Spectrum™ Technology Platform

Version 9.0 SP2

GeoComplete Guide

Pitney Bowes Software

Contents

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Enterprise GeoComplete

In this section:

GeoComplete Module

The module for Spectrum™ Technology Platform automatically suggests addresses and points of interest as you type and immediately returns candidates based on your input. You can then select your candidate to see the pinpoint location on a map. This "as you type" recognition of addresses and points of interest is particularly valuable for mobile applications and can be incorporated into many business applications.

The component is delivered as a Spectrum module and can be built into Spectrum stages just like any other component. Spectrum™ Technology Platform 9.0 must already be installed.

GeoComplete Stage

The Enterprise GeoComplete Module consists of the following stage.

- **GeoComplete** — Automatically suggests addresses and points of interest as you type and immediately returns candidates based on your input.

GeoComplete Database Resources

The GeoComplete Module databases are installed on the Spectrum™ Technology Platform server. The databases are available by subscription from Pitney Bowes Software and are updated regularly.

The GeoComplete databases are delivered in several zip files according to region. Installing one zip file installs all the included country databases. However, each country is separately licensed. See the **Installing GeoComplete Module Databases** topic in the Installation Guide for a description of the provided database zip files and included counties. See updated Release Notes for changes and information on newly supported countries.

GeoComplete Coverage

The GeoComplete Module covers addresses and points of interest for the following countries.

Andorra (AND)

Austria (AUT)

Brazil (BRA)

Belgium (BEL)

Canada (CAN)

Czech Republic (CZE)

Denmark (DNK)

Finland (FIN)

France (FRA)

Germany (DEU)

Great Britain (GBR)

Hungary (HUN)

Ireland (IRL)

Italy (ITA)

Japan (JPN)

Kuwait (KWT)

Liechtenstein (LIE)

Luxembourg (LUX)

Mexico (MEX)

Netherlands (NLD)

Norway (NOR)

Poland (POL)

Portugal (PRT)

Russia (RUS)

Singapore (SGP)

Slovakia (SVK)

Slovenia (SVN)

South Africa (ZAF)

Spain (ESP)

Sweden (SWE)

Switzerland (CHE)

Turkey (TUR)

United Arab Emirates (ARE)

United States (USA)

Note: See the Spectrum™ Technology Platform version 9.0 SP2 Release Notes for more details of country coverage and data vintages. Newly supported countries and updated data vintages will be covered in regularly updated release notes.

GeoComplete Module Features

The GeoComplete Module provides the following capabilities when built into your Spectrum™ Technology Platform application. The following capabilities are supported.

- Select country (optional). See **GeoComplete Coverage** on page 6 for a list of available countries.
- Single line input search for street addresses
- Candidates returned in order based on distance from X/Y origin
- Search Points of Interest (POI)
- Search All to include both street addresses and POI
- Search POI categories and subcategories
- Search for brand (such as a specific hotel chain) in categories and subcategories
- Search multiple countries at once
- English language for all countries plus national language for select countries

For both address searches and POI searches, candidates are displayed as you type. As you type more specific information, the results are refined to display more relevant candidates. Candidates include the

full address, POI category and subcategory (if the candidate is a Point of Interest), and indicate the distance from the origin.

The GeoComplete Module is packaged with a sample application that demonstrates many capabilities. This sample application includes a mapping feature, but it does not represent all the capabilities of GeoComplete. This is for sample and demonstration purposes only and is not a supported application.

After installing and deploying the GeoComplete Module, you can use the Management Console to explore all the capabilities and see candidate results.

You can expose additional features and preferences through the REST and SOAP API. See **Using the API** on page 16.

Street Searching Features

With Street searching you can search on all address elements including street name, city, locality, state/province, postcode. You can also include POI categories, subcategories, place names, and brand names as part of a street address search.

The entry format can include any combination of the following address elements. Consider listing the street name before the area names for more efficient searching.

```
street_name, area_name_4,area_name_3,area_name_2,area_name_1,post_code,<POI fields>
```

where:

`street_name, area_name_4,area_name_3,area_name_2,area_name_1,post_code,street_name` are street name, locality, city/town, county/region, state/province, and postal code, or equivalent address elements.

`<POI fields>` are equivalent to generic_field_4 (subcategory), generic_field_3 (category), place_name, brand_name.

As you type more specific information, the results are refined to display more relevant candidates. Candidates include the full address, POI category and subcategory, and indicate the distance from the origin. Candidates may also display other descriptive information, such as a web page address.

Instead of providing an area for POI search, you can constrain results by the search extent from the origin or by a bounding box. See **GeoComplete Preferences in Management Console** on page 13 for information on these preferences.

Point of Interest Features

With Point of Interest (POI) searching, you can enter a specific name (such as a hotel name), a category (such as Restaurant), or subcategory (such as Thai Restaurant).

The entry format is either of the following:

```
<brand name, category, or subcategory> <optional area>
```

```
<optional area>> <brand name, category, or subcategory>
```

where:

`<brand name, category, or subcategory>` is a point of interest, such as the name of a specific bank, restaurant, or hospital) or a category (such as parking lot, or petrol station), or subcategory (such as Thai Restaurant).

`<optional area>` can be a street name, city, state/province, postcode or any combination of searchable address fields. This area information is optional, but if provided, it will limit the candidates to the specified area.

As you type more specific information, the results are refined to display more relevant candidates. Candidates include the full address, POI category and subcategory, and indicate the distance from the origin. See **Returned Candidate Fields** on page 9 for a list of additional fields returned with POIs.

Instead of providing an area for POI search, you can constrain results by the search extent from the origin or by a bounding box. See **GeoComplete Preferences in Management Console** on page 13 for information on these preferences.

Note: POIs can only be searched in one country at a time. If a country code is not provided, then the current location can be used to set the country. If no country or location is provided, then a default country will be used.

For examples that illustrate POI , see **Typical Application Examples** on page 10.

Point of Interest Categories and Subcategories

Category and Subcategory Classification

Points of Interest (POI) are classified into categories and subcategories. These categories/subcategories are returned with POI candidates and you can also use these categories/subcategories for searching.

This two-level classification is simple and allows you to search and identify POIs including, but not limited to, restaurants, hotels, entertainment sites, hospital/medical facilities, shopping and retail establishments, and other businesses. The category and subcategory names are appropriate for terminology variations. For example, Cash Point, Cash Dispenser, Cash, and ATM are all terms that identify cash dispensing devices. You can search any of these terms with the GeoComplete Module to identify cash dispensing devices.

Categories are broad in nature, such as Restaurants. Subcategories are more specific, such as Barbeque Restaurants, Barbeque, or BBQ. Any other type of ethnic or specialty restaurant could also be a subcategory. Similarly, Automotive is a category with many subcategories, including Car Service, Car Repair, Car Sales, Tire Services/Tyre Services (American and British spelling variations of tire and tyre).

POI Name Searching

Points of Interest can also be searched by using the name of a business, brand, institution, or other specifically named site. These names are also are returned with POI candidates, if available.

For example, you can search for a specific coffee shop, sports stadium, hospital, hotel, park, shop, restaurant, tourist attraction, or any other site. This may be important if you are looking for a specific brand name hotel/motel chain or cafe in your location.

See **Typical Application Examples** on page 10 for examples of POI searching with the GeoComplete Module.

Returned Candidate Fields

Additional Returned Fields

Returned candidates can be previewed in the Management Console. Candidates include the complete address elements that you expect to see in Spectrum™ Technology Platform candidates, such as AddressLine, City, County, State, and Country. In addition, GeoComplete candidates return the following fields:

Table 1: GeoComplete Additional Returned Fields

Field Name	Description
Distance	Distance from origin in kilometers or miles. A distance of -0.0 means that an origin was not used.
DistanceUnit	Distance unit (kilometers or miles)

Field Name	Description
Category	For POI candidates, this is the Category.
Subcategory	For POI candidates, this is the Subcategory.
brand_name	For POI candidates, this is a Brand or business name. For example, this can be the name of a specific hotel/motel chain or
email	For POI candidates, this is the email address
faxnum	For POI candidates, this is the fax number
featureID	unique FeatureID
http	For POI candidates, this is the web site, if available
isUserDictionary	True if candidate comes from a user dictionary, false if not from user dictionary.
micode	For POI candidates, this is miCode is an eight-digit numeric code that identifies POI features by category, subcategory, and subfeature. This is not the same as the featureID and is not related to the Category and Subcategory fields described above. See **miCodes** on page 26 for a comprehensive listing of miCodes that are used for all countries.
telnum	For POI candidates, this is the telephone number.
latitude/longitude	Latitude/Longitude coordinates are returned. For POI candidates, these are exact coordinates. For street candidates, these coordinates are approximate. To get a more exact coordinates, you must perform a geocode operation on the street candidate.

Typical Application Examples

In a typical mobile application, you would allow the application to identify your geographic location. Your location will also determine the default country. For the purposes of these examples, we will assume that the default is USA, but you can change this to any supported country. See **GeoComplete Coverage** on page 6for a list of available countries.

See **Using the API** on page 16 for a description of all the options than can be controlled through the API.

Numbered Street Examples

The following example describes a GeoComplete example with a New York City numbered street.

- Start with focus in USA, New York City, midtown Manhattan. Type: `60 east 4 s`

This returns:

```
60 E 4th St, New York, NY 10003

60 E 4th St, Brooklyn, NY 11218
```

The New York (Manhattan) address is returned first, because this is closest to the origin. An identical address exists in Brooklyn, NY, several miles further from the origin. Others addresses are returned in increasingly further distance from the X/Y origin.

The following example describes a GeoComplete example with a numbered street in Italy.

- Start with focus in Italy (ITA) in the city of Palermo. Type: `via 4`

This returns:

```
Via 4 Aprile, 90133 Palermo
```

A total of ten "via 4" and "via Quarto" street addresses are returned in increasing distance from origin. The word Quarto is recognized as the number 4 in street name.

Street and Directional Abbreviation Examples

- Start with focus in Canada (CAN). Type: `990 north ma`

This returns:

```
990 N Mary Lake Rd, Huntsville, ON, P1H
```

Notice that you entered "North" but the address is returned correctly as 990 "N" Mary Lake Rd, as the address appears in the data source.

- Start with focus in USA, in Nashua, NH. Type: `923 St`

This returns:

```
923 Saint James Pl, Nashua, NH 03062
```

In this example, St is recognized as street abbreviation for Saint.

POI Examples

POI candidates include the full address, POI category and subcategory, and indicate the distance from the origin.

- You can simply allow your browser to automatically detect X/Y coordinates, as you would in a typical mobile application. In this example, starting from Troy, NY search for a veterinarian. As you type `veteri`,

  As you type this you will see a list of nearby veterinary clinics.

- Start with a origin in Piccadilly Circus, London, Great Britain. Type: `Restaurant Thai`. Or alternatively, type `Thai`.

Either POI search returns Thai Restaurants near Piccadilly Circus. Candidates include the full address, POI category, and indicate the distance from the origin.

- Planning a trip to Cajun Country in Lafayette, Louisiana? type: `lafayette la cash`

  You will see a list of ATMs (category of Cash Dispenser) in Lafayette, Louisiana.

- If you're looking for a hotel in the 92154 Zip Code area, type: `hotel 92154`

  You will see a list of hotels in the 92154 ZIP Code area of San Diego, California.

- You can combine a POI brand name with the city name. For example, if you're looking a favorite seafood restaurant in Scarborough, Maine, you could type: `clambake scar`

  As you type this you will see the listing for the Clambake Restaurant in Scarborough, Maine.

  You can combine POIs with

Multiple Country, Language, and User Dictionaries

If you use GeoComplete with more than one country selected, rules are used to determine which country has search priority. You can also have more than one dictionary per country to support standard and custom user dictionaries. For some countries, multiple dictionaries can support more than one language.

Multiple Country Support and Search Priority

If multiple countries are available to GeoComplete, countries are searched based on default rules and user input. The default country or countries can be set in the GeoComplete component during installation.

In most applications, you would select only one country or perhaps two neighboring countries (such as USA, CAN). You can select All to add the database resources for all the available GeoComplete databases.

You can also define a default country (or countries) at the Spectrum Management Console level. You can use this to control the number of countries searched, even if the GeoComplete module allows all loaded countries to be searched. Multiple country searching behavior can be summarized as follows.

Table 2: Countries Searched Based On Input and GeoComplete Settings

Input and GeoComplete Searchable Countries	Search Behavior
If input specifies a country.	Search only specified country (if loaded).
If input specifies a bounding box.	Search only loaded countries intersecting point or box; sort final list.
If GeoComplete specifies default countries (such as USA, CAN).	Only default countries are searched (for example, USA, CAN).
If GeoComplete does not specify default country or countries.	All loaded countries are searched.

When GeoComplete searches all loaded countries, significant performance issues may be encountered. If your application calls for searching all loaded GeoComplete countries, it is advisable to constrain the results using Management Console.

Language Support

Some countries can include multiple dictionaries to support more than one language. When you install databases for the following countries, you can select more than one language dictionary:

Table 3: Countries with Multiple Language Support

Country	Language Databases
Kuwait (KWT)	English and Arabic
Russia (RUS)	English and Russian
United Arab Emirates (ARE)	English and Arabic

Candidates are ordered by how close they are to the origin regardless of language. However, if candidates are equidistant from the origin, then candidates matching the input language are listed first.

Standard and User Dictionary Support

The GeoComplete Module supports both standard dictionaries and custom user dictionaries. The Management Console and API allow you to choose which dictionary (if any) has preference. See **GeoComplete Preferences in Management Console** on page 13. By default, both standard and user dictionaries (if any) are used and results from the standard dictionary are preferred.

Note: If you have a user dictionary for a country, it must be located in the same folder as the standard dictionary.

GeoComplete Preferences in Management Console

You can use several GeoComplete preferences to more precisely control the number and distance of retrieved candidates. These preferences can be controlled through the Spectrum Management Console or through equivalent API methods. See **Using the API** on page 16.

Note: The GeoComplete component is delivered as an 9.2 (9.0 SP2) module and can be built into Spectrum stages just like any other component.

Geocomplete Options

From **Management Console Modules Services** select GeoComplete. In the Options tab select GeoComplete and choose from the following options:

- **Geocomplete Level**

  Select Street, POI, or All

- **Coordinate System**

  EPSG 4326 is currently the only supported coordinate system

- **Max Candidates**

  Select 1 - 100 to specify the maximum number of candidates returned. A value of -1 specifies the maximum allowable number of candidates (100). If Max Candidates is not specified the default is 5. If you search multiple countries, GeoComplete will consider candidates from each country, sort them internally, and then present the maximum number of candidates based on the combined countries. So whether the default country is set to USA, CAN or CAN,USA GeoComplete returns the same list of candidates (tied candidates would use country order as a tiebreaker).

  Searching multiple countries using GeoComplete will impact performance.

Search Preferences

From **Management Console Modules Services** select GeoComplete. In the Options tab select Search Restrictions and choose from the following options:

- **Default Search**

  Select Address, POI, or All

- **Distance from Origin**

  Select this to specify the search extent as the maximum distance from the X/Y origin. This search distance is unlimited by default. Search Distance Units (miles or kilometers) can also be specified on the GeoComplete Options tab.

  The distance from origin and the distance units (kilometers or miles) can also be controlled through the API. See **Options** on page 16.

- **Within Bounding Box**

  Select this to specify the X/Y coordinates of a polygon that defines the area in which to search for candidates. The polygon is delimited by four sets of X/Y coordinates defining the corners of the polygon. The corners are defined as:

  - **BBoxEast**

    The coordinate defining the eastern boundary of the bounding box. For example, `-97.149410`.

  - **BBoxWest**

    The coordinate defining the western boundary of the bounding box. For example, `-97.615642`.

  - **BBoxNorth**

    The coordinate defining the northern boundary of the bounding box. For example, `30.351415`.

  - **BBoxSouth**

    The coordinate defining the southern boundary of the bounding box. For example, `30.115302`.

  From these coordinates, GeoComplete constructs a rectangle that defines the boundaries that will be searched. This example constructs a bounded area centered around Elgin, Texas.

  This extent of the search polygon can also be controlled through the API. See **Options** on page 16.

- **Search Distance Units**

  Search distance units can be miles or kilometers. The default is kilometers.

Data Preferences

From **Management Console Modules Services**. In the Options tab select Data and choose from the following options:

- **Database**

  Select the country from the drop down.

- **Database Preference**

  Select a single dictionary to use or a preferred dictionary. The default is Use Both Dictionaries, which means that both standard and user dictionaries are used with the best close match returned from either a standard or user dictionary. The choices are:

  - Use Standard Dictionary Only
  - Use User Dictionary Only
  - Use Both Dictionaries (Default)
  - Prefer User Dictionary
  - Prefer Standard Dictionary

- **Order Installed Data Resources**

  If you have multiple database resources installed, you can select the order in which they are searched. For example, if you had both the USA and CAN databases installed, you could order CAN first and USA second, or vice versa. Use the **Move Up** and **Move Down** buttons to change the order the database resources.

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GeoComplete API

In this section:

Using the API

This section describes the GeoComplete API. Both SOAP and REST are supported.

Inputs

The GeoComplete API supports the following input parameters.

Table 4: Inputs

Parameter	Description
Data.AddressLine1	Single line address
Data.Country	The 3-character ISO country code
Data.OriginLatitude	Y Coordinate of origin
Data.OriginLongitude	X Coordinate of origin

Options

The GeoComplete API supports the following optional parameters.

Table 5: Options

Parameter	Description
Option.Database	The name of the database configured in Management Console
Option.DatabaseSearchOrder	In the case of multiple dictionaries in a database, this allows you to set the dictionary preference. This controls whether candidates from one dictionary are returned ahead of similar candidates from another dictionary.
Option.Path	Path to database
Option.SearchDistance	The distance (radius) to search for candidates from the given origin. Distance units (miles or kilometers) are defined by the SearchRadiusUnits method. This distance is also used as a search distance restriction.
Option.BBoxWest	The coordinate defining the western boundary of the bounding box.
Option.BBoxSouth	The coordinate defining the southern boundary of the bounding box.
Option.BBoxNorth	The coordinate defining the northern boundary of the bounding box.
Option.BBoxEast	The coordinate defining the eastern boundary of the bounding box.
Option.GeoCompleteLevel	The level to be searched. This can be Address, POI, Category or ALL (to search both street addresses and points of interest).
Option.GeoCompleteDictionaryPreference	The dictionary preference whether to use a user dictionary, standard dictionary or both, and whether to prefer one over the other.

Parameter	Description
Option.SearchRadiusUnit	Units (feet, miles, meters, kilometers) used for Option.SearchDistance. If not specified, kilometers (km) is used unless you changed that preference in Management Console. These units are also used as a search distance restriction.
Option.CoordinateSystem	Coordinate system to use. Currently only EPSG:4326 is supported.
Option.MaxCandidates	Maximum number of candidates to return (1 - 100). Or specify -1 to return the maximum allowable number of candidates (100).

Outputs

The GeoComplete API supports the following output parameters.

Table 6: Outputs - Address

Parameter	Description
AddressLine1	The first address line containing building number and street name.
City	The city name.
County	The local administrative unit for the address (town, city, county etc). The meaning of county varies by country.
Country	The 3-character ISO country code
FirmName	Name of the firm or company.
HouseNumber	House or street number
LastLine	The last line for the address
Latitude, Longitude	Coordinates are returned. For POI candidates, these are exact coordinates. For street candidates, these coordinates are approximate.
Locality	The meaning of locality varies by country.
PostalCode	The postal code in the appropriate format for the country.
StateProvince	The meaning of State/Province varies by country.
CoordinateSystem	Coordinate System, currently EPSG:4326

Table 7: Outputs - POI

Parameter	Description
Name	Name of the POI
BrandName	Brand or business name associated with POI
Category	Major category of the POI
SubCategory	Minor category of the POI
miCode	8-digit numeric codes for POI candidates that provide feature identification by general category, subcategory, and subfeature. See **miCodes** on page 26.

Parameter	Description
http	Response protocol
telnum	Telephone number
email	Email address
faxnum	Fax number

Table 8: Outputs - Common to Address and POI

Parameter	Description
featureID	unique ID for the address or POI
isUserDictionary	True or False whether returned candidate came User Dictionary.
FormattedString	Single line representation of an address or POI
Type	Whether the response contains a POI (Type=1) or address (Type = 2)
Status	Information returned about the status of the request.
Status.Code	Status code related to the request.
Status.Description	Status description related to the request.

Sample REST Request and Response

Following is a sample REST request and response used to call GeoComplete.

Sample REST Request

Below is a sample REST request.

```
http://localhost:8080/rest/GeoComplete/results.xml?Data.AddressLine1=ab&amp;Option.Database=AUT
```

Sample REST Response

Below is a sample REST response.

```
<xml.GeoCompleteResponse>
 <output_port>
  <Address>
   <AddressLine1>Abbegasse</AddressLine1>
   <City>Wien</City>
   <County>Wien</County>
   <Country>AUT</Country>
   <LastLine>1140 Wien</LastLine>
   <Latitude>48.2051</Latitude>
   <Locality>Wien</Locality>
   <Longitude>16.29514</Longitude>
   <PostalCode>1140</PostalCode>
   <StateProvince>Wien</StateProvince>
   <Type>2</Type>
   <Distance>-0.0</Distance>
   <DistanceUnit>KILOMETERS</DistanceUnit>
   <FormattedString>Abbegasse, 1140 Wien</FormattedString>
   <IsUserDictionary>false</IsUserDictionary>
   <featureID>10400000701258</featureID>
   <user_fields/>
```

```
  </Address>
  <Address>
   <AddressLine1>Abbrenn</AddressLine1>
   <City>Wildalpen</City>
   <County>Liezen</County>
   <Country>AUT</Country>
   <LastLine>8924 Wildalpen</LastLine>
   <Latitude>47.72265</Latitude>
   <Longitude>15.022765</Longitude>
   <PostalCode>8924</PostalCode>
   <StateProvince>Steiermark</StateProvince>
   <Type>2</Type>
   <Distance>-0.0</Distance>
   <DistanceUnit>KILOMETERS</DistanceUnit>
   <FormattedString>Abbrenn, 8924 Wildalpen</FormattedString>
   <IsUserDictionary>false</IsUserDictionary>
   <featureID>10400001526402</featureID>
   <user_fields/>
  </Address>
 </output_port>
</xml.GeoCompleteResponse>
```

Sample SOAP Request and Response

Following is a sample SOAP request and response used to call GeoComplete.

Sample SOAP Request

Below is a sample SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
 xmlns:geoc="http://www.g1.com/services/GeoComplete">
   <soapenv:Header/>
   <soapenv:Body>
      <geoc:GeoCompleteRequest>
         <geoc:context>
            <geoc:account.id>admin</geoc:account.id>
            <!--Optional:-->
            <geoc:account.password>admin</geoc:account.password>
         </geoc:context>
         <!--Optional:-->
         <geoc:options>
            <!--Optional:-->
            <geoc:Database>AUT</geoc:Database>
            <!--Optional:-->
            <geoc:DatabaseSearchOrder></geoc:DatabaseSearchOrder>
            <!--Optional:-->
            <geoc:Path></geoc:Path>
            <!--Optional:-->
            <geoc:SearchDistance></geoc:SearchDistance>
            <!--Optional:-->
            <geoc:BBoxWest></geoc:BBoxWest>
            <!--Optional:-->
            <geoc:BBoxSouth></geoc:BBoxSouth>
            <!--Optional:-->
            <geoc:BBoxNorth></geoc:BBoxNorth>
            <!--Optional:-->
            <geoc:BBoxEast></geoc:BBoxEast>
            <!--Optional:-->
            <geoc:GeoCompleteLevel></geoc:GeoCompleteLevel>
            <!--Optional:-->

<geoc:GeoCompleteDictionaryPreference></geoc:GeoCompleteDictionaryPreference>
```

```
            <!--Optional:-->
            <geoc:SearchRadiusUnit></geoc:SearchRadiusUnit>
            <!--Optional:-->
            <geoc:CoordinateSystem></geoc:CoordinateSystem>
            <!--Optional:-->
            <geoc:MaxCandidates></geoc:MaxCandidates>
         </geoc:options>
         <geoc:rows>
            <!--1 or more repetitions:-->
            <geoc:row>
               <!--You may enter the following 5 items in any order-->
               <!--Optional:-->
               <geoc:AddressLine1>a</geoc:AddressLine1>
               <!--Optional:-->
               <geoc:Country></geoc:Country>
               <!--Optional:-->
               <geoc:OriginLatitude></geoc:OriginLatitude>
               <!--Optional:-->
               <geoc:OriginLongitude></geoc:OriginLongitude>
               <!--Optional:-->
               <geoc:user_fields>
                  <!--Zero or more repetitions:-->
                  <geoc:user_field>
                     <geoc:name></geoc:name>
                     <geoc:value></geoc:value>
                  </geoc:user_field>
               </geoc:user_fields>
            </geoc:row>
         </geoc:rows>
      </geoc:GeoCompleteRequest>
   </soapenv:Body>
</soapenv:Envelope>
```

Sample SOAP Response

Below is a sample SOAP response.

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
   <soap:Body>
     <GeoCompleteResponse xmlns="http://www.g1.com/services/GeoComplete">

         <rows>
            <row>
               <AddressLine1>Abbegasse</AddressLine1>
               <City>Wien</City>
               <County>Wien</County>
               <Country>AUT</Country>
               <LastLine>1140 Wien</LastLine>
               <Latitude>48.2051</Latitude>
               <Locality>Wien</Locality>
               <Longitude>16.29514</Longitude>
               <PostalCode>1140</PostalCode>
               <StateProvince>Wien</StateProvince>
               <Type>2</Type>
               <Distance>-0.0</Distance>
               <DistanceUnit>KILOMETERS</DistanceUnit>
               <FormattedString>Abbegasse, 1140 Wien</FormattedString>
               <IsUserDictionary>false</IsUserDictionary>
               <featureID>10400000701258</featureID>
               <user_fields>
                  <user_field>
                     <name/>
                     <value/>
                  </user_field>
               </user_fields>
            </row>
            <row>
               <AddressLine1>Am Abbrand</AddressLine1>
```

```
               <City>Gaweinstal</City>
               <County>Mistelbach</County>
               <Country>AUT</Country>
               <LastLine>2191 Gaweinstal</LastLine>
               <Latitude>48.47551</Latitude>
               <Locality>Gaweinstal</Locality>
               <Longitude>16.58547</Longitude>
               <PostalCode>2191</PostalCode>
               <StateProvince>Niederösterreich</StateProvince>
               <Type>2</Type>
               <Distance>-0.0</Distance>
               <DistanceUnit>KILOMETERS</DistanceUnit>
               <FormattedString>Am Abbrand, 2191
Gaweinstal</FormattedString>
               <IsUserDictionary>false</IsUserDictionary>
               <featureID>10400002963709</featureID>
               <user_fields>
                  <user_field>
                     <name/>
                     <value/>
                  </user_field>
               </user_fields>
            </row>
            <row>
               <AddressLine1>Abbé-Stadler-Gasse</AddressLine1>
               <City>Melk</City>
               <County>Melk</County>
               <Country>AUT</Country>
               <LastLine>3390 Melk</LastLine>
               <Latitude>48.226780000000005</Latitude>
               <Locality>Melk</Locality>
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Appendix

In this section:

A

Point of Interest Codes (micodes)

In this section:

miCodes

Point of Interest candidates return the miCode. These miCodes are eight-digit numeric codes that provide feature identification by general category, subcategory, and subfeature. Point of Interest miCodes are organized with the following numeric pattern:

POI miCode Numeric Patterns

10 - all Point of Interest miCodes begin with the digits 10

Digits 3 and 4 identify the POI subcategory (such as Shopping - Retail and Wholesale; Health

Digits 5 through 8 identify the subfeature codes (such as Food Stores; Hospital/Polyclinic)

Point of Interest miCodes are assigned universally across all countries.

Table 9: POI miCodes

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
00 Unclassified	00 Unclassified	10000000
01 Shopping - Retail and Wholesale	0000 Unclassified	10010000
	0000 Unclassified	10010000
	0100 General Merchandise Stores/Shops	10010100
	0101 Department Stores	10010101
	0102 Variety Stores	10010102
	0103 Warehouse Club Stores	10010103
	0200 Food Stores	10010200
	0201 Food Stores - Supermarket	10010201
	0203 Food Stores -Fish/Seafood Market	10010203
	0204 Food Stores -Fruits/Vegetable Market	10010204
	0205 Beverage / Bottle Store	10010205
	0300 Apparel and Accessory	10010300
	0400 Auto Sales and Service Stations	10010400
	0401 Car Dealership - Sales	10010401
	0402 Car Dealership - Service	10010402
	0403 Car Dealership - Sales and Service	10010403
	0404 Car Repair Facilities	10010404
	0405 Car Rental Office	10010405
	0410 Motorcycle Sales and Service	10010410
	0500 Gas / Petrol Stations	10010500

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
	0600 Furniture and Home Furnishings	10010600
	0700 Building Materials AND Garden Supplies	10010700
	0800 Wholesale Trade Durable AND Non-durables	10010800
	0900 Shopping Malls/ Shopping Centers	10010900
02 Eating and Drinking Places	0000 Unclassified	10020000
	0101 Restaurants - Ethnic - American	10020101
	0102 Restaurants - Ethnic - Chinese	10020102
	0103 Restaurants - Ethnic - Italian	10020103
	0104 Restaurants - Ethnic - German	10020104
	1050 Restaurants - Ethnic - French	10020105
	0106 Restaurants - Ethnic - Japanese	10020106
	0107 Restaurants - Ethnic - Indian	10020107
	0108 Restaurants - Ethnic - Thai	10020108
	0109 Restaurants - Ethnic - Vietnamese	10020109
	0110 Restaurants - Ethnic - Middle East	10020110
	0111 Restaurants - Ethnic - Greek	10020111
	0112 Restaurants - Ethnic - Mexican	10020112
	0200 Restaurants - Ice Cream/Soda	10020200
	0300 Restaurants - Fast Food	10020300
	0400 Restaurants - Family	10020400
	0500 Restaurants - Pizza	10020500
	0600 Restaurants - Seafood	10020600
	0700 Restaurants - Drinking/Alcoholic	10020700
	0800 High Concentration of Restaurants	10020800

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
03 Business and Personal Services	0000 Unclassified	10030000
	0100 Hotels/Motels	10030100
	0200 Personal Service Business	10030200
	0201 Laundromat	10030201
	0202 Salons	10030202
	0300 Financial Services	10030300
	0301 Banks	10030301
	0302 ATM Machine / Cash Dispenser	10030302
	0400 Broadcasting Service	10030400
	0500 Automobile Club	10030500
04 Other Business	0000 Office / Company / Industry	10040000
	0100 Agriculture and Mining	10040100
	0101 Mine/Quarry	10040101
	0200 Manufacturing	10040200
11 Tourism	0000 Unclassified	10110000
	0100 Tourist Attraction	10110100
	0200 Tourist Attraction - Building	10110200
	0201 Museum	10110201
	0202 Art Gallery / Art Center	10110202
	0203 Aquarium	10110203
	0300 Tourist Attraction - Monument	10110300
	0301 Memorial	10110301
	0400 Tourist Attraction - Natural	10110400
	0401 Scenic/Panoramic View	10110401
	0402 Beach, Represented by a Point	10110402
	0403 Mountain peak	10110403
	0405 Mountain pass	10110405
	0500 Tourist Attraction - Historic Site	10110500
	0600 Tourist Attraction - Other	10110600
	0601 Winery	10110601
	0700 Tourist Information Center	10110700
	0800 Rest Area (Public)	10110800
12 Sports	0000 Sports - Unclassified	10120000

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
	0100 Sport Center / Stadium	10120100
	0101 Tennis Court	10120101
	0102 Cricket	10120102
	0103 Football/Soccer	10120103
	0104 Baseball	10120104
	0105 Ice Skating Rink	10120105
	0106 Hockey	10120106
	0107 Basketball/Netball	10120107
	0108 Golf Course	10120108
	0109 Race Course	10120109
	0110 Rifle Range	10120110
	0111 Bowling Center	10120111
	0300 Water Sport	10120300
	0301 Swimming Pool	10120301
	0302 Yacht Basin	10120302
	0400 Sports Club	10120400
	0500 Health Club	10120500
	0600 Ski Resort	10120600
13 Recreation/Entertainment	0000 Unclassified	10130000
	0100 Cultural /Civic/ Community Center	10130100
	0101 Theater	10130101
	0102 Opera	10130102
	0103 Concert Hall	10130103
	0104 Music Center	10130104
	0105 Cinema	10130105
	0200 Leisure Center	10130200
	0201 Park	10130201
	0202 Zoo	10130202
	0203 Amusement Park	10130203
	0204 Camping Ground/Caravan park	10130204
	0205 Fairgrounds	10130205
	0206 Night Life /Clubs	10130206
	0207 Casino	10130207
	0208 Recreational Clubs	10130208
	0300 Convention Center	10130300

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
	0301 Exhibition Center	10130301
21 Educational	0000 Educational	10210000
	0100 Kindergarten/Nursery School	10210100
	0200 Elementary/Middle/High School	10210200
	0201 Elementary/Middle/High School - Catholic	10210201
	0202 Elementary/Middle/High School - Private	10210202
	0203 Elementary/Middle/High School - Public	10210203
	0300 Colleges/Universities	10210300
	0400 Vocational/Trade	10210400
	0500 Special Schools	10210500
	0600 Library	10210600
	0700 Child Care Center	10210700
22 Places of Worship	0100 Church	10220100
	0101 Baptist Church	10220101
	0102 Catholic Church	10220102
	0103 Methodist Church	10220103
	0200 Mosque	10220200
	0300 Synagogue	10220300
	0400 Buddhist Temple	10220400
	0500 Hindu Temple	10220500
	0600 Other	10220600
23 Health	0000 Health Facilities, Undefined	10230000
	0010 Pharmacy	10230010
	0100 Hospital/Polyclinic	10230100
	0200 Nursing and Personal Care	10230200
	0300 Office/Clinic of Medical Doctors	10230300
	0400 Office/Clinic of Dentist	10230400
	0500 Medical/Dental Laboratories/Services	10230500
	0600 Ambulance Station	10230600
	0700 Veterinarian Clinic/Hospital	10230700
24 Public	0000 All	10240000

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
	0100 Government Facilities	10240100
	0101 City/Municipal/Local Facility	10240101
	0102 Courts	10240102
	0103 Embassy /Foreign Government Representation	10240103
	0104 Frontier Crossing	10240104
	0300 Police Station/Facility	10240300
	0400 Fire Stations	10240400
	0500 Post Office	10240500
	0501 Post Office - Main	10240501
	0502 Post Office - Minor	10240502
	0600 Prisons	10240600
	0700 Military base /Defense	10240700
	0800 Cemetery/Crematorium	10240800
	0900 Waste Disposal /Sewerage	10240900
31 Airports	0000 Unclassified	10310000
	0010 Check-in Facility at Airport	10310010
	0011 Check-in Facility at Airport Departures	10310011
	0012 Check-in Facility at Airport Arrivals	10310012
	0010 Check-in Facility at Airport Departure/Arrivals	10310013
	0100 Airport - Civil	10310100
	0101 Airport - Public	10310101
	0102 Airport- Private	10310102
	0200 Airport - Military	10310200
	0300 Helipad	10310300
32 Stations	0000 Unclassified	10320000
	0100 Ferry terminal /Wharf/Jetty/Pontoon	10320100
	0101 Ferry Terminal Ship/Hovercraft	10320101
	0102 Ferry Terminal Train	10320102
	0200 Railway Station, Undefined	10320200
	0201 Railway Station, Underground/Metro	10320201
	0202 Railway Station, International	10320202

10 Points Of Interest Subcategories	Subfeature Codes	miCodes
	0203 Railway Station, National	10320203
	0204 Railway Station, (Sub) Urban	10320204
	0300 Bus Terminal /Depot	10320300
33 Parking	0000 Parking - Unclassified	10330000
	0100 Parking Garage	10330100
	0200 Open Parking Area	10330200
	0300 Rent-a-Car Parking	10330300
	0210 Park and Ride Lot	10330210
34 Interchanges	0000 Intersection	10340000
	0100 Freeway Exit/Entrance	10340100
	0200 Freeway to Freeway Interchange	10340200
	0300 Non Freeway Intersection	10340300

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