST send a SIP **INVITE** with **Replaces** to the GRUU that was indicated in the target element of the **park-request**. The **Replaces** header is defined in [[RFC3891]](https://go.microsoft.com/fwlink/?LinkId=114233). The CPS MUST identify itself by adding an "isCps" feature tag to its Contact URI. The **INVITE** MUST be audio-only and the SDP of the **INVITE** SHOULD indicate either "hold" or "music-on-hold". See [[MS-SDPEXT]](%5BMS-SDPEXT%5D.pdf#Section_cd17a549b94842a6aa6bfa707710faac) section 3.1.5.27 for details of **music-on-hold**.

#### Parkee's Call Successfully Replaced by the CPS

If the **INVITE** with **Replaces** to the parkee successfully establishes a dialog, the CPS MUST respond to the parker’s ms-call-park SIP **INVITE** with a SIP 200 OK. The CPS MUST identify itself by adding an "isCps" feature tag to its Contact URI. Feature tags are defined in [[RFC3840]](https://go.microsoft.com/fwlink/?LinkId=114244) section 10. The response from the CPS MUST have a body of type "application/ms-call-park+xml" and be a **park-response** element. Its **orbit** element MUST contain the value of the orbit that was chosen to park the call. The **ms-parked-call** element MUST contain a string chosen by the CPS that uniquely identifies the parked call. The version attribute of the **park-response** element MUST be set to "1.0" and the **request-id** attribute MUST match that of the corresponding **park-request**.

The auto-ringback timer for this parked call MUST be started once park completes.

#### CPS Fails to Replace the Parkee's Call

If the **INVITE** with **Replaces** to the [**parkee**](#gt_ce1dbb8a-397c-4858-878f-ea6f8a9585d4) fails to establish a dialog, the CPS MUST respond to the parker’s **ms-call-park** SIP **INVITE** with SIP 408. Such a response SHOULD have an **ms-diagnostics** of 35007 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f).

#### CPS Receives a BYE from the Parker

[**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) MUST process a **BYE** from the [**parker**](#gt_e70373de-68b0-408e-bb0a-40fe32bc71ab) as specified in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410) section 15. The CPS MUST NOT take any other action, such as terminate the parked call, simply as a result of receiving a SIP **BYE** on the **ms-call-park** dialog. If this dialog is ended, the CPS MUST NOT send any **unpark-notifications** related to the call that was parked on the terminated dialog.

#### CPS Receives a BYE on the Audio Dialog with the Parkee

[**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) MUST process the **BYE** as specified in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410) section 15. If the CPS is in the process of performing a transfer of the retriever to the parkee or if the parker-CPS dialog no longer exists, the CPS MUST NOT perform further processing for this event. Otherwise, the following additional steps apply.

The CPS MUST send a SIP **INFO** message on parker-CPS dialog with a **Content-Type** of " **"application/ms-call-park+xml"**. The body of this message MUST be an **unpark-notification**. The **version** attribute MUST be set to "1.0". The **request-id** attribute MUST be set to that of the original **park-request**. The **reason** element MUST be set to "hang-up", and the **target** element MUST NOT be present.

After sending the preceding notification, the CPS MUST then send a **BYE** on the **parker-CPS** dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool, and release any resources associated with the parked call.

#### CPS Receives an INVITE with Audio SDP

When a SIP Proxy that supports **ms-call-park** receives an **INVITE** to a number which falls inside its configured orbit pool, it MUST route the INVITE to the CPS entity. The CPS MUST attempt to find the parked call that corresponds to the orbit that was called. If no call is parked against this orbit, the CPS MUST reject the INVITE with a SIP 404. An **ms-diagnostic** code of 35000, as described in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f) section 9.2.2, SHOULD accompany this rejection. If a call is still in the process of being parked at the orbit or is in the process of retrieval by another client, **auto-ringback**, or fallback, the CPS MUST reject the INVITE with a SIP 488.

If the orbit has successfully mapped to a parked call after the previous checks, the CPS MUST accept the **INVITE**. The CPS MUST identify itself by adding an "isCps" **feature** tag to its Contact URI. Feature tags are defined in [[RFC3840]](https://go.microsoft.com/fwlink/?LinkId=114244) section 10. After the dialog is established, the CPS MUST cancel the ringback timer and send a **REFER** with **Replaces** to the retriever. The SIP **REFER** method is defined in [[RFC3515]](https://go.microsoft.com/fwlink/?LinkId=90428). The **Refer-To** header MUST be set to the [**GRUU**](#gt_72fbc9c5-8485-465c-8b46-64895c8d5102) of the parkee for the call being retrieved, and the replaces **dialog-info** MUST be set to that of the **parkee-CPS** dialog.

#### CPS Transfer of the Retriever to the Parkee Succeeds

If the transfer of the retriever to the parkee succeeds, and the **ms-call-park** dialog from the parker to the CPS still exists, the CPS MUST send a SIP **INFO** message on this dialog with a **Content-Type** of **"application/ms-call-park+xml"**. The body of this message MUST be an **unpark-notification**. The **version** attribute MUST be set to "1.0". The **request-id** attribute MUST be set to that of the original **park-request**. The reason element MUST be set to "retrieval", and the **target** element MUST be set to the [**address-of-record**](#gt_bbd777fa-e9fd-4393-965f-b718a274659a) of the SIP user that retrieved the call.

The CPS MUST then send a **BYE** on the **parker-CPS** dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool, and release any resources associated with the parked call.

#### CPS Transfer of the Retriever to the Parkee Fails

If the transfer of the retriever to the parkee fails, it MUST terminate the **retriever-CPS** dialog with a SIP **BYE**. If the **parkee-CPS** dialog still exists, the auto-ringback timer is restarted.

If the **parkee-CPS** dialog no longer exists, but the parker-CPS **ms-call-park** dialog does exist, the CPS MUST send a SIP **INFO** message on this latter dialog with a **Content-Type** of "**application/ms-call-park+xml**". The body of this message MUST be an unpark-notification. The version attribute MUST be set to "1.0". The **request-id** attribute MUST be set to that of the original **park-request**. The **reason** element MUST be set to "hang-up", and the **target** element MUST NOT be present.

After sending the preceding notification, the CPS MUST then send a **BYE** on the **parker-CPS** dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool, and release any resources associated with the parked call.

#### CPS Transfer of the Parkee to the Parker Succeeds

When a transfer of the parkee to the parker ([**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21)) is successful, as described by steps 1 through 10 in the call flow of section [4.1.5](#Section_a831193c9e9543fea575ff09c29d0a48), and the **ms-call-park** dialog from the parker to the CPS still exists, the CPS MUST send a SIP **INFO** message on this dialog with a **Content-Type** of "application/ms-call-park+xml"". The body of this message MUST be an **unpark-notification**. The **version** attribute MUST be set to "1.0". The **request-id** attribute MUST be set to that of the original **park-request**. The reason element MUST be set to "ringback". If the target element is present, if MUST be set to the [**address-of-record**](#gt_bbd777fa-e9fd-4393-965f-b718a274659a) of the parker.

The CPS MUST then send a **BYE** on the parker-CPS dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool, and release any resources associated with the parked call.

#### CPS Transfer of the Parkee to the Parker Fails

When a transfer of the parkee to the parker (auto-ringback) fails because the parkee disconnects the call during the attempted transfer, the event MUST be handled as described in section [3.1.5.5](#Section_4cefa8a0d0b64b8fbf05066883ae49c3). Otherwise, the following processing applies.

The [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) MUST increment the ringback attempt count. If the count has not yet reached the maximum, the [**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21) timer MUST be restarted and additional processing of this event MUST NOT be done. Otherwise the following processing applies. The maximum number of auto-ringback attempts is not defined in the **ms-call-park** protocol; an implementation is free to choose any maximum, or to make the maximum user-configurable.

If the maximum ringback count has been reached and there is a configured fallback URI, the CPS MUST initiate a transfer of the parkee to that fallback URI. This MUST be done by sending a SIP **REFER** to the parkee. The **Refer-To** target of the transfer MUST be the configured fallback URI.

If the maximum ringback count has been reached and there is no configured fallback URI, the CPS MUST terminate the call with the parkee by sending a SIP **BYE**. If the control dialog with the parker is still active, the CPS MUST send an **unpark-notification** with a **reason** code of "drop". This notification MUST NOT contain a **target** element. After sending this notification, the CPS MUST then send a **BYE** on the **parker-CPS** dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool and release any resources associated with the parked call.

#### CPS Transfer of the Parkee to the Fallback Succeeds

When a transfer of the parkee to the fallback URI successfully completes, the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) MUST terminate its audio dialog with the [**parkee**](#gt_ce1dbb8a-397c-4858-878f-ea6f8a9585d4). If **CPS-parker** **ms-call-park** dialog still exists, the CPS MUST send an **unpark-notification** on a SIP **INFO** in the control dialog with the parker. The **reason** code in this **unpark-notification** element MUST be "fallback", and the **target** element SHOULD be set to the fallback URI. After sending this notification, the CPS MUST send a **BYE** on the **parker-CPS** dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool and release any resources associated with the parked call.

#### CPS Transfer of the Parkee to the Fallback Fails

When a transfer of the parkee to the fallback URI fails because the parkee disconnects the call during the attempted transfer, the event MUST be handled as described in section [3.1.5.5](#Section_4cefa8a0d0b64b8fbf05066883ae49c3). Otherwise, the following processing applies (for example: if the [**parkee**](#gt_ce1dbb8a-397c-4858-878f-ea6f8a9585d4) has placed the call with [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) on hold).

When a transfer of the parkee to the fallback URI fails for any other reason, the CPS MUST terminate the call with the parkee. If the control dialog with the parker is still active, the CPS MUST send an **unpark-notification** with a **reason** code of "drop". This notification MUST NOT contain a **target** element. After sending this notification, the CPS MUST then send a **BYE** on the **parker-CPS** dialog. This **BYE** SHOULD include an **ms-diagnostics** code of 35014 as defined in [[MS-OCER]](%5BMS-OCER%5D.pdf#Section_8b2b5ee560514f66b51e71102ef7782f). The CPS MUST return the orbit to the pool and release any resources associated with the parked call.

### Timer Events

When the [**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21) timer expires, the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) MUST send a **REFER** to the parkee. The **Refer-To** target of the transfer MUST be the parker’s [**address-of-record**](#gt_bbd777fa-e9fd-4393-965f-b718a274659a). The **Refer-To** MUST contain the escaped header "ms-sensitivity=private-no-diversion", so that the triggered **INVITE** will contain this SIP header. This header’s syntax and semantics are defined in [[MS-SIPRE]](%5BMS-SIPRE%5D.pdf#Section_ab4ab24937964ed18cecf496d81a1a83) section 2.2.10 and 3.9.5.2.1.

### Other Local Events

None.

# Protocol Examples

The following sections provide example of the protocols defined earlier in this document.

## ms-call-park

The following sections contain examples of the ms-call-park protocol. Note the consistent convention throughout the set of examples in these subsections:

* The call park service (CPS) is a logical entity inside a server that implements this protocol.
* Alice, Bob, Carol, and Dave are arbitrary users of a user agent client (UAC) that implements this protocol.
* Alice is the user that parks the call.
* Bob is the user whose call is parked.
* Carol is a user who retrieves Bob from the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d).
* Dave is the user whose SIP URI was previously configured in the CPS as the fallback.

Note that, for clarity, the following are omitted from the diagrams in the following examples (because they have no bearing on the ms-call-park protocol):

* SIP "1xx" provisional responses
* non-final NOTIFY messages for the REFER dialogs
* ICE re-INVITEs

Each of the preceding, however, is generated and processed according to the specifications in [[RFC3261]](https://go.microsoft.com/fwlink/?LinkId=90410).

### Park a Call

In this example, Alice and Bob are already in an audio conversation, and Alice decides to park Bob at the CPS, as shown in the following diagram.



Figure 2: Call parking call flow

The following are the sequence of events:

1. Alice sends a SIP [**INVITE**](#gt_d4b1b9b3-4b41-4686-aae0-afcd932693da) with a park-request element to the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d), specifying the communication medium to be parked (audio), the dialog information for the call, and the [**GRUU**](#gt_72fbc9c5-8485-465c-8b46-64895c8d5102) of the user that is in the referenced call.
2. INVITE sip:callparkservice.contoso.com@ contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA SIP/2.0
3. Via: SIP/2.0/TLS 172.24.32.147:53243
4. Max-Forwards: 70
5. From: <sip:alice@contoso.com>;tag=f7f67d48c8;epid=c9a8219cde
6. To: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>
7. Call-ID: d80ebcb31ffd4d6bbe4061291478dc00
8. CSeq: 1 INVITE
9. Contact: <sip:alice@contoso.com;opaque=user:epid:zNEfM3iQbV6i7RUjfAv4LQAA;gruu>
10. User-Agent: UCCAPI/4.0.7259.501 OC/4.0.7259.501 (Microsoft Communicator 2010 (Beta))
11. Ms-Conversation-ID: AcqulstFttoMXPODT9SSd7WYs+haWQ==
12. Supported: timer
13. Supported: histinfo
14. Supported: ms-safe-transfer
15. Supported: ms-sender
16. Supported: ms-early-media
17. ms-keep-alive: UAC;hop-hop=yes
18. Allow: INVITE, BYE, ACK, CANCEL, INFO, UPDATE, REFER, NOTIFY, BENOTIFY, OPTIONS
19. Proxy-Authorization: NTLM qop="auth", realm="SIP Communications Service", opaque="F1C4F39A", targetname="callparkservice.contoso.com", crand="6d34b235", cnum="180", response="010000003231396311f6bb00c225885e"
20. Content-Type: application/ms-call-park+xml
21. Content-Length: 357
22. <?xml version="1.0"?>
23. <park-request version="1.0" request-id="1">
24. <audio>
25. <dialog-info>
26. <call-id>0fa2623eb27c4fa1b61e5ea6544e8dd1</call-id>
27. <from-tag>fdb9094ccb</from-tag>
28. <to-tag>5d42553c6f</to-tag>
29. </dialog-info>
30. <target>sip:bob@contoso.com;opaque=user:epid:NbwN8db8n1uZbHVdCgJh0AAA;gruu</target>
31. </audio>

</park-request>

1. The CPS sends an **INVITE** with **Replaces** to the parkee. Here, it has SDP and a **Contact** header that indicate that it is streaming music on hold.
2. INVITE sip:172.24.33.241:51780;transport=tls;ms-opaque=1d722d38d1;ms-received-cid=93C000;grid SIP/2.0
3. Record-Route: <sip:callparkservice.contoso.com:5061;transport=tls;opaque=state:T:F:Ci.R93c000:Ieh.wPN9F9YaCxPXGgsTfcEVACdwFcvCY35DVD11HoRz7Nb-iNu1fe2BYn24cYBCwX4qWl3ELVtwAA;lr;ms-route-sig=fcpqENIhj3z5BDaZvtNxkXuRIOKm0Rdwq-jYxwX9sh0DgX4qWl3ELVtwAA>;tag=03DDFB3C955DC1EEFA829A26150FDBAD
4. Via: SIP/2.0/TLS 172.29.105.97:5061;branch=z9hG4bKF04DE060.A5A5E217A610871A;branched=TRUE;ms-internal-info="dp3PPLUp1SqNd-3b37waSFX0IMn3CV2L4-kSw1QH2ie34X4qWlsux72QAA"
5. Authentication-Info: TLS-DSK qop="auth", opaque="6C58FF34", srand="DF4B3AB2", snum="248", rspauth="4ccbe7bee9e868972257f7d22695308cc22136ad", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
6. Max-Forwards: 69
7. Content-Length: 3745
8. Via: SIP/2.0/TLS 172.29.105.97:52493;branch=z9hG4bKacf610b7;ms-received-port=52493;ms-received-cid=971400
9. P-Asserted-Identity: "Call Park Service"<sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>
10. From: "Call Park Service"<sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>;epid=9FC09D8ABF;tag=89e629df39
11. To: <sip:bob@contoso.com;opaque=user:epid:NbwN8db8n1uZbHVdCgJh0AAA;gruu>;epid=38e610bbd5
12. CSeq: 100 INVITE
13. Call-ID: 3734e209-9e6e-455e-8986-ac1acb135d0d
14. Contact: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;text;audio;video;image;+sip.rendering="no";isCps
15. Expires: 600
16. Priority: Normal
17. Supported: Replaces
18. Supported: ms-dialog-route-set-update
19. Supported: timer
20. Supported: 100rel
21. Supported: gruu-10
22. User-Agent: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
23. Content-Type: multipart/alternative; boundary=aMHda3MG7oSOMCuhrx23ZCRDS9ibp9Vk
24. Allow: ACK
25. replaces: 0fa2623eb27c4fa1b61e5ea6544e8dd1;from-tag=fdb9094ccb;to-tag=5d42553c6f
26. Ms-Conversation-ID: b3e492f404ea4a7f9ac521f741d61bb3
27. Session-Expires: 320
28. Min-SE: 90
29. Allow: CANCEL,BYE,INVITE,MESSAGE,INFO,SERVICE,OPTIONS,BENOTIFY,NOTIFY,PRACK,UPDATE
30. History-Info: <sip:bob@contoso.com>;index=1
31. --aMHda3MG7oSOMCuhrx23ZCRDS9ibp9Vk
32. Content-Type: application/sdp
33. Content-ID: 832e213d-1282-4044-89d3-e1c21063e1e6
34. Content-Disposition: session;handling=optional;ms-proxy-2007fallback
35. v=0
36. o=- 90 0 IN IP4 172.29.105.97
37. s=session
38. c=IN IP4 172.29.105.97
39. b=CT:100000
40. t=0 0
41. m=audio 54594 RTP/SAVP 112 111 0 8 116 4 13 118 97
42. c=IN IP4 172.29.105.97
43. a=rtcp:54595
44. a=candidate:Qz9KjMOw3l4xWjjAisUuiqvW82Lz+1Ie9eC0G9iS/dw 1 KeJs2nKyybxoNxPExpecJw UDP 0.830 172.29.105.97 54594
45. a=candidate:Qz9KjMOw3l4xWjjAisUuiqvW82Lz+1Ie9eC0G9iS/dw 2 KeJs2nKyybxoNxPExpecJw UDP 0.830 172.29.105.97 54595
46. a=candidate:jKBvXbUbFuTZbkOo1GNxHh+vxZ92Fx1rmeNNV7KHS4w 1 n8w9Nozwe6xhmg/CcTx5wg TCP 0.150 172.29.104.128 53246
47. a=candidate:jKBvXbUbFuTZbkOo1GNxHh+vxZ92Fx1rmeNNV7KHS4w 2 n8w9Nozwe6xhmg/CcTx5wg TCP 0.150 172.29.104.128 53246
48. a=candidate:TBbV97WIGDJh2f0wcO3LgHCVswZT93Ms9mILCCaXJZ0 1 R4nqch2vZr63eY56p8Sa1w UDP 0.450 172.29.104.128 59031
49. a=candidate:TBbV97WIGDJh2f0wcO3LgHCVswZT93Ms9mILCCaXJZ0 2 R4nqch2vZr63eY56p8Sa1w UDP 0.450 172.29.104.128 53458
50. a=candidate:56uDx5Qr3fqMel4PXaL1GNxiTNwFPbDMXV9EIlw2qPM 1 ckrQJz914WKbvjjO92koFA TCP 0.250 172.29.105.97 49389
51. a=candidate:56uDx5Qr3fqMel4PXaL1GNxiTNwFPbDMXV9EIlw2qPM 2 ckrQJz914WKbvjjO92koFA TCP 0.250 172.29.105.97 49389
52. a=label:main-audio
53. a=cryptoscale:1 client AES\_CM\_128\_HMAC\_SHA1\_80 inline:U5AwqxEVWzlswsc3ESNuqxZsyjF/8o2EVmpy3ghr|2^31|1:1
54. a=crypto:2 AES\_CM\_128\_HMAC\_SHA1\_80 inline:L+RBO8KufEk/IB+YwG6awdrvCdvZyw9gUYv5wks5|2^31|1:1
55. a=crypto:3 AES\_CM\_128\_HMAC\_SHA1\_80 inline:ijE6xzUzoeubNucTU2Q+Ti/j0EmlXBcd5U0oKA5n|2^31
56. a=sendonly
57. a=rtpmap:112 G7221/16000
58. a=fmtp:112 bitrate=24000
59. a=rtpmap:111 SIREN/16000
60. a=fmtp:111 bitrate=16000
61. a=rtpmap:0 PCMU/8000
62. a=rtpmap:8 PCMA/8000
63. a=rtpmap:116 AAL2-G726-32/8000
64. a=rtpmap:4 G723/8000
65. a=rtpmap:13 CN/8000
66. a=rtpmap:118 CN/16000
67. a=rtpmap:97 RED/8000
68. --aMHda3MG7oSOMCuhrx23ZCRDS9ibp9Vk
69. Content-Type: application/sdp
70. Content-ID: 4ce3b538-08e8-47ea-ba52-d1c05b819e68
71. v=0
72. o=- 91 0 IN IP4 172.29.105.97
73. s=session
74. c=IN IP4 172.29.105.97
75. b=CT:100000
76. t=0 0
77. m=audio 55486 RTP/SAVP 112 111 0 8 116 4 13 118 97
78. c=IN IP4 172.29.105.97
79. a=rtcp:55487
80. a=ice-ufrag:MDhj
81. a=ice-pwd:tANsCintAKGCI2C+TBKJzZi9
82. a=candidate:1 1 UDP 2130706431 172.29.105.97 55486 typ host
83. a=candidate:1 2 UDP 2130705918 172.29.105.97 55487 typ host
84. a=candidate:2 1 tcp-pass 6555135 172.29.104.128 58409 typ relay raddr 172.29.105.97 rport 52609
85. a=candidate:2 2 tcp-pass 6555134 172.29.104.128 58409 typ relay raddr 172.29.105.97 rport 52609
86. a=candidate:3 1 UDP 16647679 172.29.104.128 57190 typ relay raddr 172.29.105.97 rport 50314
87. a=candidate:3 2 UDP 16647678 172.29.104.128 55772 typ relay raddr 172.29.105.97 rport 50315
88. a=candidate:4 1 tcp-act 7076863 172.29.104.128 58409 typ relay raddr 172.29.105.97 rport 52609
89. a=candidate:4 2 tcp-act 7076350 172.29.104.128 58409 typ relay raddr 172.29.105.97 rport 52609
90. a=candidate:5 1 tcp-act 1684797951 172.29.105.97 52609 typ srflx raddr 172.29.105.97 rport 52609
91. a=candidate:5 2 tcp-act 1684797438 172.29.105.97 52609 typ srflx raddr 172.29.105.97 rport 52609
92. a=label:main-audio
93. a=cryptoscale:1 client AES\_CM\_128\_HMAC\_SHA1\_80 inline:U5AwqxEVWzlswsc3ESNuqxZsyjF/8o2EVmpy3ghr|2^31|1:1
94. a=crypto:2 AES\_CM\_128\_HMAC\_SHA1\_80 inline:L+RBO8KufEk/IB+YwG6awdrvCdvZyw9gUYv5wks5|2^31|1:1
95. a=crypto:3 AES\_CM\_128\_HMAC\_SHA1\_80 inline:ijE6xzUzoeubNucTU2Q+Ti/j0EmlXBcd5U0oKA5n|2^31
96. a=sendonly
97. a=feature:MoH
98. a=rtpmap:112 G7221/16000
99. a=fmtp:112 bitrate=24000
100. a=rtpmap:111 SIREN/16000
101. a=fmtp:111 bitrate=16000
102. a=rtpmap:0 PCMU/8000
103. a=rtpmap:8 PCMA/8000
104. a=rtpmap:116 AAL2-G726-32/8000
105. a=rtpmap:4 G723/8000
106. a=rtpmap:13 CN/8000
107. a=rtpmap:118 CN/16000
108. a=rtpmap:97 RED/8000
109. --aMHda3MG7oSOMCuhrx23ZCRDS9ibp9Vk—
110. Park response from CPS to parker.
111. SIP/2.0 200 OK
112. Authentication-Info: NTLM qop="auth", opaque="A3EEB267", srand="A7F38F5A", snum="159", rspauth="0100000000000000b328734a6251281e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
113. Via: SIP/2.0/TLS 172.24.32.147:52774;ms-received-port=52774;ms-received-cid=A94F00
114. FROM: "Alice"<sip:alice@contoso.com>;tag=65c0e6ba25;epid=c9a8219cde
115. TO: "Call Park Service"<sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;tag=bd5d9ee6e;epid=9FC09D8ABF
116. CSEQ: 1 INVITE
117. CALL-ID: 902cb5a0511c49f5a0b3c4c90f9c396a
118. RECORD-ROUTE: <sip:callparkservice.contoso.com:5061;transport=tls;opaque=state:F:Ci.Ra94f00;lr;ms-route-sig=gcsOHIxQhEzOTEufH-s3Q1VY2YJJC3uNWKq1GPad2DmTbf3fd43ELVtwAA>
119. CONTACT: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;text;audio;video;image;+sip.rendering="no";isCps
120. CONTENT-LENGTH: 364
121. SUPPORTED: ms-dialog-route-set-update
122. SUPPORTED: gruu-10
123. SUPPORTED: ms-dialog-route-set-update
124. SUPPORTED: timer
125. SUPPORTED: 100rel
126. CONTENT-TYPE: application/ms-call-park+xml
127. ALLOW: ACK
128. SERVER: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
129. Allow: CANCEL,BYE,INVITE,PRACK,UPDATE
130. Session-Expires: 320;refresher=uac
131. Min-SE: 90
132. <?xml version="1.0"?><park-response xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema" version="1.0" request-id="1" xmlns="http://schemas.microsoft.com/rtc/2008/12/callpark">
133. <orbit>1504</orbit>
134. <ms-parked-call>3e851601-72d9-40d8-88d7-647e6ab8a7d5;from-tag=76ea4cdd28;to-tag=2950af20b5</ms-parked-call>
135. </park-response>

### Retrieve a Parked Call

Now, Carol wants to retrieve Bob’s call from the CPS by calling the [**orbit**](#gt_735d0008-c155-4547-b948-825ffc1b7458) that was verbally given to her by Alice over an intercom system, as shown in the following diagram.



Figure 3: Call retrieval call flow

The following are the sequence of events:

1. **INVITE** from retriever to the CPS (orbit).
2. INVITE sip:1561;phone-context=defaultprofile@contoso.com;user=phone SIP/2.0
3. Via: SIP/2.0/TLS 172.24.32.147:53243
4. Max-Forwards: 70
5. From: <sip:carol@contoso.com>;tag=7c4136f3b6;epid=c9a8219cde
6. To: <sip:1561;phone-context=defaultprofile@contoso.com;user=phone>
7. Call-ID: a19e7ff9ec9243bb9416276afe7bc707
8. CSeq: 1 INVITE
9. Contact: <sip:carol@contoso.com;opaque=user:epid:zNEfM3iQbV6i7RUjfAv4LQAA;gruu>
10. User-Agent: UCCAPI/4.0.7259.501 OC/4.0.7259.501 (Microsoft Communicator 2010 (Beta))
11. Ms-Conversation-ID: Acqult1rcSuM8PsUQRuPSG8+8eSpXQ==
12. Supported: timer
13. Supported: histinfo
14. Supported: ms-safe-transfer
15. Supported: ms-sender
16. Supported: ms-early-media
17. Supported: 100rel
18. ms-keep-alive: UAC;hop-hop=yes
19. Allow: INVITE, BYE, ACK, CANCEL, INFO, UPDATE, REFER, NOTIFY, BENOTIFY, OPTIONS
20. Accept-Language: en-US
21. P-Preferred-Identity: <sip:carol@contoso.com>, <tel:+16045009855>
22. Supported: replaces
23. Supported: ms-conf-invite
24. Proxy-Authorization: NTLM qop="auth", realm="SIP Communications Service", opaque="F1C4F39A", targetname="callparkservice.contoso.com", crand="1a5dd029", cnum="190", response="0100000032313963e2810a50c225885e"
25. Content-Type: multipart/alternative;boundary="----=\_NextPart\_000\_0112\_01CAAE53.CFA8DF70"
26. Content-Length: 4254
27. ------=\_NextPart\_000\_0112\_01CAAE53.CFA8DF70
28. Content-Type: application/sdp
29. Content-Transfer-Encoding: 7bit
30. Content-ID: <b489599777aa430b9da31348efb50512>
31. Content-Disposition: session; handling=optional; ms-proxy-2007fallback
32. v=0
33. o=- 0 0 IN IP4 172.24.32.147
34. s=session
35. c=IN IP4 172.24.32.147
36. b=CT:99980
37. t=0 0
38. m=audio 1430 RTP/SAVP 114 9 112 111 0 8 116 115 4 97 13 118 101
39. a=candidate:7glJym+8xXYE7ln4CPtnW97wVR8b1x13R9zyw0kv6VE 1 6+KIe3erFJRpXVNobDG8uA UDP 0.830 172.24.32.147 1430
40. a=candidate:7glJym+8xXYE7ln4CPtnW97wVR8b1x13R9zyw0kv6VE 2 6+KIe3erFJRpXVNobDG8uA UDP 0.830 172.24.32.147 1431
41. a=candidate:G8WU/wakZ6vcWLH6HmGVlqW9TgT/GvwMkgbcyXKmHR4 1 7IxYkxgPD44+SOOReDn6Ug TCP 0.190 172.29.104.128 52522
42. a=candidate:G8WU/wakZ6vcWLH6HmGVlqW9TgT/GvwMkgbcyXKmHR4 2 7IxYkxgPD44+SOOReDn6Ug TCP 0.190 172.29.104.128 52522
43. a=candidate:hXdZC/YfrrZ7gB1mBbhOvbCobZ/5uB+HPL2u9LfPF1Q 1 8TReKb/S6hKU9rTJwOJnUw UDP 0.490 172.29.104.128 57440
44. a=candidate:hXdZC/YfrrZ7gB1mBbhOvbCobZ/5uB+HPL2u9LfPF1Q 2 8TReKb/S6hKU9rTJwOJnUw UDP 0.490 172.29.104.128 57209
45. a=candidate:nc60zTy88o3N6IeFZUQqKxm11LfE1uzgs9Cb6FotTGU 1 izGbS0hUf7lWPrHeNbomoA TCP 0.250 172.24.32.147 12113
46. a=candidate:nc60zTy88o3N6IeFZUQqKxm11LfE1uzgs9Cb6FotTGU 2 izGbS0hUf7lWPrHeNbomoA TCP 0.250 172.24.32.147 12113
47. a=cryptoscale:1 client AES\_CM\_128\_HMAC\_SHA1\_80 inline:R6tc6M3JBw+FSAaAV28BjGaY58SA/Sby+3VC5vEg|2^31|1:1
48. a=crypto:2 AES\_CM\_128\_HMAC\_SHA1\_80 inline:SC+2HWHlPpzL+AFRHPQUOh87XJLuWqGfMyBD2PEx|2^31|1:1
49. a=crypto:3 AES\_CM\_128\_HMAC\_SHA1\_80 inline:KO7nWgLW+1kiIcbtrxHhKs0FySzQvwKzAUIeCxPP|2^31
50. a=maxptime:200
51. a=rtpmap:114 x-msrta/16000
52. a=fmtp:114 bitrate=29000
53. a=rtpmap:9 G722/8000
54. a=fmtp:9 bitrate=64000
55. a=rtpmap:112 G7221/16000
56. a=fmtp:112 bitrate=24000
57. a=rtpmap:111 SIREN/16000
58. a=fmtp:111 bitrate=16000
59. a=rtpmap:0 PCMU/8000
60. a=rtpmap:8 PCMA/8000
61. a=rtpmap:116 AAL2-G726-32/8000
62. a=rtpmap:115 x-msrta/8000
63. a=fmtp:115 bitrate=11800
64. a=rtpmap:4 G723/8000
65. a=rtpmap:97 RED/8000
66. a=rtpmap:13 CN/8000
67. a=rtpmap:118 CN/16000
68. a=rtpmap:101 telephone-event/8000
69. a=fmtp:101 0-16
70. a=encryption:required
71. ------=\_NextPart\_000\_0112\_01CAAE53.CFA8DF70
72. Content-Type: application/sdp
73. Content-Transfer-Encoding: 7bit
74. Content-ID: <13540bd27847415a80d642719d10b62e>
75. Content-Disposition: session; handling=optional
76. v=0
77. o=- 0 0 IN IP4 172.24.32.147
78. s=session
79. c=IN IP4 172.24.32.147
80. b=CT:99980
81. t=0 0
82. m=audio 3464 RTP/SAVP 114 9 112 111 0 8 116 115 4 97 13 118 101
83. a=ice-ufrag:9PRU
84. a=ice-pwd:L55ePii649rP6SFRt15b8aSx
85. a=candidate:1 1 UDP 2130706431 172.24.32.147 3464 typ host
86. a=candidate:1 2 UDP 2130705918 172.24.32.147 3465 typ host
87. a=candidate:2 1 TCP-PASS 6556159 172.29.104.128 54033 typ relay raddr 172.24.32.147 rport 12130
88. a=candidate:2 2 TCP-PASS 6556158 172.29.104.128 54033 typ relay raddr 172.24.32.147 rport 12130
89. a=candidate:3 1 UDP 16648703 172.29.104.128 51922 typ relay raddr 172.24.32.147 rport 12194
90. a=candidate:3 2 UDP 16648702 172.29.104.128 57455 typ relay raddr 172.24.32.147 rport 12195
91. a=candidate:4 1 TCP-ACT 7076863 172.29.104.128 54033 typ relay raddr 172.24.32.147 rport 12130
92. a=candidate:4 2 TCP-ACT 7076350 172.29.104.128 54033 typ relay raddr 172.24.32.147 rport 12130
93. a=candidate:5 1 TCP-ACT 1684797951 172.24.32.147 12130 typ srflx raddr 172.24.32.147 rport 12130
94. a=candidate:5 2 TCP-ACT 1684797438 172.24.32.147 12130 typ srflx raddr 172.24.32.147 rport 12130
95. a=cryptoscale:1 client AES\_CM\_128\_HMAC\_SHA1\_80 inline:R6tc6M3JBw+FSAaAV28BjGaY58SA/Sby+3VC5vEg|2^31|1:1
96. a=crypto:2 AES\_CM\_128\_HMAC\_SHA1\_80 inline:SC+2HWHlPpzL+AFRHPQUOh87XJLuWqGfMyBD2PEx|2^31|1:1
97. a=crypto:3 AES\_CM\_128\_HMAC\_SHA1\_80 inline:KO7nWgLW+1kiIcbtrxHhKs0FySzQvwKzAUIeCxPP|2^31
98. a=maxptime:200
99. a=rtpmap:114 x-msrta/16000
100. a=fmtp:114 bitrate=29000
101. a=rtpmap:9 G722/8000
102. a=fmtp:9 bitrate=64000
103. a=rtpmap:112 G7221/16000
104. a=fmtp:112 bitrate=24000
105. a=rtpmap:111 SIREN/16000
106. a=fmtp:111 bitrate=16000
107. a=rtpmap:0 PCMU/8000
108. a=rtpmap:8 PCMA/8000
109. a=rtpmap:116 AAL2-G726-32/8000
110. a=rtpmap:115 x-msrta/8000
111. a=fmtp:115 bitrate=11800
112. a=rtpmap:4 G723/8000
113. a=rtpmap:97 RED/8000
114. a=rtpmap:13 CN/8000
115. a=rtpmap:118 CN/16000
116. a=rtpmap:101 telephone-event/8000
117. a=fmtp:101 0-16
118. a=encryption:required
119. ------=\_NextPart\_000\_0112\_01CAAE53.CFA8DF70--
120. 200 OK response from the CPS to the retriever.
121. SIP/2.0 200 OK
122. Authentication-Info: NTLM qop="auth", opaque="F1C4F39A", srand="A9E7FBEB", snum="289", rspauth="010000000000000027f917b4c225885e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
123. Via: SIP/2.0/TLS 172.24.32.147:53243;ms-received-port=53243;ms-received-cid=93AD00
124. FROM: "Carol"<sip:carol@contoso.com>;tag=7c4136f3b6;epid=c9a8219cde
125. TO: "Call Park Service"<sip:1561;phone-context=defaultprofile@contoso.com;user=phone>;tag=3840f02e1;epid=9FC09D8ABF
126. CSEQ: 1 INVITE
127. CALL-ID: a19e7ff9ec9243bb9416276afe7bc707
128. RECORD-ROUTE: <sip:callparkservice.contoso.com:5061;transport=tls;lr>,<sip:callparkservice.contoso.com:5061;transport=tls;opaque=state:F:Ci.R93ad00;lr;ms-route-sig=fcFKiRGz\_gyy36K7L9GluERFkSKBfs9OrDO\_37HbOAksl2aC873ELVtwAA>
129. CONTACT: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;text;audio;video;image;+sip.rendering="no";isCps
130. CONTENT-LENGTH: 1600
131. PRIORITY: Normal
132. SUPPORTED: Replaces
133. SUPPORTED: ms-dialog-route-set-update
134. SUPPORTED: gruu-10
135. SUPPORTED: ms-dialog-route-set-update
136. SUPPORTED: timer
137. SUPPORTED: 100rel
138. CONTENT-TYPE: application/sdp
139. ALLOW: ACK
140. P-ASSERTED-IDENTITY: "Call Park Service"<sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>
141. SERVER: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
142. Content-ID: 87154620-82d8-450d-8ef4-6abbb3d8286c
143. Ms-Conversation-ID: 2a3c6c9a81344c02afac4134a4c4a1d5
144. test: ValueType
145. Allow: CANCEL,BYE,INVITE,MESSAGE,INFO,SERVICE,OPTIONS,BENOTIFY,NOTIFY,PRACK,UPDATE
146. Session-Expires: 320;refresher=uac
147. Min-SE: 90
148. v=0
149. o=- 92 0 IN IP4 172.29.105.97
150. s=session
151. c=IN IP4 172.29.105.97
152. b=CT:100000
153. t=0 0
154. m=audio 49880 RTP/SAVP 112 111 0 8 116 4 13 118 97 101
155. c=IN IP4 172.29.105.97
156. a=rtcp:49881
157. a=ice-ufrag:jlXc
158. a=ice-pwd:7Jp4lSce/OsXrTRZXv54hlwl
159. a=candidate:1 1 UDP 2130706431 172.29.105.97 49880 typ host
160. a=candidate:1 2 UDP 2130705918 172.29.105.97 49881 typ host
161. a=candidate:2 1 tcp-pass 6555135 172.29.104.128 57627 typ relay raddr 172.29.105.97 rport 49344
162. a=candidate:2 2 tcp-pass 6555134 172.29.104.128 57627 typ relay raddr 172.29.105.97 rport 49344
163. a=candidate:3 1 UDP 16647679 172.29.104.128 53203 typ relay raddr 172.29.105.97 rport 49394
164. a=candidate:3 2 UDP 16647678 172.29.104.128 58574 typ relay raddr 172.29.105.97 rport 49395
165. a=candidate:4 1 tcp-act 7076863 172.29.104.128 57627 typ relay raddr 172.29.105.97 rport 49344
166. a=candidate:4 2 tcp-act 7076350 172.29.104.128 57627 typ relay raddr 172.29.105.97 rport 49344
167. a=candidate:5 1 tcp-act 1684797951 172.29.105.97 49344 typ srflx raddr 172.29.105.97 rport 49344
168. a=candidate:5 2 tcp-act 1684797438 172.29.105.97 49344 typ srflx raddr 172.29.105.97 rport 49344
169. a=label:main-audio
170. a=crypto:2 AES\_CM\_128\_HMAC\_SHA1\_80 inline:yXC7Fbiponz6NoAhfxgWEWRNmBxqBp23KK6kUxfe|2^31|1:1
171. a=inactive
172. a=rtpmap:112 G7221/16000
173. a=fmtp:112 bitrate=24000
174. a=rtpmap:111 SIREN/16000
175. a=fmtp:111 bitrate=16000
176. a=rtpmap:0 PCMU/8000
177. a=rtpmap:8 PCMA/8000
178. a=rtpmap:116 AAL2-G726-32/8000
179. a=rtpmap:4 G723/8000
180. a=rtpmap:13 CN/8000
181. a=rtpmap:118 CN/16000
182. a=rtpmap:97 RED/8000
183. a=rtpmap:101 telephone-event/8000
184. a=fmtp:101 0-16,36
185. a=encryption:rejected
186. **REFER** with **Replaces** from the CPS to the retriever.
187. REFER sip:172.24.32.147:53243;transport=tls;ms-opaque=9ef8a0c1a7;ms-received-cid=93AD00;grid SIP/2.0
188. Record-Route: <sip:callparkservice.contoso.com:5061;transport=tls;opaque=state:F:Ci.R93ad00;lr;ms-route-sig=fc33YHhnWIrn64ChTBmCxvUU0eGVhjM2iafkHMCc8oPZATot9h3ELVtwAA>;ms-rrsig=fcwEOV0eT3SysJWhlv2ihhAzRNg2Cm\_nucYepdBTAAOZsTot9h3ELVtwAA;tag=03DDFB3C955DC1EEFA829A26150FDBAD
189. Via: SIP/2.0/TLS 172.29.105.97:5061;branch=z9hG4bK4763AD94.61DFA213A9538728;branched=FALSE;ms-internal-info="dpCKv2Ef778Hz2DmLZumqqt2Q0mI2U0VWM5E9MiQY6rssTot9hsux72QAA"
190. Authentication-Info: NTLM qop="auth", opaque="F1C4F39A", srand="4B931040", snum="290", rspauth="0100000065003e00a56b0937c225885e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
191. Max-Forwards: 68
192. Via: SIP/2.0/TLS 172.29.105.97:49715;branch=z9hG4bKABCD3AAA.C6B4B18CA9538728;branched=FALSE;ms-received-port=49715;ms-received-cid=93B800
193. Record-Route: <sip:callparkservice.contoso.com:5061;transport=tls;lr>;tag=03DDFB3C955DC1EEFA829A26150FDBAD
194. Via: SIP/2.0/TLS 172.29.105.97:52500;branch=z9hG4bK86f04a78;ms-received-port=52500;ms-received-cid=971600
195. FROM: <sip:1561;phone-context=defaultprofile@contoso.com;user=phone>;epid=9FC09D8ABF;tag=3840f02e1
196. TO: <sip:carol@contoso.com>;epid=c9a8219cde;tag=7c4136f3b6
197. CSEQ: 1 REFER
198. CALL-ID: a19e7ff9ec9243bb9416276afe7bc707
199. CONTACT: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;text;audio;video;image;+sip.rendering="no";isCps
200. CONTENT-LENGTH: 0
201. EXPIRES: 600
202. REFER-TO: <sip:bob@contoso.com;opaque=user:epid:NbwN8db8n1uZbHVdCgJh0AAA;gruu?REPLACES=3734e209-9e6e-455e-8986-ac1acb135d0d%3Bfrom-tag%3D89e629df39%3Bto-tag%3D945de20b6b>
203. REFERRED-BY: <sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>
204. SUPPORTED: ms-dialog-route-set-update
205. SUPPORTED: gruu-10
206. USER-AGENT: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
207. P-ASSERTED-IDENTITY: "Call Park Service"<sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>
208. REPLACES: 3734e209-9e6e-455e-8986-ac1acb135d0d;from-tag=89e629df39;to-tag=945de20b6b
209. Unpark-notification from the CPS to the parker.
210. INFO sip:172.24.32.147:53243;transport=tls;ms-opaque=9ef8a0c1a7;ms-received-cid=93AD00;grid SIP/2.0
211. Via: SIP/2.0/TLS 172.29.105.97:5061;branch=z9hG4bK6C9F3A20.EF80794F7CF82A8A;branched=FALSE;ms-internal-info="aqmh5h6vyOWEFfB4yyo\_5KvxKjV6QD8Cy0DZdBXFOjZ1RPeYDvsux72QAA"
212. Authentication-Info: NTLM qop="auth", opaque="F1C4F39A", srand="7717EE53", snum="368", rspauth="010000000000000027da1308c225885e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
213. Max-Forwards: 69
214. Via: SIP/2.0/TLS 172.29.105.97:53098;branch=z9hG4bKcbf4261;ms-received-port=53098;ms-received-cid=988A00
215. FROM: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;epid=9FC09D8ABF;tag=658f588fa7
216. TO: <sip:alice@contoso.com>;epid=c9a8219cde;tag=ceb4ba7ad8
217. CSEQ: 1 INFO
218. CALL-ID: fc4419ac7c694c57b5d6a9b457f054a9
219. CONTENT-LENGTH: 352
220. SUPPORTED: ms-dialog-route-set-update
221. USER-AGENT: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
222. CONTENT-TYPE: application/ms-call-park+xml
223. <?xml version="1.0"?><unpark-notification xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema" version="1.0" request-id="1" xmlns="http://schemas.microsoft.com/rtc/2008/12/callpark">
224. <reason>retrieval</reason>
225. <target>sip:carol@contoso.com</target></unpark-notification>

### Failure to Park a Call

In this example, Alice and Bob are already in an audio conversation. Alice attempts to park Bob at the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d), but the operation fails because there were no free orbits in the pool. The **INVITE** is sent as illustrated in section [4.1.1](#Section_0c415b455a5247c28b8b6a7cf900adfd). The SIP 500 failure response is as shown in the following code example. The **ms-diagnostics** provides the client with the specific reason that there are no free orbits left in the pool. The following diagram shows the scenario.



Figure 4: Call park failure call flow

1. SIP/2.0 500 Not Acceptable Here
2. Authentication-Info: NTLM qop="auth", opaque="F1C4F39A", srand="39318B7B", snum="73", rspauth="01000000636f72703502ba47c225885e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
3. Via: SIP/2.0/TLS 172.24.32.147:53243;ms-received-port=53243;ms-received-cid=93AD00
4. FROM: "Alice"<sip:alice@contoso.com>;tag=3140dd2ac8;epid=c9a8219cde
5. TO: "Call Park Service"<sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;tag=8eb9b1841;epid=9FC09D8ABF
6. CSEQ: 1 INVITE
7. CALL-ID: 5ada44a9ad874ceea6a8bba545b72eec
8. CONTENT-LENGTH: 0
9. SERVER: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
10. ms-diagnostics-public: 35002;reason=" No more available orbits"

### Failure to Retrieve a Parked Call

In this example, Carol dials the [**orbit**](#gt_735d0008-c155-4547-b948-825ffc1b7458) that she was given by Alice (not depicted). The retrieve operation fails because Bob has already hung up. The **INVITE** is sent as illustrated in section [4.1.2](#Section_ac9974faad8548a391a5b9378b14af31). The failure SIP 404 response is as shown in the following diagram. The **ms-diagnostics** provides the client with the specific reason that no call was found at the orbit that was dialed. The following diagram shows the scenario.



Figure 5: Call retrieve failure call flow

1. SIP/2.0 404 Not Found
2. Authentication-Info: NTLM qop="auth", opaque="F1C4F39A", srand="4462AD0E", snum="122", rspauth="010000000000000022721bb1c225885e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
3. Via: SIP/2.0/TLS 172.24.32.147:53243;ms-received-port=53243;ms-received-cid=93AD00
4. FROM: "Alice"<sip:alice@contoso.com>;tag=8c3c64ab12;epid=c9a8219cde
5. TO: "Call Park Service"<sip:1610;phone-context=defaultprofile@contoso.com;user=phone>;tag=6bf9148926;epid=9FC09D8ABF
6. CSEQ: 1 INVITE
7. CALL-ID: a00e8b60829649bc8e4803f55202bfbe
8. CONTENT-LENGTH: 0
9. PRIORITY: Normal
10. SUPPORTED: Replaces
11. P-ASSERTED-IDENTITY: "Call Park Service"<sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>
12. SERVER: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
13. ms-diagnostics-public: 35000;reason="Orbit not found"Ms-Conversation-ID: 2a3c6c9a81344c02afac4134a4c4a1d5

### Auto-Ringback Is Answered by the Parker

In this example, Bob’s call has been parked at the server for too long, so the [**CPS**](#gt_b898beb5-0dda-426c-9587-f2686ad53b5d) initiates an [**auto-ringback**](#gt_b7809be1-298a-4f57-98f2-558c55151d21), sending it back to the user who parked it (Alice). Alice answers this incoming call. The following diagram shows the scenario.



Figure 6: Auto-ringback call flow

The following is the sequence of events.

1. The CPS refers Bob back to the original parker (Alice). The **Refer-To** header contains an escaped **ms-sensitivity** header that will prevent Alice’s voicemail from automatically answering this call.
2. REFER sip:172.24.33.241:51780;transport=tls;ms-opaque=1d722d38d1;ms-received-cid=93C000;grid SIP/2.0
3. Record-Route: <sip:callparkservice.contoso.com:5061;transport=tls;opaque=state:T:F:Ci.R93c000:Ieh.wPN9F9YaCxPXGgsTfcNiXMO1va0pg9kGHtbWO5uwPB8XfNpm\_6TLQtnrQu71MippNy3ELVtwAA;lr;ms-route-sig=fcDnk7eC6-ioeJreYCrFx4VneIRDKeXlDnKyxVQ6UJ46UippNy3ELVtwAA>;tag=03DDFB3C955DC1EEFA829A26150FDBAD
4. Via: SIP/2.0/TLS 172.29.105.97:5061;branch=z9hG4bKB4652A68.7293A62227ECDD47;branched=FALSE;ms-internal-info="aqDW1SFf1td8hYZ46OltTFqqPWqp-nQpCukZOY1vh4NzwippNysux72QAA"
5. Authentication-Info: TLS-DSK qop="auth", opaque="6C58FF34", srand="472D422C", snum="485", rspauth="5ccd8289853502c316cb46d3474ac238216a49cc", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
6. Max-Forwards: 69
7. Via: SIP/2.0/TLS 172.29.105.97:53551;branch=z9hG4bK7c84ac40;ms-received-port=53551;ms-received-cid=99A000
8. FROM: <sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>;epid=9FC09D8ABF;tag=a07dbb9f2d
9. TO: <sip:bob@contoso.com;opaque=user:epid:NbwN8db8n1uZbHVdCgJh0AAA;gruu>;epid=38e610bbd5;tag=63ad71d932
10. CSEQ: 116 REFER
11. CALL-ID: 4b3604e4-7130-4608-86ad-d2e5718b4626
12. CONTACT: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;text;audio;video;image;+sip.rendering="no";isCps
13. CONTENT-LENGTH: 0
14. EXPIRES: 600
15. REFER-TO: <sip:alice@contoso.com?ms-sensitivity=private-no-diversion>
16. REFERRED-BY: <sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>;ms-referee-uri="sip:bob@contoso.com"
17. SUPPORTED: ms-dialog-route-set-update
18. SUPPORTED: gruu-10
19. USER-AGENT: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
20. P-ASSERTED-IDENTITY: "Call Park Service"<sip:RtcApplication-49804d56-9297-4f58-be0a-0872df68b817@contoso.com>
21. After the auto-ringback has been successfully answered, the CPS sends an **unpark-notification** to the original parker (Alice).
22. INFO sip:172.24.32.147:53243;transport=tls;ms-opaque=9ef8a0c1a7;ms-received-cid=93AD00;grid SIP/2.0
23. Via: SIP/2.0/TLS 172.29.105.97:5061;branch=z9hG4bK6CD71B75.EE6B06F2293ACD4C;branched=FALSE;ms-internal-info="aqdRZF\_shkBibefV4cKrf5cznHs5Rmwa30urp2KWm3hRzyBmvusux72QAA"
24. Authentication-Info: NTLM qop="auth", opaque="F1C4F39A", srand="8F87CCF5", snum="500", rspauth="0100000000000000beab4f88c225885e", targetname="callparkservice.contoso.com", realm="SIP Communications Service", version=4
25. Max-Forwards: 69
26. Via: SIP/2.0/TLS 172.29.105.97:53594;branch=z9hG4bK199fe9bf;ms-received-port=53594;ms-received-cid=99AA00
27. FROM: <sip:callparkservice.contoso.com@contoso.com;gruu;opaque=srvr:Microsoft.Rtc.Applications.Cps:4H28w6olDlm9KG3nl5tyBQAA>;epid=9FC09D8ABF;tag=79b542798
28. TO: <sip:alice@contoso.com>;epid=c9a8219cde;tag=972664809d
29. CSEQ: 1 INFO
30. CALL-ID: 173c5a778fc54a458a82f44f6acbd276
31. CONTENT-LENGTH: 275
32. SUPPORTED: ms-dialog-route-set-update
33. USER-AGENT: RTCC/4.0.0.0 Call\_Park\_Service\_1.0
34. CONTENT-TYPE: application/ms-call-park+xml
35. <?xml version="1.0"?><unpark-notification xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema" version="1.0" request-id="1" xmlns="http://schemas.microsoft.com/rtc/2008/12/callpark">
36. <reason>ringback</reason></unpark-notification>

The call flow for the case where a parked call is transferred to the Fallback is similar, but the unpark-notification will show "fallback" instead of "ringback" as the reason. Additionally, there would be a target element in the unpark notification that is set to the address-of-record of the fallback user.

# Security

## Security Considerations for Implementers

None.

## Index of Security Parameters

None.

# Appendix A: Full XML Schema

The following sections give the [**XML schemas**](#gt_bd0ce6f9-c350-4900-827e-951265294067) (if applicable) for the protocols defined in this document.

## ms-call-park XML Schema

1. <?xml version="1.0" encoding="utf-8"?>
2. <xs:schema
3. elementFormDefault="qualified"
4. attributeFormDefault="unqualified"
5. targetNamespace="http://schemas.microsoft.com/rtc/2008/12/callpark"
6. xmlns:tns="http://schemas.microsoft.com/rtc/2008/12/callpark"
7. xmlns:xs="http://www.w3.org/2001/XMLSchema"
8. version="1.0">
9. <!-- ALLOWED ROOT ELEMENTS -->
10. <xs:element name="park-request" type="tns:park-request-type"/>
11. <xs:element name="park-response" type="tns:park-response-type"/>
12. <xs:element name="unpark-notification" type="tns:unpark-notification-type"/>
13. <!-- PARK REQUEST TYPE -->
14. <xs:complexType name="park-request-type">
15. <xs:sequence>
16. <xs:element name="audio" type="tns:modality-park-request-type"/>
17. <xs:any namespace="##other" processContents="lax"/>
18. </xs:sequence>
19. <xs:attribute name="version" type="xs:string" use="required"/>
20. <xs:attribute name="request-id" type="xs:string" use="required"/>
21. </xs:complexType>
22. <!-- MODALITY PARK REQUEST TYPE -->
23. <xs:complexType name="modality-park-request-type">
24. <xs:sequence>
25. <xs:element name="dialog-info" type="tns:dialog-info-type"/>
26. <xs:element name="target" type="xs:anyURI"/>
27. </xs:sequence>
28. </xs:complexType>
29. <!-- DIALOG INFO TYPE -->
30. <xs:complexType name="dialog-info-type">
31. <xs:sequence>
32. <xs:element name="call-id" type="xs:string"/>
33. <xs:element name="from-tag" type="xs:string"/>
34. <xs:element name="to-tag" type="xs:string"/>
35. </xs:sequence>
36. </xs:complexType>
37. <!-- PARK RESPONSE TYPE -->
38. <xs:complexType name="park-response-type">
39. <xs:sequence>
40. <xs:element name="orbit" type="xs:string" />
41. <xs:element name="ms-parked-call" type="xs:string" />
42. </xs:sequence>
43. <xs:attribute name="version" type="xs:string" use="required"/>
44. <xs:attribute name="request-id" type="xs:string" use="required"/>
45. </xs:complexType>
46. <!-- UNPARK NOTIFICATION TYPE -->
47. <xs:complexType name="unpark-notification-type">
48. <xs:sequence>
49. <xs:element name="reason" type="tns:unpark-reason-type"/>
50. <xs:element name="target" type="xs:anyURI" minOccurs="0"/>
51. </xs:sequence>
52. <xs:attribute name="version" type="xs:string" use="required"/>
53. <xs:attribute name="request-id" type="xs:string" use="required"/>
54. </xs:complexType>
55. <!-- UNPARK REASON TYPE -->
56. <xs:simpleType name="unpark-reason-type">
57. <xs:restriction base="xs:string">
58. <xs:enumeration value="retrieval"/>
59. <xs:enumeration value="hang-up"/>
60. <xs:enumeration value="ringback"/>
61. <xs:enumeration value="fallback"/>
62. <xs:enumeration value="drop"/>
63. </xs:restriction>
64. </xs:simpleType>
65. </xs:schema>

# Appendix B: 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 Server 2010
* Microsoft Lync 2010
* Microsoft Lync Server 2013
* 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
* Microsoft Skype for Business 2021

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.

[<1> Section 2.1.1](#Appendix_A_Target_1): Lync 2010, Lync Server 2010: IPv6 is not supported.

# 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.

| Section | Description | Revision class |
| --- | --- | --- |
| [7](#Section_bc948e6a657f4e06be28815660c38be5) Appendix B: Product Behavior | Updated list of supported products. | Major |

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