Oracle Field Service Cloud
Integrating with GPS API
Preface

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# Introduction

## Document Purpose

This document is a developer’s guide for the GPS API. The GPS API is available as part of the Oracle Field Service Cloud platform.

It contains information to enable the integration of an external GPS system with Oracle Field Service Cloud.

## Scope of the Document

The document describes the elements of SOAP technology and its usage when creating client applications for interacting with the GPS module of OFSC system.

## Target Audience

This document is intended for software developers, implementing SOAP clients for interaction with the OFSC GPS module.

## Accessing the APIs

To access the Oracle Field Service Cloud APIs, you must use the https://api.etadirect.com URL scheme. All old URL schemes such as, companyname.etadirect.com, na.etadirect.com, eu.etadirect.com, and so on are deprecated for Oracle Field Service Cloud versions 15.8 and later.

For example, if you are using https://companyname.etadirect.com/soap/inbound/?wsdl to access the Inbound WSDL API, the URL per the new scheme is https://api.etadirect.com/soap/inbound/?wsdl.

## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activate route</td>
<td>Start the work day</td>
</tr>
<tr>
<td>Term</td>
<td>Explanation</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Activity</td>
<td>Entity of the Oracle Field Service Cloud system that represents any time-consuming activity of the resource</td>
</tr>
<tr>
<td>Client Application</td>
<td>See SOAP Client Application</td>
</tr>
<tr>
<td>Decimal degrees</td>
<td>Representation of latitude and longitude geographic coordinates as decimal fractions</td>
</tr>
<tr>
<td>Delivery</td>
<td>In this context, transportation of GPS data from external GPS service to Oracle Field Service Cloud</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System – space-based global navigation satellite system, providing data on location of objects on the Earth in a given moment of time</td>
</tr>
<tr>
<td>Bucket</td>
<td>Entity appearing on the resource tree which can contain resources of a defined type and be assigned activities</td>
</tr>
<tr>
<td>Capacity</td>
<td>Workforce possessing the necessary work skills available at a certain moment of time</td>
</tr>
<tr>
<td>Capacity category</td>
<td>Predefined set of work skills, work skill groups and time slots within which they are considered by the Capacity Management API</td>
</tr>
<tr>
<td>Customer</td>
<td>End-customer, entity that benefits from the activity</td>
</tr>
<tr>
<td>ISO 8601 format</td>
<td>see <a href="http://en.wikipedia.org/wiki/ISO_8601">http://en.wikipedia.org/wiki/ISO_8601</a></td>
</tr>
<tr>
<td>SOAP</td>
<td>Lightweight protocol for exchange of information in a decentralized, distributed environment</td>
</tr>
<tr>
<td>SOAP 1.1</td>
<td>See <a href="http://www.w3.org/TR/2000/NOTE-SOAP-20000508/">http://www.w3.org/TR/2000/NOTE-SOAP-20000508/</a></td>
</tr>
<tr>
<td>SOAP Interface</td>
<td>Interface used to receive requests and return responses via SOAP</td>
</tr>
<tr>
<td>SOAP Client Application</td>
<td>Application running at the Client’s site and providing interaction with Oracle Field Service Cloud server via SOAP</td>
</tr>
<tr>
<td>SOAP Fault</td>
<td>SOAP element used to carry error and/or status information in a SOAP message</td>
</tr>
<tr>
<td>SOAP Faultcode</td>
<td>SOAP element intended to be used by software to provide an algorithmic mechanism for identifying the fault</td>
</tr>
<tr>
<td>SOAP Faultstring</td>
<td>SOAP element intended to provide a human readable explanation of the fault and not intended for algorithmic processing</td>
</tr>
<tr>
<td>User</td>
<td>1) Person using Oracle Field Service Cloud</td>
</tr>
<tr>
<td></td>
<td>2) Entity used for authentication and authorization, allowing people or external software to access Oracle Field Service Cloud</td>
</tr>
</tbody>
</table>
GPS API Overview

The aim of the GPS module is to support integration of the OFSC system with external GPS-based systems, providing position tracking of GPS-enabled devices (hereinafter – the objects).

This module works as a data cache and security firewall, and allows providing GPS data to OFSC quickly and safely.

The GPS interface provides OFSC with data that enables it to see the current and earlier positions of an object on the map, and shows their trace (it is shown as a sequence of blue dots).
3 Accessing the GPS API

User Authentication Structure

All API methods use the 'user' structure as authentication to determine the permissions of the Oracle Field Service Cloud client company user.

The following table describes the Oracle Field Service Cloud SOAP authentication structure mandatory fields.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>now</td>
<td>string</td>
<td>current time in ISO 8601 format</td>
</tr>
<tr>
<td>company</td>
<td>string</td>
<td>case-insensitive identifier of the Client for which data is to be retrieved provided by Oracle during integration</td>
</tr>
<tr>
<td>login</td>
<td>string</td>
<td>case-insensitive identifier of a specific user within the Company provided by Oracle during integration</td>
</tr>
<tr>
<td>auth_string</td>
<td>string</td>
<td>authentication hash;</td>
</tr>
</tbody>
</table>

Use one of the following:

- auth_string = SHA256(now + SHA256(password+SHA256(login)));
  where, 'password' is a case-sensitive set of characters used for user authentication provided by Oracle during integration.

- auth_string = md5(now + md5(password));
  where, 'password' is a case-sensitive set of characters used for user authentication provided by Oracle during integration.

For example:

For the password "secret123", login "soap", and date "2014-01-10T13:56:50Z", the auth_string is calculated as follows:

auth_string = SHA256( "2014-01-10T13:56:50Z" + SHA256( "secret123" + SHA256( "soap" ))) = b477d40346ab40f1a1a038843d88e661fa293bec5cc63359895ab4923051002a

<user>
<now>2014-01-10T13:56:50Z</now>
<login>soap</login>
<company>in132</company>
<auth_string>b477d40346ab40f1a1a038843d88e661fa293bec5cc63359895ab4923051002a</auth_string>
Authentication

The 'user' structure is used for the request authentication. The relevant error is returned if the authentication fails.

If you created a login policy to allow access for only certain IP addresses, the login policy is applicable to the APIs as well.

For example, you defined to allow requests only from IP address 110.0.133.185 for a User Type="API_User" and with login policy "API_login_policy". This implies that authentication fails for a user accessing the APIs from an IP address other than 110.0.133.18, though the login credentials are correct.

<table>
<thead>
<tr>
<th>Number</th>
<th>Login</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>now</td>
<td>is different from the current time on the server and this difference exceeds the predefined time-window (30 minutes by default)</td>
</tr>
<tr>
<td>2</td>
<td>company</td>
<td>cannot be found in the Oracle Field Service Cloud</td>
</tr>
<tr>
<td>3</td>
<td>login</td>
<td>cannot be found for this company</td>
</tr>
<tr>
<td>4</td>
<td>user with this 'login' is not authorized to use the current method</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>auth_string</td>
<td>is not equal to md5(now+md5(password)) or auth_string = SHA256(now + SHA256(password+SHA256(login))));;</td>
</tr>
</tbody>
</table>

For example: 'now' = "2005-07-07T09:25:02+00:00" and password = "Pa$$w0rD" then md5 (password) = "06395148c998f3388e87f22bdf5c84b" concatenated string = = "2005-0707T09:25:02+00:006395148c998f3388e87f22bdf5c84b" auth_string should be: auth_string = "62469089f554d7a38bac95e3f29a989"

Otherwise authentication is successful and the request is processed further.
4 GPS API Methods

GPS API Methods

The following operations are used to deliver GPS data by means of SOAP:

The following table describes the GPS API methods.

<table>
<thead>
<tr>
<th>Method</th>
<th>Can be used to...</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>set_position</td>
<td>...update the object position</td>
<td>Enables the external system to update information about last known position(s) of the object(s) specified by the identifier(s)</td>
</tr>
<tr>
<td>get_position</td>
<td>...obtain information on the object position</td>
<td>Enables OFSC to obtain information about the last known position of the object(s) specified by the identifier(s) and (optionally) history of their movement</td>
</tr>
</tbody>
</table>
5 GPS API Methods Description

'set_position' Method

The 'set_position' method is used to update the position of an object. Several objects and their GPS coordinates and timestamps can be specified in one transaction.

'set_position' Request

The 'set_position' method request specifies:

- the identifier of the object whose position is to be updated
- the geographic coordinates to be set for the specified object
- the time when the object was at the position defined by the coordinates

All method parameters are mandatory (if any mandatory parameter is missing, the corresponding error is returned).

The following table describes the 'set_position' request parameters.

<table>
<thead>
<tr>
<th>Name</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>authentication</td>
<td>Yes</td>
<td>struct</td>
<td>authentication structure</td>
</tr>
<tr>
<td>elements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>data</td>
<td>Yes</td>
<td>struct</td>
<td>array of 'item' elements each corresponding to a single object whose position is to be defined</td>
</tr>
</tbody>
</table>

- 'item' Element of 'set_position' Request

Each 'item' element represents an object whose position is to be defined and contains the following mandatory elements:

<table>
<thead>
<tr>
<th>Name</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>Yes</td>
<td>string</td>
<td>case-sensitive object identifier; can be an object login, name, external ID, etc.</td>
</tr>
<tr>
<td>latitude</td>
<td>Yes</td>
<td>float</td>
<td>geographical latitude (Greenwich Geographical Coordinates in decimal degrees)</td>
</tr>
<tr>
<td>longitude</td>
<td>Yes</td>
<td>float</td>
<td>geographical longitude (Greenwich Geographical Coordinates in decimal degrees)</td>
</tr>
<tr>
<td>timestamp</td>
<td>Yes</td>
<td>DateTime</td>
<td>timestamp in the YYYY-MM-DD HH:MM:SS format</td>
</tr>
</tbody>
</table>
'set_position' Request Example

```xml
xmlns:ns1="urn:toatech:Positioning:1.0">
  <SOAP-ENV:Body>
    <ns1:set_position>
      <now>2014-05-15T17:10:51+00:00</now>
      <login>soap</login>
      <company>in132</company>
      <auth_string>238165d8d5603c670cecfb6b4faeb698</auth_string>
      <data>
        <item>
          <id>22</id>
          <latitude>23.99</latitude>
          <longitude>32.5</longitude>
        </item>
        <item>
          <id>HARTWIG, Luis</id>
          <latitude>20.00</latitude>
          <longitude>32.5</longitude>
          <timestamp>2014-05-15T12:10:15</timestamp>
        </item>
      </data>
    </ns1:set_position>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

'set_position' Response

If the transaction fails, a fault response is returned. Upon a successful transaction, the 'set_position' method returns the number of successfully updated objects.

The following table describes the 'set_position' response parameters.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>return</td>
<td>int</td>
<td>number of updated objects</td>
</tr>
</tbody>
</table>

'set_position' Response Example

```xml
xmlns:ns1="urn:toatech:Positioning:1.0">
  <SOAP-ENV:Body>
    <ns1:set_positionResponse>
      <return>2</return>
    </ns1:set_positionResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```
'get_position' Method

The 'get_position' method is used to retrieve GPS coordinates of the object(s) on the basis of object identifiers and timeframe specified.

'get_position' Request

A 'get_position' request contains the following elements:

<table>
<thead>
<tr>
<th>Name</th>
<th>Required</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>authentication elements</td>
<td>Yes</td>
<td>struct</td>
<td>authentication structure</td>
</tr>
<tr>
<td>ids</td>
<td>Yes</td>
<td>struct</td>
<td>array of 'item' elements each containing a case-sensitive object identifier; can be an object login, name, external ID, etc.</td>
</tr>
<tr>
<td>timefrom</td>
<td>Yes</td>
<td>DateTime</td>
<td>beginning of the search interval in the YYYY-MM-DD HH:MM:SS format</td>
</tr>
<tr>
<td>timeto</td>
<td>Yes</td>
<td>DateTime</td>
<td>end of the search interval in the YYYY-MM-DD HH:MM:SS format</td>
</tr>
</tbody>
</table>
| history             | No       | bool       | option defining whether the request should return the history of the object(s) movement (the list of coordinates with the corresponding timestamps) within the interval defined with the 'timefrom' and 'timeto' parameters

At least one 'item' element is mandatory.

'default value: false

'get_position' Request Example

```
xmlns:ns1="urn:toatech:Positioning:1.0">
  <SOAP-ENV:Body>
    <ns1:get_position>
      <now>2014-08-14T16:51:53Z</now>
      <login>soap</login>
      <company>in132</company>
      <auth_string>ef8c4c522657e55f928b128b8d259b97</auth_string>
      <ids>
        <item>1022</item>
        <item>1023</item>
        <item>1024</item>
      </ids>
      <timefrom>2012-02-14T00:00:01</timefrom>
      <timeto>2012-02-14T23:59:59</timeto>
    </ns1:get_position>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```
'get_position' Response

If the transaction fails, a fault response is returned. Upon a successful transaction, the 'get_position' response consists of a 'return' element containing the GPS data of the objects specified in the request. The 'return' element is an array of 'item' elements each corresponding to a single object specified in the request.

The following table describes the 'get_position' response parameters.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>string</td>
<td>object identifier</td>
</tr>
<tr>
<td>status</td>
<td>int</td>
<td>transaction status code for the object identified with the 'id' parameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>possible values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 – 'id' found, coordinates returned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – 'id' not found, no coordinates returned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 – 'id' found, but no GPS coordinates correspond to the specified time frame. No coordinates returned</td>
</tr>
<tr>
<td>coordinates</td>
<td>struct</td>
<td>array of 0 or more 'item' elements each containing data on the GPS position of a single object</td>
</tr>
<tr>
<td>authentication elements</td>
<td>struct</td>
<td>authentication structure</td>
</tr>
</tbody>
</table>

- 'item' Element of 'get_position' Response

Each 'item' element represents an object whose position is to be defined and contains the following mandatory elements:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>latitude</td>
<td>float</td>
<td>geographical latitude (Greenwich Geographical Coordinates in decimal degrees)</td>
</tr>
<tr>
<td>longitude</td>
<td>float</td>
<td>geographical longitude (Greenwich Geographical Coordinates in decimal degrees)</td>
</tr>
<tr>
<td>timestamp</td>
<td>DateTime</td>
<td>timestamp in the YYYY-MM-DD HH:MM:SS format</td>
</tr>
</tbody>
</table>

The 'item' elements in the 'coordinates' array are sorted by the 'timestamp', so that later (newer) records are located higher.
'get_position' Response Examples

```xml
xmlns:ns1="urn:toatech:Positioning:1.0">
  <SOAP-ENV:Body>
    <ns1:get_positionResponse>
      <return>
        <item>
          <id>12345</id>
          <status>1</status>
          <coordinates/>
        </item>
        <item>
          <id>12346</id>
          <status>1</status>
          <coordinates/>
        </item>
      </return>
    </ns1:get_positionResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

- 'get_position' Response Containing Objects Coordinates

```xml
xmlns:ns1="urn:toatech:Positioning:1.0">
  <SOAP-ENV:Body>
    <ns1:get_positionResponse>
      <return>
        <item>
          <id>1022</id>
          <status>0</status>
          <coordinates>
            <item>
              <latitude>38.99</latitude>
              <longitude>31.2</longitude>
              <timestamp>2012-05-31T19:29:54Z</timestamp>
            </item>
          </coordinates>
        </item>
        <item>
          <id>1023</id>
          <status>0</status>
          <coordinates>
            <item>
              <latitude>23.99</latitude>
              <longitude>32.2</longitude>
              <timestamp>2012-05-31T19:29:54Z</timestamp>
            </item>
          </coordinates>
        </item>
        <item>
          <id>1024</id>
          <status>0</status>
          <coordinates>
            <item>
              <latitude>40.94</latitude>
              <longitude>33.2</longitude>
              <timestamp>2012-05-31T19:29:54Z</timestamp>
            </item>
          </coordinates>
        </item>
      </return>
    </ns1:get_positionResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```
6 Fault Responses

Fault Responses

Upon transaction error Fault Responses are returned. Fault response contains a faultcode and faultstring of an error message.

Error Messages

Each error message is either a SOAP Fault message, or an HTTP error, or a ResourceElement error. GPS Interface responses can contain the following error messages:

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Message</th>
<th>Occurs When</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP error</td>
<td>404</td>
<td>Not Found</td>
<td>Request method is not POST (except when getting WSDL)</td>
</tr>
<tr>
<td>SOAP Fault</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server</td>
<td></td>
<td>Procedure &quot;X&quot; not present</td>
<td>Method name is not 'get_position' or 'set_position'</td>
</tr>
<tr>
<td>Server</td>
<td></td>
<td>SOAP-ERROR: Encoding:</td>
<td>in the 'set_position' method, the value of latitude or longitude is specified incorrectly</td>
</tr>
<tr>
<td>Client</td>
<td></td>
<td>Authentication failed</td>
<td>Invalid credentials are specified in request</td>
</tr>
<tr>
<td>Client</td>
<td></td>
<td>Wrong parameter format</td>
<td>Request format is invalid</td>
</tr>
<tr>
<td>Client</td>
<td></td>
<td>Invalid interval of time was</td>
<td>In the 'get_position' method, the value of 'timeto' is less than 'timefrom'</td>
</tr>
<tr>
<td>Server</td>
<td></td>
<td>specified</td>
<td></td>
</tr>
<tr>
<td>Server</td>
<td></td>
<td>Database error</td>
<td>Server cannot connect to database or execute query</td>
</tr>
<tr>
<td>Client</td>
<td></td>
<td>Invalid value of geographic</td>
<td>In the 'set_position' method, the value of latitude or longitude is specified incorrectly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>coordinate(s)</td>
<td></td>
</tr>
<tr>
<td>Client</td>
<td></td>
<td>Bad Request</td>
<td>Request is not valid XML</td>
</tr>
<tr>
<td>ResourceElement status</td>
<td>1</td>
<td>1</td>
<td>In the 'get_position' method, no data found for the specified interval</td>
</tr>
</tbody>
</table>
Fault Response Example

```xml
<?xml version="1.0"?>
  <SOAP-ENV:Body>
    <SOAP-ENV:Fault>
      <faultcode>SOAP-ENV:Client</faultcode>
      <faultstring>Bad Request</faultstring>
    </SOAP-ENV:Fault>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```