

# [MS-E911WS]: Web Service for E911 Support Protocol Specification

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## Revision Summary

Date	Revision History	Revision Class	Comments
03/31/2010	0.1	Major	Initial Availability
04/30/2010	0.2	Editorial	Revised and edited the technical content
06/07/2010	0.3	Editorial	Revised and edited the technical content
06/29/2010	0.4	Editorial	Changed language and formatting in the technical content.
07/23/2010	0.4	No change	No changes to the meaning, language, or formatting of the technical content.
09/27/2010	1.0	Major	Significantly changed the technical content.
11/15/2010	1.0	No change	No changes to the meaning, language, or formatting of the technical content.
12/17/2010	1.0	No change	No changes to the meaning, language, or formatting of the technical content.

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# 1 Introduction

This document specifies the Location Information Web Service interface that is used by clients to retrieve locations associated with network identifiers, or locations within a city. A location is a civic address with up to room level granularity. The network identifiers that can be specified are the Wireless Access Point, Received Signal Strength Indication, Media Access Control Address, Chassis, Port, Subnet, and Internet Protocol Address.

## 1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

**authentication**  
**certificate**  
**fully qualified domain name (FQDN)**  
**Hypertext Transfer Protocol (HTTP)**  
**Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)**  
**Internet Protocol version 4 (IPv4)**  
**Internet Protocol version 6 (IPv6)**  
**Kerberos**  
**Message Authentication Code (MAC)**  
**NT LAN Manager (NTLM) Authentication Protocol**  
**Secure Sockets Layer (SSL)**  
**Transmission Control Protocol (TCP)**  
**type-length-value (TLV)**

The following terms are defined in [\[MS-OFCGLOS\]](#):

**endpoint**  
**presence information**  
**Presence Information Data Format (PIDF)**  
**Session Initiation Protocol (SIP)**  
**SOAP (Simple Object Access Protocol)**  
**SOAP body**  
**SOAP envelope**  
**SOAP message**  
**SOAP operation**  
**Transport Layer Security (TLS)**  
**URI (Uniform Resource Identifier)**  
**URL (Uniform Resource Locator)**  
**WSDL (Web Services Description Language)**  
**WSDL message**  
**XML namespace**  
**XML Schema**

The following terms are specific to this document:

**public safety answering point (PSAP):** A call center that is responsible for answering calls to a telephone number for an emergency service and, in some cases, dispatching that service.

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

## 1.2 References

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[IEEE802.1AB] Congdon, P., Ed. and Lane, B., Ed., "Station and Media Access Control Connectivity Discovery", April 2005, <http://www.ieee802.org/1/pages/802.1ab.html>

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.ietf.org/rfc/rfc2119.txt>

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

[RFC3863] Sugano, H., Fujimoto, S., Klyne, G., et al., "Presence Information Data Format (PIDF)", RFC 3863, August 2004, <http://www.ietf.org/rfc/rfc3863.txt>

[RFC4119] Peterson, J., "A Presence-based GEOPRIV Location Object Format", December 2005, <http://www.ietf.org/rfc/rfc4119.txt>

[RFC5139] Thomson, M. and Winterbottom, J., "Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)", February 2008, <http://www.rfc-editor.org/rfc/rfc5139.txt>

[SOAP1.1] Box, D., Ehnebuske, D., Kakivaya, G., et al., "Simple Object Access Protocol (SOAP) 1.1", May 2000, <http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>

[WSA1.0] World Wide Web Consortium, "Web Services Addressing 1.0 - WSDL Binding", 29 May 2006, <http://www.w3.org/TR/ws-addr-wsdl/>

[WSDL] Christensen, E., Curbera, F., Meredith, G., and Weerawarana, S., "Web Services Description Language (WSDL) 1.1", W3C Note, March 2001, <http://www.w3.org/TR/2001/NOTE-wsdl-20010315>

[XMLNS] World Wide Web Consortium, "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation 8 December 2009, <http://www.w3.org/TR/REC-xml-names/>

[XMLSCHEMA1] Thompson, H.S., Ed., Beech, D., Ed., Maloney, M., Ed., and Mendelsohn, N., Ed., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

[XMLSCHEMA2] Biron, P.V., Ed. and Malhotra, A., Ed., "XML Schema Part 2: Datatypes", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>

### 1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)", March 2007.

[MS-NLMP] Microsoft Corporation, "[NT LAN Manager \(NTLM\) Authentication Protocol Specification](#)", June 2007.

[MS-OCAUTHWS] Microsoft Corporation, "[OC Authentication Web Service Protocol Specification](#)", March 2010.

[MS-OFGLS] Microsoft Corporation, "[Microsoft Office Master Glossary](#)", June 2008.

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

[RFC4559] Jaganathan, K., Zhu, L., and Brezak, J., "SPNEGO-based Kerberos and NTLM HTTP Authentication in Microsoft Windows", RFC 4559, June 2006, <http://www.ietf.org/rfc/rfc4559.txt>

### 1.3 Protocol Overview (Synopsis)

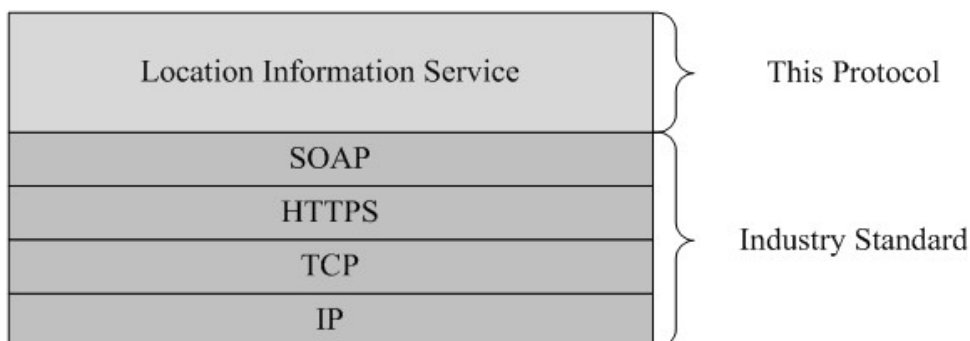
This protocol is used to retrieve the locations based on network identifiers, or based on city.

This protocol specifies a request that contains the network identifiers for which locations need to be retrieved. The response contains the response status and, if the request is processed successfully, the locations that are most appropriate for the network identifiers specified. This protocol also specifies another request that contains the city, state, and country/region for which locations need to be retrieved. The response contains the response status and, if the request is processed successfully, the locations in that city, state, and country/region.

This protocol is defined as a Web service. This protocol specifies the structure of the schema used to construct the body in the request and response messages. This protocol uses **SOAP (Simple Object Access Protocol)**, as described in [\[SOAP1.1\]](#), and **Web Services Description Language (WSDL)**, as described in [\[WSDL\]](#) to describe the structure of the message body. The full WSDL is included in section [6](#).

### 1.4 Relationship to Other Protocols

This protocol uses SOAP over **Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)**, as described in [\[RFC2818\]](#), as shown in the following layering diagram.



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

### 1.5 Prerequisites/Preconditions

For a client that uses this protocol with a server, it is assumed that the server has an operational SOAP1.1/HTTP1.1 /TCP/IP stack. It is also assumed that the client has the **fully qualified domain name (FQDN) (1)** of the server to which the client will connect. The client can obtain the FQDN (1) of the server via a different channel, for example, the **Session Initiation Protocol (SIP)** signaling channel. The server also requires that the client be able to negotiate **Hypertext Transfer Protocol (HTTP)** over **Transport Layer Security (TLS)** to establish the connection.

## 1.6 Applicability Statement

This protocol is designed so that a client can acquire the location that can be passed on with an E911 call, so that a **public safety answering point (PSAP)** can dispatch emergency help to the correct destination. The locations returned can also be used by the client to publish **presence information**.

## 1.7 Versioning and Capability Negotiation

None.

## 1.8 Vendor-Extensible Fields

None.

## 1.9 Standards Assignments

None.



## 2 Messages

### 2.1 Transport

This protocol uses SOAP, as specified in [\[SOAP1.1\]](#). The protocol uses the security model described in [\[MS-OCAUTHWS\]](#) section 1.3.

### 2.2 Common Message Syntax

This section contains common definitions used by this protocol. The syntax of the definitions uses the **XML Schema**, as defined in [\[XMLSCHEMA1\]](#) and [\[XMLSCHEMA2\]](#), and WSDL, as defined in [\[WSDL\]](#).

#### 2.2.1 Namespaces

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

Prefix	XML Namespace	Specification
soap	<a href="http://schemas.xmlsoap.org/wsdl/soap">http://schemas.xmlsoap.org/wsdl/soap</a>	SOAP <a href="#">[SOAP1.1]</a>
s / xsd	<a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a>	XML Schema <a href="#">[XMLSCHEMA1]</a> , <a href="#">[XMLSCHEMA2]</a>
http	<a href="http://schemas.xmlsoap.org/wsdl/http">http://schemas.xmlsoap.org/wsdl/http</a>	HTTP <a href="#">[RFC2616]</a>
ca	<a href="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr">urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr</a>	Revised Civic Location Format for Presence Information Data Format Location Object <a href="#">[RFC5139]</a>
pidf	<a href="urn:ietf:params:xml:ns:pidf">urn:ietf:params:xml:ns:pidf</a>	PIDF <a href="#">[RFC3863]</a>
wsaw	<a href="http://www.w3.org/2006/05/addressing/wsdl">http://www.w3.org/2006/05/addressing/wsdl</a>	Web Service Addressing <a href="#">[WSA1.0]</a>
wsdl	<a href="http://schemas.xmlsoap.org/wsdl">http://schemas.xmlsoap.org/wsdl</a>	WSDL <a href="#">[WSDL]</a>
tns	<a href="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010">urn:schema:Microsoft.Rtc.WebComponent.Lis.2010</a>	

#### 2.2.2 Messages

None.

#### 2.2.3 Elements

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

Element	Description
<b>Entity</b>	The <b>URI (Uniform Resource Identifier)</b> that the Location Object returned in the <b>Presence Information Data Format (PIDF)</b> document references. It is typically

Element	Description
	expected to be the URI of the user making the Web service request.
<b>ReturnCode</b>	The return code indicating whether the request succeeded or the reason for failure.
<b>presenceList</b>	List of <b>pidf:presence</b> elements each containing a <b>location</b> object.

## 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.

Complex Type	Description
<b>presenceListType</b>	List of <b>pidf:presence</b> elements. The <b>pidf:presence</b> element, as defined by PIDF <a href="#">[RFC3863]</a> , with a GEOPRIV Location Object, as defined in <a href="#">[RFC4119]</a> , based extension for the status value embedded in it. The <b>location-info</b> element embedded in the <b>geopriv</b> element, must conform to the Civic Location Format defined in <a href="#">[RFC5139]</a> . The client ignores all except the following elements returned in the Civic Address: <b>country/region, A1, A3, PRD, RD, STS, POD, HNO, HNS, LOC, NAM, PC</b> . If the address cannot be trusted to match the network identifiers specified in the location request, the <b>method</b> element embedded in the <b>geopriv</b> element must have the value "Manual".

## 2.2.5 Simple Types

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

Simple Type	Description
<b>ReturnCodeType</b>	The return code indicating whether the request succeeded or the reason for failure. 200=Success; 400=Bad Request; 404=Not Found; 500=Internal Server Error;
<b>restrictedAnyURI</b>	<b>s:anyURI</b> but bounded to length between 1 and 64.

## 2.2.6 Attributes

This specification does not define any common XML Schema attribute definitions.

## 2.2.7 Groups

This specification does not define any common XML Schema group definitions.

## 2.2.8 Attribute Groups

This specification does not define any common XML Schema attribute group definitions.

## 3 Protocol Details

### 3.1 Server Details

The Location Information Service listens on a PortType called ILIService. The interface exposes two operations called **GetLocations** and **GetLocationsInCity**.

#### 3.1.1 Abstract Data Model

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

The Location Information Service does not retain any state between requests, but conceptually has access to configuration that maps network identifiers such as the following:

- Wireless Access Point
- Received Signal Strength Indication
- Media Access Control Address
- Chassis
- Port
- Subnet
- Internet Protocol Address to Locations

#### 3.1.2 Timers

None.

#### 3.1.3 Initialization

As part of initialization, the server MUST start listening for incoming requests on an HTTPS **Uniform Resource Locator (URL)**. The client MUST have access to this HTTPS URL and can obtain the URL by a channel that is separate from the HTTPS channel used for retrieving locations, for example, through SIP.

#### 3.1.4 Message Processing Events and Sequencing Rules

The following table lists the **SOAP operations** specified in this protocol.

Operation	Description
<b>GetLocations</b>	This operation retrieves the most appropriate locations that match the network identifiers specified in a location request.
<b>GetLocationsInCity</b>	This operation retrieves the locations in city, state, and country/region specified in the request.

### 3.1.4.1 GetLocations

The following excerpt from this protocol's WSDL specifies the messages that constitute this operation:

```
<wsdl:operation name="GetLocations">
  <wsdl:input wsaw:Action="LIService/GetLocations" name="GetLocationsRequest"
message="tns:GetLocationsRequest" />
  <wsdl:output wsaw:Action="LIService/GetLocationsResponse" name="GetLocationsResponse"
message="tns:GetLocationsResponse" />
</wsdl:operation>
```

When a client needs to request a location, a **Transmission Control Protocol (TCP)** connection MUST be made to the server and **Secure Sockets Layer (SSL)** MUST be negotiated. The address of the server that makes the TCP connection can be obtained through a different channel, such as SIP. After successful SSL negotiation, a SOAP HTTP request, **GetLocationsRequest** message, MUST be constructed with a **SOAP body** containing the **GetLocationsRequest** element.

On receiving a **GetLocationsRequest** request, the server queries its repository of locations to get all of the locations that match the network identifiers specified in the request. After obtaining a location match, the server MUST construct the **GetLocationsResponse** message, containing the **GetLocationsResponse** element, and it MUST send the message in the SOAP HTTP response, which is a 2xx response to a SOAP HTTP request. In case of errors, the response message MUST specify the error and the type of error that was encountered by the server.

#### 3.1.4.1.1 Messages

The following **WSDL message** definitions are specific to this operation.

##### 3.1.4.1.1.1 GetLocationsRequest

The **GetLocationsRequest SOAP message** is a request that is sent from the client to retrieve the locations of the **endpoint (5)**, typically just after login and whenever the client endpoint (5) connects to another wireless access point. The request information MUST be captured in the **GetLocationsRequest** element in the SOAP body of the message. The **GetLocationsRequest** element is specified in section [3.1.4.1.3.1](#).

##### 3.1.4.1.1.2 GetLocationsResponse

The **GetLocationsResponse** SOAP message is a response that is sent by the server after it executes a request to retrieve the locations of the endpoint (5). This message contains the locations that match the network identifiers specified in the request. The result is represented in the **GetLocationsResponse** element, which MUST be in the SOAP body of the SOAP message. The **GetLocationsResponse** element is specified in section [3.1.4.1.3.2](#). If the server is able to successfully match any locations for the network identifiers, the response element contains the locations matched and a **ReturnCodeType** indicating success. These locations are included in the complex type **presenceListType**, which is specified in section [3.1.4.1.3](#). In case of an error, the response element MUST specify the reason for the failure to retrieve locations in the simple type **ReturnCodeType**, which is specified in section [2.2.5](#).

#### 3.1.4.1.2 Elements

All elements in the WSDL are contained in complex types and specified in section [3.1.4.1.3](#).

### 3.1.4.1.3 Complex Types

The following XML Schema complex type definitions are specific to this operation.

Complex Type	Description
<b>GetLocationsRequest</b>	The overall container of the request to retrieve locations for network identifiers.
<b>GetLocationsResponse</b>	The overall container of the response to the request to retrieve locations for network identifiers. <b>GetLocationsResponse</b> contains the response status and, if the response is successful, the list of locations.

#### 3.1.4.1.3.1 GetLocationsRequest

The **GetLocationsRequest** complex type is the overall container of the information that is sent in the SOAP request to retrieve locations for network identifiers. The schema of the request body within the **SOAP envelope** is as follows.

```
<:schema xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
xmlns:tns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
targetNamespace="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.1">
  <s:element name="GetLocationsRequest">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="1" maxOccurs="1" name="Entity"
type="tns:restrictedAnyURI" />
        <s:element minOccurs="0" maxOccurs="1" name="WAPBSSID"
type="tns:EnetMacAddressType" />
        <s:element minOccurs="0" maxOccurs="1" name="RSSI" type="s:unsignedByte" />
        <s:element minOccurs="0" maxOccurs="1" name="MAC"
type="tns:EnetMacAddressType" />
        <s:element minOccurs="0" maxOccurs="1" name="ChassisID"
type="tns:LLDPChassisIDOrPortIDTLVType" />
        <s:element minOccurs="0" maxOccurs="1" name="PortID"
type="tns:LLDPChassisIDOrPortIDTLVType" />
        <s:element minOccurs="0" maxOccurs="1" name="SubnetID" type="tns:IPAddress"
/>
      </s:sequence>
    </s:complexType>
  </s:element>

  <s:simpleType name="restrictedAnyURI">
    <s:annotation>
      <s:documentation>anyURI but bounded to length between 1 and 64.</s:documentation>
    </s:annotation>
    <s:restriction base="s:anyURI">
      <s:minLength value="1" />
      <s:maxLength value="64" />
    </s:restriction>
  </s:simpleType>

  <s:simpleType name="EnetMacAddressType">
    <s:annotation>
      <s:documentation>an Ethernet MAC address in IEEE 802 standard format human-
readable form. http://en.wikipedia.org/wiki/MAC_address</s:documentation>
    </s:annotation>
```

```

    <s:restriction base="s:string">
      <s:pattern value="((([a-zA-F0-9]{1,2})-){5}) ([a-zA-F0-9]{1,2})" />
    </s:restriction>
  </s:simpleType>
  <s:simpleType name="IPAddress">
    <s:annotation>
      <s:documentation>an IP (v4 or v6) address.</s:documentation>
    </s:annotation>
    <s:restriction base="s:string">
      <s:minLength value="0" />
      <s:maxLength value="39" />
      <s:pattern value="((25[0-5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])\.){3}(25[0-5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])" />
      <s:pattern value="((([0-9a-zA-F]{1,4}:){7}([0-9a-zA-F]{1,4}))" />
      <s:pattern value="((([0-9a-zA-F]{1,4}:){6})((([0-9]{1,3})\.([0-9]{1,3})\.([0-9]{1,3})\.([0-9]{1,3}))" />
      <s:pattern value="((([0-9a-zA-F]{1,4}:)*([0-9a-zA-F]{1,4}))*(:)([0-9a-zA-F]{1,4}:)*([0-9a-zA-F]{1,4}))" />
      <s:pattern value="((([0-9a-zA-F]{1,4}:)*([0-9a-zA-F]{1,4}))*(:)([0-9a-zA-F]{1,4}:)*([0-9a-zA-F]{1,4}))" />
    </s:restriction>
  </s:simpleType>
  <s:simpleType name="LLDPChassisIDOrPortIDTLVType">
    <s:annotation>
      <s:documentation>a Link Layer Discovery Protocol TLV.</s:documentation>
    </s:annotation>
    <s:restriction base="s:base64Binary">
      <s:minLength value="0" />
      <s:maxLength value="258" />
    </s:restriction>
  </s:simpleType>
</s:schema>

```

### 3.1.4.1.3.2 GetLocationsResponse

The **GetLocationsResponse** complex type is the overall container in the response to the **GetLocationsRequest** request. **GetLocationsResponse** encapsulates the results of the operation to retrieve locations for network identifiers. It contains an optional **presenceList** element of type **presenceListType**, and one **ReturnCode** element of type **ReturnCodeType**. The schema for this complex type within the SOAP envelope is as follows:

```

<s:element name="GetLocationsResponse">
  <s:complexType>
    <s:sequence>
      <s:element minOccurs="1" maxOccurs="1" name="ReturnCode" type="tns:ReturnCodeType" />
      <s:element minOccurs="0" maxOccurs="1" name="presenceList" type="tns:presenceListType" />
    </s:sequence>
  </s:complexType>
</s:element>

```

### 3.1.4.1.4 Simple Types

The XML Schema simple definitions described in the following table are specific to this operation.

Simple Type	Description
<b>EnetMacAddressType</b>	A string <b>Message Authentication Code (MAC)</b> address format.
<b>IPAddress</b>	A string with <b>Internet Protocol version 4 (IPv4)</b> or <b>Internet Protocol version 6 (IPv6)</b> address format.
<b>LLDPChassisIDOrPortIDTLVType</b>	A binary blob representing the <b>ChassisID</b> or <b>PortID type-length-value (TLV)</b> as defined by <a href="#">[IEEE802.1AB]</a> .

### 3.1.4.2 GetLocationsInCity

The following excerpt from the WSDL for this protocol specifies the messages that constitute this operation:

```
<wsdl:operation name="GetLocationsInCity">
  <wsdl:input wsaw:Action="LIService/GetLocationsInCity" name="GetLocationsInCityRequest"
message="tns:GetLocationsInCityRequest" />
  <wsdl:output wsaw:Action="LIService/GetLocationsInCityResponse"
name="GetLocationsInCityResponse" message="tns:GetLocationsInCityResponse" />
</wsdl:operation>
```

When a client needs to request a location, a TCP connection **MUST** be made to the server and SSL **MUST** be negotiated. The address of the server that makes the TCP connection can be obtained through a different channel, such as SIP. After successful SSL negotiation, a SOAP HTTP request, **GetLocationsInCityRequest** message, **MUST** be constructed with a SOAP body containing the **GetLocationsInCityRequest** element.

On receiving a **GetLocationsInCityRequest** request, the server queries its repository of locations to get all of the locations that match the **City**, **State**, and **Country** specified in the request. After obtaining the locations, the server **MUST** construct the **GetLocationsInCityResponse** message, containing the **GetLocationsInCityResponse** element, and it **MUST** send the message in the SOAP HTTP response, which is a 2xx response to a SOAP HTTP request. In case of errors, the response message **MUST** specify the error that was encountered by the server.

#### 3.1.4.2.1 Messages

The following WSDL message definitions are specific to this operation.

##### 3.1.4.2.1.1 GetLocationsInCityRequest

The **GetLocationsInCityRequest** SOAP message is a request that is sent from the client, typically as a result of a user action to retrieve locations in a city. The request information **MUST** be captured in the **GetLocationsInCityRequest** element in the SOAP body of the message. The **GetLocationsInCityRequest** element is specified in section [3.1.4.2.3.1](#).

##### 3.1.4.2.1.2 GetLocationsInCityResponse

The **GetLocationsInCityResponse** SOAP message is a response that is sent by the server after it executes a request to retrieve locations in a city. This message contains the result of matching locations in the repository with the city, state, and country/region specified in the request. The result is represented in the **GetLocationsInCityResponse** element, which **MUST** be in the SOAP body of the SOAP message. The **GetLocationsInCityResponse** element is specified in section [3.1.4.2.3.2](#). If the server is able to successfully match any locations for the city, state and country/region, the **response** element contains the locations matched and a **ReturnCodeType**

indicating success. These locations are included in the complex type **presenceListType**, which is specified in section [3.1.4.1.3](#). In case of an error, the response element MUST specify the reason for the failure to retrieve locations in the simple type **ReturnCodeType**, which is specified in section [2.2.5](#).

### 3.1.4.2.2 Elements

All elements in the WSDL are contained in complex types and specified in section [3.1.4.2.3](#).

### 3.1.4.2.3 Complex Types

The XML Schema simple definitions described in the following table are specific to this operation.

Complex Type	Description
<b>GetLocationsInCityRequest</b>	The overall container of the request to retrieve locations for city, state, and country/region.
<b>GetLocationsInCityResponse</b>	The overall container of the response to the request to retrieve locations for city, state, and country/region. <b>GetLocationsInCityResponse</b> contains the response status and, if the response is successful, the list of locations.

#### 3.1.4.2.3.1 GetLocationsInCityRequest

The **GetLocationsInCityRequest** complex type is the overall container of the information that is sent in the SOAP request to retrieve locations for city, state, and country/region. The schema of the request body within the SOAP envelope is as follows:

```
<s:schema xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
xmlns:tns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
targetNamespace="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
xmlns:ca="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr" elementFormDefault="qualified"
attributeFormDefault="unqualified" version="1.1">
  <s:element name="GetLocationsInCityRequest">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="1" maxOccurs="1" name="Entity"
type="tns:restrictedAnyURI" />
        <s:element minOccurs="1" maxOccurs="1" name="Country" type="ca:iso3166a2" />
        <s:element minOccurs="1" maxOccurs="1" name="State" type="tns:StateType" />
        <s:element minOccurs="1" maxOccurs="1" name="City" type="tns:CityType" />
      </s:sequence>
    </s:complexType>
  </s:element>

  <s:simpleType name="restrictedAnyURI">
    <s:annotation>
      <s:documentation>anyURI but bounded to length between 1 and 64.</s:documentation>
    </s:annotation>
    <s:restriction base="s:anyURI">
      <s:minLength value="1" />
      <s:maxLength value="64" />
    </s:restriction>
  </s:simpleType>
  <s:simpleType name="StateType">
```



```

    <s:annotation>
      <s:documentation>any string of length 2.</s:documentation>
    </s:annotation>
    <s:restriction base="s:string">
      <s:minLength value="2" />
      <s:maxLength value="2" />
    </s:restriction>
  </s:simpleType>
  <s:simpleType name="CityType">
    <s:annotation>
      <s:documentation>any string of length between 1 and 64.</s:documentation>
    </s:annotation>
    <s:restriction base="s:string">
      <s:minLength value="1" />
      <s:maxLength value="64" />
    </s:restriction>
  </s:simpleType>
</s:schema>

```

### 3.1.4.2.3.2 GetLocationsInCityResponse

The **GetLocationsInCityResponse** complex type is the overall container in the response to the **GetLocationsInCityRequest** request. **GetLocationsInCityResponse** encapsulates the results of the operation to retrieve locations for city, state, and country/region. It contains an optional **presenceList** element of type **presenceListType**, and one **ReturnCode** element of type **ReturnCodeType**. The schema for this complex type within the SOAP envelope is as follows:

```

<s:element name="GetLocationsInCityResponse">
  <s:complexType>
    <s:sequence>
      <s:element minOccurs="1" maxOccurs="1" name="ReturnCode" type="tns:ReturnCodeType" />
      <s:element minOccurs="0" maxOccurs="1" name="presenceList"
type="tns:presenceListType" />
    </s:sequence>
  </s:complexType>
</s:element>

```

### 3.1.4.2.4 Simple Types

The XML Schema simple definitions described in the following table are specific to this operation.

Simple Type	Description
<b>CityType</b>	A string of length between 1 and 64 that represents the <b>City</b> .
<b>StateType</b>	A string of length 2 that represents the <b>State</b> .

### 3.1.5 Timer Events

None.

### 3.1.6 Other Local Events

None.

## 3.2 Client Details

The client side of this protocol is simply a pass-through. That is, no additional timers or other state is required on the client side of this protocol. Calls made by the higher-layer protocol or application are passed directly to the transport, and the results returned by the transport are passed directly back to the higher-layer protocol or application.

## 4 Protocol Examples

To retrieve the location for the network identifiers of a client, the protocol client constructs the following WSDL message.

```
<soap:Body>
  <GetLocationsRequest xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <Entity>sip:voip_911_user1@contoscovdomain.com</Entity>
    <!-- <WAPBSSID>string</WAPBSSID> -->
    <RSSI>0</RSSI>
    <MAC>12-22-22-22-22-22</MAC>
    <!-- <ChassisID>base64Binary</ChassisID> -->
    <!-- <PortID>base64Binary</PortID> -->
    <SubnetID>192.168.0.0</SubnetID>
    <IP>192.168.0.244</IP>
  </GetLocationsRequest>
</soap:Body>
```

The protocol server then responds with the following.

```
<soap:Body>
  <GetLocationsResponse xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <ReturnCode>200</ReturnCode>
    <presenceList>
      <presence entity="sip:voip_911_user1@contoscovdomain.com"
  xmlns="urn:ietf:params:xml:ns:pidf">
        <tuple id="_LIS:0">
          <status>
            <geopriv xmlns="urn:ietf:params:xml:ns:pidf:geopriv10">
              <location-info>
                <civicAddress xmlns="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr">
                  <country>US</country>
                  <A1>WA</A1>
                  <A3>Redmond</A3>
                  <PRD />
                  <RD>163rd</RD>
                  <STS>Ave</STS>
                  <POD>NE</POD>
                  <HNO>3910</HNO>
                  <HNS />
                  <LOC>30/3351</LOC>
                  <NAM>Microsoft</NAM>
                  <PC>98052</PC>
                </civicAddress>
              </location-info>
            </geopriv>
          </status>
        </tuple>
      </presence>
    </presenceList>
  </GetLocationsResponse>
</soap:Body>
```

To retrieve the locations for the city, state, and country/region specified by a client, the protocol client constructs the following WSDL message.

```
<soap:Body>
  <GetLocationsInCityRequest xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <Entity>sip:voip_911_user1@vcontoscodomain.com</Entity>
    <Country>US</Country>
    <State>WA</State>
    <City>San Francisco</City>
  </GetLocationsInCityRequest>
</soap:Body>
```

The protocol server then responds with the following.

```
<soap:Body>
  <GetLocationsInCityResponse xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <ReturnCode>404</ReturnCode>
  </GetLocationsInCityResponse>
</soap:Body>
```

## 5 Security

### 5.1 Security Considerations for Implementers

This protocol allows HTTP connections only over SSL. Users are authenticated using **Kerberos** v5 and **NT LAN Manager (NTLM) Authentication Protocol authentication (2)** methods. NTLM is specified in [\[MS-NLMP\]](#). Clients can also be authenticated using the SPNEGO-based Kerberos and NTLM HTTP authentication (2), as specified in [\[RFC4559\]](#) Clients can also be authenticated using custom **certificate (1)** based authentication (2), as specified in [\[MS-OCAUTHWS\]](#)

### 5.2 Index of Security Parameters

None.

## 6 Appendix A: Full WSDL

For ease of implementation, the full WSDL is provided in this section.

```
<?xml version="1.0" encoding="utf-8" ?>
<wsdl:definitions name="LIService"
targetNamespace="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsa10="http://www.w3.org/2005/08/addressing"
xmlns:wsx="http://schemas.xmlsoap.org/ws/2004/09/mex"
xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/"
xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-
1.0.xsd" xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
xmlns:wsap="http://schemas.xmlsoap.org/ws/2004/08/addressing/policy"
xmlns:misc="http://schemas.microsoft.com/ws/2005/12/wsdl/contract"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsam="http://www.w3.org/2007/05/addressing/metadata"
xmlns:wsaw="http://www.w3.org/2006/05/addressing/wsdl"
xmlns:tns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/">
  <wsdl:types>
    <xsd:schema>
      <xsd:import namespace="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
schemaLocation="LIService.xsd" />
    </xsd:schema>
  </wsdl:types>
  <wsdl:message name="GetLocationsRequest">
    <wsdl:part name="parameters" element="tns:GetLocationsRequest" />
  </wsdl:message>
  <wsdl:message name="GetLocationsResponse">
    <wsdl:part name="parameters" element="tns:GetLocationsResponse" />
  </wsdl:message>
  <wsdl:message name="GetLocationsInCityRequest">
    <wsdl:part name="parameters" element="tns:GetLocationsInCityRequest" />
  </wsdl:message>
  <wsdl:message name="GetLocationsInCityResponse">
    <wsdl:part name="parameters" element="tns:GetLocationsInCityResponse" />
  </wsdl:message>
  <wsdl:portType name="ILIService">
    <wsdl:operation name="GetLocations">
      <wsdl:input wsaw:Action="LIService/GetLocations" name="GetLocationsRequest"
message="tns:GetLocationsRequest" />
      <wsdl:output wsaw:Action="LIService/GetLocationsResponse"
name="GetLocationsResponse" message="tns:GetLocationsResponse" />
    </wsdl:operation>
    <wsdl:operation name="GetLocationsInCity">
      <wsdl:input wsaw:Action="LIService/GetLocationsInCity"
name="GetLocationsInCityRequest" message="tns:GetLocationsInCityRequest" />
      <wsdl:output wsaw:Action="LIService/GetLocationsInCityResponse"
name="GetLocationsInCityResponse" message="tns:GetLocationsInCityResponse" />
    </wsdl:operation>
  </wsdl:portType>
  <wsdl:binding name="LIServiceSoap" type="tns:ILIService">
    <soap:binding transport="http://schemas.xmlsoap.org/soap/http" />
    <wsdl:operation name="GetLocations">
      <soap:operation soapAction="LIService/GetLocations" style="document" />
    </wsdl:operation>
  </wsdl:binding>
</definitions>
```

```

    <wsdl:input name="GetLocationsRequest">
      <soap:body use="literal" />
    </wsdl:input>
    <wsdl:output name="GetLocationsResponse">
      <soap:body use="literal" />
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="GetLocationsInCity">
    <soap:operation soapAction="LIService/GetLocationsInCity" style="document" />
    <wsdl:input name="GetLocationsInCityRequest">
      <soap:body use="literal" />
    </wsdl:input>
    <wsdl:output name="GetLocationsInCityResponse">
      <soap:body use="literal" />
    </wsdl:output>
  </wsdl:operation>
</wsdl:binding>
<wsdl:service name="LIService">
  <wsdl:port name="LIServiceSoap" binding="tns:LIServiceSoap">
    <soap:address
location="https://server.vdomain.com/LocationInformation/LIService.svc" />
  </wsdl:port>
</wsdl:service>
</wsdl:definitions>

```

**LIService.xsd** referenced in the preceding WSDL is as follows.

```

<?xml version="1.0"?>
<s:schema xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns:ca="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"
xmlns:pidf="urn:ietf:params:xml:ns:pidf"
xmlns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
xmlns:tns="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
targetNamespace="urn:schema:Microsoft.Rtc.WebComponent.Lis.2010"
elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.1">
  <s:import schemaLocation="..\..\..\..\common\xsd\lis\CivicAddress.rfc5139.xsd"
namespace="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr" />
  <s:import schemaLocation="..\..\..\..\common\xsd\lis\Pidf_LO.rfc3863.xsd"
namespace="urn:ietf:params:xml:ns:pidf" />
  <s:element name="GetLocationsRequest">
    <s:complexType>
      <s:sequence>
        <s:element minOccurs="1" maxOccurs="1" name="Entity"
type="tns:restrictedAnyURI" />
        <s:element minOccurs="0" maxOccurs="1" name="WAPSSID"
type="tns:EnetMacAddressType" />
        <s:element minOccurs="0" maxOccurs="1" name="RSSI" type="s:unsignedByte" />
        <s:element minOccurs="0" maxOccurs="1" name="MAC"
type="tns:EnetMacAddressType" />
        <s:element minOccurs="0" maxOccurs="1" name="ChassisID"
type="tns:LLDPChassisIDOrPortIDTLVType" />
        <s:element minOccurs="0" maxOccurs="1" name="PortID"
type="tns:LLDPChassisIDOrPortIDTLVType" />
        <s:element minOccurs="0" maxOccurs="1" name="SubnetID" type="tns:IPAddress"
/>
        <s:element minOccurs="0" maxOccurs="1" name="IP" type="tns:IPAddress" />
      </s:sequence>
    </s:complexType>

```

```

</s:element>
<s:element name="GetLocationsResponse">
  <s:complexType>
    <s:sequence>
      <s:element minOccurs="1" maxOccurs="1" name="ReturnCode"
type="tns:ReturnCodeType" />
      <s:element minOccurs="0" maxOccurs="1" name="presenceList"
type="tns:presenceListType" />
    </s:sequence>
  </s:complexType>
</s:element>
<s:element name="GetLocationsInCityRequest">
  <s:complexType>
    <s:sequence>
      <s:element minOccurs="1" maxOccurs="1" name="Entity"
type="tns:restrictedAnyURI" />
      <s:element minOccurs="1" maxOccurs="1" name="Country" type="ca:iso3166a2" />
      <s:element minOccurs="1" maxOccurs="1" name="State" type="tns:StateType" />
      <s:element minOccurs="1" maxOccurs="1" name="City" type="tns:CityType" />
    </s:sequence>
  </s:complexType>
</s:element>
<s:element name="GetLocationsInCityResponse">
  <s:complexType>
    <s:sequence>
      <s:element minOccurs="1" maxOccurs="1" name="ReturnCode"
type="tns:ReturnCodeType" />
      <s:element minOccurs="0" maxOccurs="1" name="presenceList"
type="tns:presenceListType" />
    </s:sequence>
  </s:complexType>
</s:element>
<s:simpleType name="restrictedAnyURI">
  <s:annotation>
    <s:documentation>anyURI but bounded to length between 1 and 64.</s:documentation>
  </s:annotation>
  <s:restriction base="s:anyURI">
    <s:minLength value="1" />
    <s:maxLength value="64" />
  </s:restriction>
</s:simpleType>
<s:simpleType name="StateType">
  <s:annotation>
    <s:documentation>any string of length 2.</s:documentation>
  </s:annotation>
  <s:restriction base="s:string">
    <s:minLength value="2" />
    <s:maxLength value="2" />
  </s:restriction>
</s:simpleType>
<s:simpleType name="CityType">
  <s:annotation>
    <s:documentation>any string of length between 1 and 64.</s:documentation>
  </s:annotation>
  <s:restriction base="s:string">
    <s:minLength value="1" />
    <s:maxLength value="64" />
  </s:restriction>
</s:simpleType>

```



```

<s:simpleType name="EnetMacAddressType">
  <s:annotation>
    <s:documentation>an Ethernet MAC address in IEEE 802 standard format human-
readable form. http://en.wikipedia.org/wiki/MAC_address</s:documentation>
  </s:annotation>
  <s:restriction base="s:string">
    <s:pattern value="([a-fA-F0-9]{1,2}-){5}([a-fA-F0-9]{1,2})" />
  </s:restriction>
</s:simpleType>
<s:simpleType name="IPAddress">
  <s:annotation>
    <s:documentation>an IP (v4 or v6) address.</s:documentation>
  </s:annotation>
  <s:restriction base="s:string">
    <s:minLength value="0" />
    <s:maxLength value="39" />
    <s:pattern value="((25[0-5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])\.)\{3\}(25[0-
5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])" />
    <s:pattern value="([0-9a-fA-F]{1,4}:){7}([0-9a-fA-F]{1,4})" />
    <s:pattern value="([0-9a-fA-F]{1,4}:){6}([0-9]{1,3}\.[0-9]{1,3}\.[0-
9]{1,3}\.[0-9]{1,3})" />
    <s:pattern value="(((?>[0-9a-fA-F]{1,4}):)*(?>[0-9a-fA-F]{1,4}))*(:)((?>[0-
9a-fA-F]{1,4}):)*(?>[0-9a-fA-F]{1,4}))*" />
    <s:pattern value="(((?>[0-9a-fA-F]{1,4}):)*(?>[0-9a-fA-F]{1,4}))*(:)((?>[0-
9a-fA-F]{1,4}):)*(?>[0-9a-fA-F]{1,4}))*(((?>[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}))"
/>
  </s:restriction>
</s:simpleType>
<s:simpleType name="LLDPChassisIDOrPortIDTLVType">
  <s:annotation>
    <s:documentation>a Link Layer Discovery Protocol TLV.</s:documentation>
  </s:annotation>
  <s:restriction base="s:base64Binary">
    <s:minLength value="0" />
    <s:maxLength value="258" />
  </s:restriction>
</s:simpleType>
<s:complexType name="presenceListType">
  <s:sequence>
    <s:element minOccurs="0" maxOccurs="unbounded" ref="pidf:presence" />
  </s:sequence>
</s:complexType>
<s:simpleType name="ReturnCodeType">
  <s:annotation>
    <s:documentation>200=Success; 400=Bad Request; 404=Not Found; 500=Internal Server
Error;</s:documentation>
  </s:annotation>
  <s:restriction base="s:string">
    <s:enumeration value="200" />
    <s:enumeration value="400" />
    <s:enumeration value="404" />
    <s:enumeration value="500" />
  </s:restriction>
</s:simpleType>
</s:schema>

```

## 7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft® Lync™ Server 2010
- Microsoft® Lync™ 2010

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

## 8 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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