[MS-OCDISCWS]:
Lync Autodiscover Web Service Protocol

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# Revision Summary

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1 Introduction

The Lync Autodiscover Web Service Protocol defines a set of operations that allows a client to discover its home server information.

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:

200 OK: A response to indicate that the request has succeeded.

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

fully qualified domain name (FQDN): An unambiguous domain name that gives an absolute location in the Domain Name System’s (DNS) hierarchy tree, as defined in [RFC1035] section 3.1 and [RFC2181] section 11.

Hypertext Markup Language (HTML): An application of the Standard Generalized Markup Language (SGML) that uses tags to mark elements in a document, as described in [HTML].

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].

JavaScript Object Notation (JSON): A text-based, data interchange format that is used to transmit structured data, typically in Asynchronous JavaScript + XML (AJAX) web applications, as described in [RFC7159]. The JSON format is based on the structure of ECMAScript (Jscript, JavaScript) objects.

Session Initiation Protocol (SIP): An application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. SIP is defined in [RFC3261].

topology: The structure of the connections between members.

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].

UTF-8: A byte-oriented standard for encoding Unicode characters, defined in the Unicode standard. Unless specified otherwise, this term refers to the UTF-8 encoding form specified in [UNICODE5.0.0/2007] section 3.9.

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 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 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. We will assist you in finding the relevant information.

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


1.2.2 Informative References

None.

1.3 Overview

This protocol allows clients to discover web services on their home server and general topology information.

1.4 Relationship to Other Protocols

This protocol uses Hypertext Transfer Protocol (HTTP), as described in [RFC2616], and Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS), as described in [RFC2818], as shown in the following layering diagram.

![Layering Diagram]

Figure 1: This protocol in relation to other protocols

This protocol is dependent on [MS-OCAUTHWS] to authenticate users.

1.5 Prerequisites/Preconditions

Prior to the protocol execution, it is required that DNS entries be configured for both the internal and external Autodiscover services. The DNS entries are canonical name entries of the format lyncdiscover.<sipdomain> and lyncdiscoverinternal.<sipdomain> whose entries point to the primary Autodiscover service for the deployment’s Session Initiation Protocol (SIP) domain. These DNS entries will allow the protocol client to discover the first-hop Autodiscover service in the protocol execution. Further client details are described in section 3.2.

1.6 Applicability Statement

This protocol is applicable to clients that need to discover their home server information.

1.7 Versioning and Capability Negotiation

None.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.
2 Messages

2.1 Transport

Protocol messages MUST be transported via HTTP, as specified in [RFC2616], or HTTPS, as specified in [RFC2818]. The service SHOULD be served on ports 80 and 443, but MAY be served on other ports.

Protocol messages are text-based and MUST be UTF-8 encoded. Messages MUST NOT contain a byte order mark.

2.2 Message Syntax

This section contains common definitions used by this protocol. The syntax of the definitions uses the XML schema as defined in [XMLSCHEMA1/2] and [XMLSCHEMA2/2], and JavaScript Object Notation (JSON) as specified in [RFC4627].

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.

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Namespaces URI</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>xs</td>
<td><a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a></td>
<td>[XMLSCHEMA1/2] [XMLSCHEMA2/2]</td>
</tr>
</tbody>
</table>

2.2.2 Custom HTTP Headers

The messages exchanged in this protocol use the following HTTP headers in addition to the existing set of standard HTTP headers.

<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorization</td>
<td>Specifies the client authentication header for requests to the OAuth Resource defined in section 3.1.5.5.</td>
</tr>
<tr>
<td>X-Ms-WebTicket</td>
<td>Specifies the client authentication header for requests to the User Resource defined in section 3.1.5.3.</td>
</tr>
<tr>
<td>X-Ms-WebTicketUrl</td>
<td>Specifies the Web Ticket Service location where a client can retrieve the web ticket. The Web Ticket Service is described in [MS-OCAUTHWS].</td>
</tr>
</tbody>
</table>

2.2.2.1 Authorization Header

The request to the OAuth resource MUST contain this authorization header. If the request does not include the authorization header, the request will be rejected with a 401 Unauthorized error code. The semantics regarding this authorization header are specified in [RFC2616] section 14.8 and more details about this authorization header are described in [MS-OCAUTHWS].
2.2.2.2 X-Ms-WebTicket Header

The request to the User resource MUST contain the X-Ms-WebTicket header. If the request does not include this header, the request will be rejected with a 401 Unauthorized error code. The semantics regarding this header are specified in [MS-OCAUTHWS].

2.2.2.3 X-Ms-WebTicketUrl Header

If the request to the User resource does not contain an X-Ms-WebTicket header, the 401 Unauthorized response will contain the X-Ms-WebTicketUrl header with the value being the URL of the Web Ticket Service, as described in [MS-OCAUTHWS]. The semantics regarding this header are specified as follows:

```
X-Ms-WebTicketUrl = "X-Ms-WebTicketUrl" "" absolute-URI
```

The semantics regarding absolute-URI are specified in [RFC3986] section 4.3.

2.2.3 Common URI Parameters

The following table summarizes the set of common URI parameters defined by this specification.

<table>
<thead>
<tr>
<th>URI parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sipuri</td>
<td>The Session Initiation Protocol (SIP) URI of the user whose home server information is being discovered.</td>
</tr>
</tbody>
</table>

2.2.3.1 Sipuri URI Parameter

The request to the root resource MUST contain the sipuri parameter, as specified in [RFC3261] section 25.1<1>. If the request does not contain this parameter, the client MAY eventually receive a 404 Not Found response code when proceeding with the rest of the protocol.

2.2.4 Complex Types

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

<table>
<thead>
<tr>
<th>Complex Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutodiscoverResponse</td>
<td>The type of the top level element AutodiscoverResponse that will always be returned in every Autodiscover response.</td>
</tr>
<tr>
<td>Domain</td>
<td>Contains links that define topology information of the current server.</td>
</tr>
<tr>
<td>Link</td>
<td>Contains an href attribute which indicates the URL to access the resource identified by its corresponding token attribute.</td>
</tr>
<tr>
<td>Root</td>
<td>Contains a collection of links that identify resources exposed by the current server.</td>
</tr>
<tr>
<td>SipAccess</td>
<td>Contains the fully qualified domain name (FQDN) and port of the Session Initiation Protocol (SIP) server.</td>
</tr>
</tbody>
</table>
2.2.4.1 AutodiscoverResponse

The AutodiscoverResponse type is the type of the top level element AutodiscoverResponse that MUST be returned in every Autodiscover response where a body is present. This type MUST contain one and only one of the possible sub-elements: Domain (see the Domain type, section 2.2.4.2), Root (see the Root type, section 2.2.4.4), or User (see the User type, section 2.2.4.6).

The AccessLocation attribute MUST be present, as specified in section 2.2.5.1.

**XML Schema:**

```xml
<xs:complexType name="AutodiscoverResponse">
  <xs:sequence>
    <xs:element minOccurs="0" maxOccurs="1" name="Root" type=" Root"/>
    <xs:element minOccurs="0" maxOccurs="1" name="User" type=" User"/>
    <xs:element minOccurs="0" maxOccurs="1" name="Domain" type=" Domain"/>
  </xs:sequence>
  <xs:attribute name="AccessLocation" type="xs:string"/>
</xs:complexType>
```

**JSON Schema:**

```json
AutodiscoverResponse
{
  "id": " AutodiscoverResponse",
  "type": "object",
  "properties": {
    "AccessLocation": {
      "required": true,
      "type": [
        "string",
        "null"
      ]
    },
    "Root": {
      "id": "Root",
      "required": true,
      "type": [
        "object",
        "null"
      ]
    },
    "User": {
      "id": "User",
      "required": true,
      "type": [
        "object",
        "null"
      ]
    },
    "Domain": {
      "id": "Domain",
      "required": true,
      "type": [
        "object",
        "null"
      ]
    }
  }
}
```

<table>
<thead>
<tr>
<th>Complex Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>Contains topology information of the user's home server.</td>
</tr>
</tbody>
</table>
2.2.4.2 Domain

The Domain type contains links that define topology information of the current server.

There is also a collection of links contained in the Domain type. These Link (see the Link type, section 2.2.4.3) elements indicate the web service URL for the corresponding tokens. The possible tokens are defined in section 3.1.5.4.

Information regarding the SipAccess type is in section 2.2.4.5.

XML Schema:

```
<xs:complexType name="Domain">
  <xs:sequence>
    <xs:element minOccurs="0" maxOccurs="1" name="SipServerInternalAccess" type="SipAccess" />
    <xs:element minOccurs="0" maxOccurs="1" name="SipClientInternalAccess" type="SipAccess" />
    <xs:element minOccurs="0" maxOccurs="1" name="SipServerExternalAccess" type="SipAccess" />
    <xs:element minOccurs="0" maxOccurs="1" name="SipClientExternalAccess" type="SipAccess" />
    <xs:element minOccurs="0" maxOccurs="unbounded" name="Link" type="Link"/>
  </xs:sequence>
</xs:complexType>
```

JSON Schema:

```
"Domain": {  
  "id": "Domain",  
  "required": true,  
  "type": {   
    "object",   
    "null"  
  },  
  "properties": {   
    "SipServerInternalAccess": {   
      "$ref": "SipAccess"  
    },   
    "SipClientInternalAccess": {   
      "$ref": "SipAccess"  
    },   
    "SipServerExternalAccess": {   
      "$ref": "SipAccess"  
    },   
    "SipClientExternalAccess": {   
      "$ref": "SipAccess"  
    },   
    "Links": {   
      "$ref": "Link[]"  
    }  
  }  
}
```
2.2.4.3 Link

The Link type is used to identify the URL to access a server resource. The URL which the Link element gives access to is present in the href attribute. The token attribute of the link is a unique string that identifies the type of resource to which the corresponding href will give access. The token (section 2.2.5) and href (section 2.2.5) attributes MUST be present in every Link element. For more details about token, see section 2.2.5.5.

XML Schema:

```xml
<xs:complexType name="Link">
  <xs:attribute name="token" type="xs:string"/>
  <xs:attribute name="href" type="xs:string"/>
</xs:complexType>
```

JSON Schema:

```json
"items": {
  "id": "Link",
  "type": [
    "object",
    "null"
  ],
  "properties": {
    "token": {
      "required": true,
      "type": [
        "string",
        "null"
      ]
    },
    "href": {
      "required": true,
      "type": [
        "string",
        "null"
      ]
    }
  }
}
```

2.2.4.4 Root

The Root type contains links that define URLs that are served by the responding Autodiscover service. See the Link type in section 2.2.4.3 for the Link element. The corresponding tokens that identify these links are defined in section 3.1.5.2.

XML Schema:

```xml
<xs:complexType name="Root">
  <xs:sequence>
    <xs:element minOccurs="0" maxOccurs="unbounded" name="Link" type="Link"/>
  </xs:sequence>
</xs:complexType>
```

JSON Schema:

```json
"items": {
  "id": "Root",
  "type": [
    "object",
    "null"
  ],
  "properties": {
    "token": {
      "required": true,
      "type": [
        "string",
        "null"
      ]
    },
    "href": {
      "required": true,
      "type": [
        "string",
        "null"
      ]
    }
  }
}
```
2.2.4.5 SipAccess

The **SipAccess** type reveals the fully qualified domain name (FQDN) and port of the **Session Initiation Protocol (SIP)** server. Protocol clients can use the **fqdn** and **port** attributes to connect to the SIP server front-end. See section 2.2.5 for the **fqdn** and **port** attributes. The **SipAccess** type is contained in the User and Domain resources under the elements. The type can be defined in four different elements that give different meanings to how the contents SHOULD be used. The behavior is described in the following table:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SipServerInternalAccess</td>
<td>This element reveals the SIP server FQDN and listening port to be used by SIP servers in the internal network.</td>
</tr>
<tr>
<td>SipServerExternalAccess</td>
<td>This element defines the SIP server FQDN and listening port to be used by SIP servers in the external network.</td>
</tr>
<tr>
<td>SipClientInternalAccess</td>
<td>This element defines the SIP server FQDN and listening port to be used by SIP clients in the internal network.</td>
</tr>
<tr>
<td>SipClientExternalAccess</td>
<td>This element defines the SIP server FQDN and listening port to be used by SIP clients in the external network.</td>
</tr>
</tbody>
</table>
XML Schema:

```xml
<xs:complexType name="SipAccess">
    <xs:attribute name="fqdn" type="xs:string" />
    <xs:attribute name="port" type="xs:string" />
</xs:complexType>
```

**JSON Schema:**

```json
"properties": {
    "SipAccess": {
        "id": "SipAccess",
        "required": true,
        "type": {
            "object",
            "null"
        },
        "properties": {
            "fqdn": {
                "required": true,
                "type": {
                    "string",
                    "null"
                }
            },
            "port": {
                "required": true,
                "type": {
                    "string",
                    "null"
                }
            }
        }
    }
}
```

### 2.2.4.6 User

The **User** type contains links that define topology information for the current user.

There is also a collection of links contained in the **User** type. These **link** (see the **Link** type in section 2.2.4.3) elements indicate the web service URL for the corresponding tokens. The possible tokens are defined in section 3.1.5.3.

Information regarding the **SipAccess** type is found in section 2.2.4.5.

XML Schema:

```xml
<xs:complexType name="User">
    <xs:sequence>
        <xs:element minOccurs="0" maxOccurs="1" name="SipServerInternalAccess" type="SipAccess" />
        <xs:element minOccurs="0" maxOccurs="1" name="SipClientInternalAccess" type="SipAccess" />
        <xs:element minOccurs="0" maxOccurs="1" name="SipServerExternalAccess" type="SipAccess" />
        <xs:element minOccurs="0" maxOccurs="1" name="SipClientExternalAccess" type="SipAccess" />
        <xs:element minOccurs="0" maxOccurs="unbounded" name="link" type="link"/>
    </xs:sequence>
</xs:complexType>
```
### 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.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AccessLocation</td>
<td>An indicator of whether the client is connecting from inside or outside of the network.</td>
</tr>
<tr>
<td>Fqdn</td>
<td>The fully qualified domain name (FQDN) of the Session Initiation Protocol (SIP) server.</td>
</tr>
<tr>
<td>href</td>
<td>A URL that is relative to the service’s root URL</td>
</tr>
<tr>
<td>Port</td>
<td>The listening port of the SIP server.</td>
</tr>
<tr>
<td>Attribute</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>token</td>
<td>A classification that is used to infer the purpose and use of the attributed item. Somewhat analogous to a type in traditional, compiled programming languages</td>
</tr>
</tbody>
</table>

### 2.2.5.1 AccessLocation

This attribute MUST have values of either "internal" or "external". A value of "internal" indicates that the current server is hosting internal network traffic, while a value of "external" indicates that the current server is hosting external network traffic.

### 2.2.5.2 Fqdn


### 2.2.5.3 Href

This attribute specifies a URL that is relative to the service's root URL.

### 2.2.5.4 Port

This attribute specifies the listening port of the [SIP](https://en.wikipedia.org/wiki/Session_Initiation_Protocol) server.

### 2.2.5.5 Token

The following table summarizes the set of possible tokens and their descriptions. For every `token` attribute, there MUST be a corresponding `href` attribute (section 2.2.5.3). The `href` attribute contains a URL that the client can use to access related services. Semantics on the entry points to each URL can be found in the following table. However, no details are provided beyond the entry points.

<table>
<thead>
<tr>
<th>Token</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Internal/Autodiscover&quot;</td>
<td>Identifies the Autodiscover Service Root entry point that can be accessed from the internal network. See section 3.1.5.1 for semantics on this URL.</td>
</tr>
<tr>
<td>&quot;External/Autodiscover&quot;</td>
<td>Identifies the Autodiscover Service's Root entry point that can be accessed from the external network. See section 3.1.5.1 for semantics on this URL.</td>
</tr>
<tr>
<td>&quot;Internal/AuthBroker&quot;</td>
<td>Identifies the AuthBroker Service entry point that can be accessed from the internal network. This service exposes a SOAP endpoint and publishes a MEX document. The Authbroker Service is specified as the Authentication Broker Service in [MS-OCAUTHWS]. MEX documents are specified in [WS-MetaDataExchange].</td>
</tr>
<tr>
<td>&quot;External/AuthBroker&quot;</td>
<td>Identifies the AuthBroker Service entry point that can be accessed from the external network. This service exposes a SOAP endpoint and publishes a MEX document. The Authbroker Service is specified as the Authentication Broker Service in [MS-OCAUTHWS]. MEX documents are specified in [WS-MetaDataExchange].</td>
</tr>
<tr>
<td>&quot;Internal/Ucwa&quot;</td>
<td>Identifies the Ucwa Service entry point that can be accessed from the internal network. This service exposes a REST endpoint that supports a GET operation. The Ucwa Service is defined in [MS-OCSMP].</td>
</tr>
<tr>
<td>&quot;External/Ucwa&quot;</td>
<td>Identifies the Ucwa Service entry point that can be accessed from the external network. This service exposes a REST endpoint that supports a GET operation. The Ucwa Service is defined in [MS-OCSMP].</td>
</tr>
<tr>
<td>Token</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>&quot;Redirect&quot;</td>
<td>Identifies an Autodiscover Service URL which is the Root entry point of the next hop in the discovery flow. See section 3.1.5.2 for semantics on this URL.</td>
</tr>
<tr>
<td>&quot;User&quot;</td>
<td>Identifies the Autodiscover Service URL for the User entry point. Semantics on this URL can be found in section 3.1.5.3.</td>
</tr>
<tr>
<td>&quot;Domain&quot;</td>
<td>Identifies the Autodiscover Service URL for the Domain entry point. Semantics on this URL can be found in section 3.1.5.4.</td>
</tr>
<tr>
<td>&quot;OAuth&quot;</td>
<td>Identifies the Autodiscover Service URL for the OAuth entry point. Semantics on this URL can be found in section 3.1.5.5.</td>
</tr>
</tbody>
</table>
3 Protocol Details

3.1 Server Details
This section specifies details that pertain to the protocol server behavior.

3.1.1 Abstract Data Model
None.

3.1.2 Timers
None.

3.1.3 Initialization
None.

3.1.4 Higher-Layer Triggered Events
None.

3.1.5 Message Processing Events and Sequencing Rules
The following table lists all the exposed resources by the Autodiscover Service.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root</td>
<td>Service entry point that allows navigation to child resources.</td>
</tr>
<tr>
<td>User</td>
<td>Provides user home server information.</td>
</tr>
<tr>
<td>Domain</td>
<td>Provides general topology information about the current server.</td>
</tr>
<tr>
<td>OAuth</td>
<td>Provides user home server information.</td>
</tr>
</tbody>
</table>

3.1.5.1 Common Processing Details
The following table lists all the possible Accept headers handled by the Server, and the Content-Type returned in the response.

<table>
<thead>
<tr>
<th>Accept Header Values</th>
<th>Returned Content-Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Accept header specified</td>
<td>application/vnd.microsoft.rtc.autodiscover+json;v=1</td>
</tr>
<tr>
<td>application/vnd.microsoft.rtc.autodiscover+xml;v=1</td>
<td>application/vnd.microsoft.rtc.autodiscover+xml;v=1</td>
</tr>
<tr>
<td>Application/vnd.microsoft.rtc.autodiscover+json;v=1</td>
<td>application/vnd.microsoft.rtc.autodiscover+json;v=1</td>
</tr>
<tr>
<td><em>/</em></td>
<td>application/vnd.microsoft.rtc.autodiscover+json;v=1</td>
</tr>
</tbody>
</table>
If none of the Accept headers listed in the table are sent with any request, the server will respond with a 406 (Not Acceptable) response.

If the returned Content-Type is "application/vnd.microsoft.rtc.autodiscover+xml;v=1", then the response will be in XML format and MUST be de-serialized according to the schemas in section 2.2.4.

If the returned Content-Type is "application/vnd.microsoft.rtc.autodiscover+json;v=1", then the response will be in JSON format and MUST be de-serialized according to the schemas in section 2.2.4.

### 3.1.5.2 Root

The Root resource is the entry point to an instance of the Autodiscover Service. All requests to this resource MUST contain the sipuri query parameter defined in section 2.2.3.1.

The resource URL for this parameter is https://<fqdn>/autodiscover/autodiscoverservice.svc/root?sipuri=<sipuri> . The server might also listen on HTTP depending on the server configuration. If a request is made to the HTTP Root resource, the server MUST respond with a **200 OK** and a **Root** element that contains a single **Link** element with token named "Redirect" and an **href** that points to the next hop URL that the client SHOULD request.

If the sipuri of the user cannot be processed by the current Autodiscover Service, the Autodiscover Service MUST respond with a 200 OK with a **Root** element that contains a **Link** with a token named "Redirect" and an **href** that points to the next hop URL that can handle the request.

If the current Autodiscover Service can handle the request, then the server MUST respond with a 200 OK and a **Root** element that contains **Link** elements for child resources of the current Autodiscover Service. See section 2.2.4.4 for the schema of the **Root** element. If there is no "Redirect" link present in the **Root** element, then there MUST be "User" and "Domain" tokens present. The "OAuth" token might be present depending on the server version.

#### 3.1.5.2.1 GET

This section details the Request and Response body for the supported GET HTTP operation to the Root resource.

**3.1.5.2.1.1 Request Body**

None.

**3.1.5.2.1.2 Response Body**

The Autodiscover Service MUST respond with an **AutodiscoverResponse** element (section 2.2.4.1) that contains a **Root** element (section 2.2.4.4).

#### 3.1.5.3 User

The User resource exposes **topology** information of a user’s home server. The client MUST discover the User URL by parsing the href of the **Link** element in the GET response from the Root resource.

If the request to the User resource does not contain a valid X-Ms-WebTicket header as specified in section 2.2.2.2, the server MUST respond with a 401 Unauthorized response.

If a valid X-Ms-WebTicket header is provided and the user’s home server information is unknown, the server MUST respond with a 404 Not Found response code and an empty body.

If a valid X-Ms-WebTicket header is provided and the user's home server information exists on a separate server, the server MUST respond with a 200 OK response code and a **User** element. The
**User** element MUST contain only one **Link** element with a "Redirect" Token. Semantics of the "Redirect" Token are defined in section 2.2.5.5.

If a valid X-Ms-WebTicket header is provided and the user’s home server information exists on the current server, the server MUST respond with a 200 response code and a **User** element in the body. The **User** element MAY contain any of the following links depending on what is configured in the topology.

1. Internal/Autodiscover
2. External/Autodiscover
3. Internal/AuthBroker
4. External/AuthBroker
5. Internal/Ucwa
6. External/Ucwa

The **SipAccess** types might also be present in the response depending on what is configured in the topology.

### 3.1.5.3.1 GET

This section details the Request and Response body for the supported GET HTTP operation to the User resource.

#### 3.1.5.3.1.1 Request Body

None.

#### 3.1.5.3.1.2 Response Body

If the response code is **200 OK**, then the response MUST contain an **AutodiscoverResponse** element that contains a **User** element. These elements are defined in sections 2.2.4.1 and 2.2.4.6.

If the response code is 401 Unauthorized, then there will be an **HTML** formatted body.

If the response code is 404 Not Found, then there will be an empty body.

### 3.1.5.4 Domain

The Domain resource exposes information about the topology information of the current server to the client. The client MUST discover the Domain URL by parsing the **Link** element in the GET response from the Root resource.

The Domain resource MUST respond with a **200 OK** to every request and contain a **Domain** element in the body. The **Domain** element is defined in section 2.2.4.2.

The **Domain** element MAY contain any of the following links, depending on what is configured in the topology. The links are identified by tokens for which semantics are defined in section 2.2.5.5.

1. Internal/Autodiscover
2. External/Autodiscover
3. Internal/AuthBroker
4. External/AuthBroker
5. Internal/Ucwa
6. External/Ucwa

The SipAccess types might also be present in the response, depending on what is configured in the topology.

### 3.1.5.4.1 GET

This section details the Request and Response body for the supported GET HTTP operation to the Domain resource.

#### 3.1.5.4.1.1 Request Body

None.

#### 3.1.5.4.1.2 Response Body

The response MUST contain an AutodiscoverResponse element that contains a Domain element. These elements are defined in sections 2.2.4.1 and 2.2.4.2.

### 3.1.5.5 OAuth

The OAuth resource exposes topology information of a user's home server. The client MUST discover the OAuth URL by parsing the href of the Link element in the GET response from the Root resource.

If the request to the OAuth resource does not contain an Authorization header as specified in section 2.2.2.1, the server MUST respond with a 401 Unauthorized response.

If the request to the OAuth resource contains an invalid Authorization header as specified in section 2.2.2.1, the server MUST respond with a 403 Forbidden response.

If a valid Authorization header is provided and the user’s home server information is unknown, the server MUST respond with a 404 Not Found response code and an empty body.

If a valid Authorization header is provided and the user’s home server information exists on a separate server, the server MUST respond with a 200 OK response code and a User element. The User element MUST contain only one link with a "Redirect" token. Semantics of the "Redirect" Token are in section 2.2.5.5.

If a valid Authorization header is provided and the user’s home server information exists on the current server, the server MUST respond with a 200 response code and a User element in the body. The User element might contain any of the following links depending on what is configured in the topology.

1. Internal/Autodiscover
2. External/Autodiscover
3. Internal/AuthBroker
4. External/AuthBroker
5. Internal/Ucwa
6. External/Ucwa

The SipAccess types might also be present in the response depending on what is configured in the topology.
3.1.5.5.1 GET
This section details the Request and Response body for the supported GET HTTP operation to the OAuth resource.

3.1.5.5.1.1 Request Body
None.

3.1.5.5.1.2 Response Body
If the response code is 200 OK, then the response MUST contain an AutodiscoverResponse element that contains a User element. These elements are defined in sections 2.2.4.1 and 2.2.4.6.

If the response code is 401 Unauthorized, then there will be an HTML formatted body.

If the response code is 404 Not Found, then there will be an empty body.

3.1.6 Timer Events
None.

3.1.7 Other Local Events
None.

3.2 Client Details
This section specifies details that pertain to protocol client behavior.

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

3.2.1.1 Discovery of Autodiscover
The client will usually not have the initial Autodiscover service URL to send the first HTTP request and initiate the protocol flow. The client MUST construct and send requests to as many as four URLs to discover the initial Autodiscover service. The URLs constructed are based off of the client’s Session Initiation Protocol (SIP) domain and MUST contain the following:

1. http://lyncdiscoverinternal.<sipdomain>
2. https://lyncdiscoverinternal.<sipdomain>
4. https://lyncdiscover.<sipdomain>

The client MAY execute requests 1 and 2 in parallel, and MAY execute requests 3 and 4 in parallel. The client MUST wait until getting a response from both request 1 and 2 before sending a request to 3 or 4.
The client MUST process the result of the first successful request and MAY cancel any pending requests after receiving a successful response. The body of the response to any of the previously listed requests MUST contain an \texttt{AutodiscoverResponse} element which contains a \texttt{Root} element.

### 3.2.1.2 Redirect Detection

This protocol will result in many redirects. To prevent any redirect loops, the client MUST NOT allow more than 10 redirects in the entirety of the flow, or the client MUST implement redirect loop detection.

### 3.2.1.3 Internal External Network Switching

The final response of the OAuth, User, and Domain resources will contain an \texttt{AutodiscoverResponse} element with the \texttt{AccessLocation} attribute present, as well as internal and external links of the web services. The internal and external links are both provided in the same response to assist the client in switching between internal and external web services for times when the client is transitioning from inside to outside the network or vice versa. If the \texttt{AccessLocation} has the value "internal", the client SHOULD use the internal links. If the \texttt{AccessLocation} has the value "external", the client SHOULD use the external links.

The client also has the ability to probe the Autodiscover service to determine whether it is internal or external without executing the full protocol. After the client obtains the internal and external Autodiscover links, the client MAY cache them and probe the Root resource and determine its network location based on the \texttt{AccessLocation} value returned in the response. If the client loses network connectivity for a brief period of time, the client MAY send a single GET request to the internal and external Autodiscover sites and then connect to the corresponding URL stored in the cache based on the returned \texttt{AccessLocation} value.

The client SHOULD cache the returned web service URLs until the client receives an error connecting to one of the web services.

### 3.2.2 Timers

None.

### 3.2.3 Initialization

None.

### 3.2.4 Higher-Layer Triggered Events

None.

### 3.2.5 Message Processing Events and Sequencing Rules

None.

### 3.2.6 Timer Events

None.

### 3.2.7 Other Local Events

None.
4 Protocol Examples

4.1 Discover Home Server

In this scenario, the client follows this protocol to discover its home server URLs.

The client constructs and sends an HTTP and HTTPS request to the Autodiscover service based on its Session Initiation Protocol (SIP) URI, john@contoso.com.

```
GET http://lyncdiscover.contoso.com/?sipuri=john@contoso.com HTTP/1.1
Host: contoso.com
Accept: application/vnd.microsoft.rtc.autodiscover+xml;v=1

GET https://lyncdiscoverinternal.contoso.com HTTP/1.1
Host: contoso.com
Accept: application/vnd.microsoft.rtc.autodiscover+xml;v=1
```

The HTTPS request succeeds first with the following result.

```
HTTP/1.1 200 OK
Cache-Control: no-cache
Content-Type: application/vnd.microsoft.rtc.autodiscover+xml;v=1

<?xml version="1.0" encoding="utf-8"?>
<AutodiscoverResponse xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" AccessLocation="Internal">
  <Root>
    <Link token="Domain"
    <Link token="User"
    <Link token="Self"
    <Link token="OAuth"
  </Root>
</AutodiscoverResponse>
```

The client parses the returned links and sends an HTTP GET to the href of the link with the "OAuth" token. The client provides the JSON token in the Authorization header.

```
GET https://contoso.com/autodiscover/autodiscoverservice.svc/root/oauth/user?originalDomain=contoso.com HTTP/1.1
Host: contoso.com
Authorization: Bearer Y4LBFDjzqXHPxYMHIj9snKNNWi0lyShf+i/GU9B+scVnYB3T5Bp6w==
Accept: application/vnd.microsoft.rtc.autodiscover+xml;v=1
```

The server authenticates the client and returns a Redirect response indicating the home server location of the client.

```
HTTP/1.1 200 OK
Cache-Control: no-cache
Content-Type: application/vnd.microsoft.rtc.autodiscover+xml;v=1

<?xml version="1.0" encoding="utf-8"?>
```
The client sends an HTTPS request to redirect the link.

GET https://pool1.contoso.com/Autodiscover/AutodiscoverService.svc/root?originalDomain=contoso.com HTTP/1.1
Host: pool1.contoso.com
Accept: application/vnd.microsoft.rtc.autodiscover+xml;v=1

The HTTPS request succeeds with the following result.

HTTP/1.1 200 OK
Cache-Control: no-cache
Content-Type: application/vnd.microsoft.rtc.autodiscover+xml;v=1

<User>
  <Link href="https://pool1.contoso.com/Autodiscover/AutodiscoverService.svc/root?originalDomain=contoso.com" token="Redirect"/>
</User>
</AutodiscoverResponse>

The HTTPS request succeeds with the following result.

HTTP/1.1 200 OK
Cache-Control: no-cache
Content-Type: application/vnd.microsoft.rtc.autodiscover+xml;v=1

<User>
  <Link href="https://pool1.contoso.com/Autodiscover/AutodiscoverService.svc/root/domain?originalDomain=contoso.com" token="Domain"/>
  <Link href="https://pool1.contoso.com/Autodiscover/AutodiscoverService.svc/root/user?originalDomain=contoso.com" token="User"/>
  <Link href="https://pool1.contoso.com/Autodiscover/AutodiscoverService.svc/root/oauth/user?originalDomain=contoso.com" token="OAuth"/>
</User>
</AutodiscoverResponse>

The client sends an HTTPS request to OAuth link with Authentication header.

GET https://pool1.contoso.com/autodiscover/autodiscoverservice.svc/root/oauth/user?originalDomain=contoso.com HTTP/1.1
Host: contoso.com
Authorization: Bearer Y4LBFDJzqXHpxXMHj9snKNWiW0lyShf+1/GU9B+scVnYB3T5BDp6w==
Accept: application/vnd.microsoft.rtc.autodiscover+xml;v=1

The HTTPS request succeeds with the following result.

HTTP/1.1 200 OK
Cache-Control: no-cache
Content-Type: application/vnd.microsoft.rtc.autodiscover+xml;v=1

<User>
  <Link href="https://pool1.contoso.com/Autodiscover/AutodiscoverService.svc/root//Internal/Autodiscover"/>
  <Link href="https://pool1.contoso.com/Reach/sip.svc"/>
  <Link href="https://pool1.contoso.com/Ucwa/oauth/v1/applications"/>
</User>
</AutodiscoverResponse>
<Link token="External/Autodiscover" href="https://pool1external.contoso.com/Autodiscover/AutodiscoverService.svc/root"/>
<Link token="External/AuthBroker" href="https://pool1external.contoso.com/Reach/sip.svc"/>
<Link token="External/Ucwa" href="https://pool1external.contoso.com/Ucwa/oauth/v1/applications"/>
</User>
</AutodiscoverResponse>
5 Security

5.1 Security Considerations for Implementers
None.

5.2 Index of Security Parameters
None.
Appendix A: Full XML Schema

For ease of implementation, the following is the full XML schema for this protocol.

```xml
<?xml version="1.0" encoding="utf-8"?>
<xs:schema elementFormDefault="qualified" xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="AutodiscoverResponse" nillable="true" type="AutodiscoverResponse" />
  <xs:complexType name="AutodiscoverResponse">
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="1" name="Root" type="Root" />
      <xs:element minOccurs="0" maxOccurs="1" name="User" type="User" />
      <xs:element minOccurs="0" maxOccurs="1" name="Domain" type="Domain" />
    </xs:sequence>
    <xs:attribute name="AccessLocation" type="xs:string" />
  </xs:complexType>
</xs:schema>
```
7 Appendix B: Full JSON Schema

For ease of implementation, the following is the full JSON schema for this protocol.

```json
{
  "id": "AutodiscoverResponse",
  "type": "object",
  "properties": {
    "AccessLocation": {
      "required": true,
      "type": [ "string", "null" ]
    },
    "Root": {
      "id": "Root",
      "required": true,
      "type": [ "object", "null" ]
    },
    "properties": {
      "Links": {
        "id": "Link["]",
        "required": true,
        "type": [ "array", "null" ],
        "items": {
          "id": "Link",
          "type": [ "object", "null" ]
        },
        "properties": {
          "token": {
            "required": true,
            "type": [ "string", "null" ]
          },
          "href": {
            "required": true,
            "type": [ "string", "null" ]
          }
        }
      }
    }
  },
  "User": {
    "id": "User",
    "required": true,
    "type": [ "object", "null" ]
  },
  "properties": {
    "SipServerInternalAccess": {
      "id": "SipAccess",
      "required": true,
      "type": [ "string", "null" ]
    }
  }
}
```
"object",
"null"
},
"properties": {
  "fqdn": {
    "required": true,
    "type": [
      "string",
      "null"
    ]
  },
  "port": {
    "required": true,
    "type": [
      "string",
      "null"
    ]
  }
},
"SipClientInternalAccess": {
  "$ref": "SipAccess"
},
"SipServerExternalAccess": {
  "$ref": "SipAccess"
},
"SipClientExternalAccess": {
  "$ref": "SipAccess"
},
"Links": {
  "$ref": "Link[]"
}
},
"Domain": {
  "id": "Domain",
  "required": true,
  "type": [
    "object",
    "null"
  ],
  "properties": {
    "SipServerInternalAccess": {
      "$ref": "SipAccess"
    },
    "SipClientInternalAccess": {
      "$ref": "SipAccess"
    },
    "SipServerExternalAccess": {
      "$ref": "SipAccess"
    },
    "SipClientExternalAccess": {
      "$ref": "SipAccess"
    },
    "Links": {
      "$ref": "Link[]"
    }
  }
}
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 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

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 2.2.3.1: Lync Client 2013/Skype for Business and Lync Server 2013 use the sipuri parameter, but the prefix "sip:" is omitted.
9 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.
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