Getting Started With the ACSELERATOR Database API

The ACSELERATOR Database API is a RESTful web service that provides access to device data ACSELERATOR TEAM® SEL-5045 Software collects through the use of a pattern of HTTP requests and responses.

See demonstration projects in the Demos file at http://localhost:5230/api/demos on the computer running the API service.

Installation

There are two versions of the ACSELERATOR Database API:

- The Single version supports one database connection and one client connection.
- The Enterprise version supports multiple database connections and multiple client connections.

The Single version requires that the API be installed on the same computer that the client is running on; it only accepts requests from localhost. The Enterprise version can be installed on the same computer as the database, on the client, or on another computer.

Connections to the ACSELERATOR Database are encrypted and authenticated through the use of connection keys described in the ACSELERATOR QuickSet® SEL-5030 Software Instruction Manual. The connections to the API are not encrypted and are inherently trusted, so remote instances should only be used on a secure, trusted network.

The API can be configured to run under Internet Information Services (IIS) and leverage the encryption and authentication that this web server offers. For more information on this deployment, please contact api_planning@selinc.com.

To install the API, double-click the installer EXE file and follow the wizard. After the installation completes, open the Google Chrome browser and go to http://localhost:5230/. Click **Configuration** in the upper menu and select the default ACSELERATOR Database. The database options will be the connection keys installed on the computer. For more information about connection keys, see the QuickSet instruction manual.

Requests to the API

The API supports two methods for making requests:

- Use of standard HTTP GET requests
- Use of strongly typed request objects that the API provides

Standard HTTP GET Requests

Standard HTTP GET requests to the API are easy to use from many technologies and languages, but they can be more prone to errors than strongly typed requests.

Example HTTP Request:

```
http://{api-host}:{api-port}/api/{resource_type}/?Param1=Hello?Param2=3
```

Strongly Typed Requests

You can use the strongly typed request objects API supplies to make strongly typed requests:

- C# (recommended): **/api/types/csharp**
- Typescript (recommended): **/api/types/typescript**
- Vb.NET: **/api/types/vbnet**

The strongly typed request objects for C# and Vb.NET require the use of such additional references as System, Runtime, Serialization, and ServiceStack. Acquire typed objects by navigating to **/api/types/{language_name}** in a web browser.

The equivalent strongly typed request object in C# for the previous example would display as follows:

```
[Route("/api/{resource_type}", "GET")]
   public class ExampleRequest
   {
     string Param1 { get;set; }
     int Param2 { get;set; }
   }
```

And the client would make the request as follows:

```
ServiceClient client = new JsonClient("http://{api-host}:{api-port}/");
   ExampleRequest request = new ExampleRequest{ Param1 = "hello", Param2 = 3 };
   ExampleResponse response = client.Get(request);
```

When the client uses one of the previously listed supported languages, it is best to use strongly typed requests for making requests to the API.

Service clients are available for each of the supported strongly typed languages:

- C# Service Client
- Typescript Service Client
- Vb.NET Service Client

Request Parameters

All requests have the following optional parameters:

- **Format**: specifies the data format in which the API returns the response. Valid options are json, xml, or jsv. If the client does not provide the value, the API uses the Accept HTTP header field. If the client does not provide the Accept field, the API returns the response in formatted HTML.
- **Version**: specifies the version of the API to which the client makes the requests. If the client does not provide this information, the API uses the currently installed API version.
- **DbHost**: specifies the hostname of a server containing a database that TEAM uses. If the client does not provide this information, the API uses the default database host that the API Configuration Page specifies.

Many requests return a collection of records and have the following additional optional parameters:

- **PageNumber**: specifies which page of a collection or which records split into pages for return. If the client does not provide this, the API uses the value 1 to return to the first page in the collection.
- **PageSize**: specifies the size of pages into which the API splits the record collection. If the client does not provide this information, the API uses a page size of 1000. The maximum page size is 10,000.

Some requests return records for a provided time span and have the following parameters:

- **StartDate**: an ISO 8601 formatted date and time string from which to begin seeking data. If the client does not provide this information, the API uses the date of the oldest record meeting the criteria of the request.
- **EndDate**: an ISO 8601 formatted date and time string at which a search for data ends. If the client does not provide this information, the API uses the date of the newest record meeting the criteria of the request. The end date value must be greater than that for the start date.

ISO 8601 allows offsets from Coordinated Universal Time (UTC) (time zone information). If the requests do not include an offset, the time stamps of the records the API returns will be in UTC (with an offset of zero). If the client provides a time zone, the API normalizes the time stamp of all records to the provided time zone.

Each individual request may have additional *required* and *optional* parameters in addition to those specified.

Responses From the API

Every request to the API has a corresponding response.

When the client uses strongly typed request objects, the API returns the corresponding strongly typed response object.

Response Properties

All responses may contain the following members:

- **Version**: the version of the API that generated the response. Always populated.
- **DbHost**: the hostname of the TEAM database server against which the API generated the response. Always populated.
- **ResponseStatus**: will only be populated in the response if the API encounters an error. Incorrect request parameters or network issues are examples of errors that will generate a response status are Example ResponseStatus (JSON).

```
  "ResponseStatus": {
     "ErrorCode": "",
     "Message": "",
     "StackTrace": "",
     "Errors": [
       {
          "ErrorCode": "",
          "FieldName": "",
          "Message": "",
          "Meta": {}
       }
     ],
     "Meta": {}
  },
```

Responses that contain a single record contain the following member:

- **Data**: this member populates with an instance of the record type the client requests.

Responses that contain a set of records contain the following members:

- **Data[ ]**: this member will be an array populated with multiple instances of the record type that the client requested.
- **PageInfo**: contains information about the pagination of the record set in the response.
- **CurrentPage**: the page number of the current response.
- **PageSize**: the page size of the current response.
- **TotalPages**: the number of pages in the entire record set corresponding to the request.
- **TotalRecords**: the total number of records corresponding to the request.
- **FirstPageUrl**: the HTTP URL to generate a request for the first page in this record set.
- **PreviousPageUrl**: the HTTP URL to generate a request for the previous page in this record set. Will be null if this is the first page.
- **NextPageUrl**: the HTTP URL to generate a request for the next page in this record set. Will be null if this is the last page.
- **LastPageUrl**: the HTTP URL to generate a request for the last page in the record set.
- **FirstPageAbsoluteUrl**: the absolute HTTP URL to generate a request for the first page in this record set.
- **PreviousPageAbsoluteUrl**: the absolute HTTP URL to generate a request for the previous page in this record set. Will be null if this is the first page.
- **NextPageAbsoluteUrl**: the absolute HTTP URL to generate a request for the next page in this record set. Will be null if this is the last page.
- **LastPageAbsoluteUrl**: the absolute HTTP URL to generate a request for the last page in this record set.

Example PageInfo (JSON)

```
{
  "PageInfo": {
    "CurrentPage": 3,
    "PageSize": 5,
    "TotalPages": 7,
    "TotalRecords": 32,
    "FirstPageUrl": "/api/device?pageNumber=1&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "PreviousPageUrl": "/api/device?pageNumber=2&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "NextPageUrl": "/api/device?pageNumber=4&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "LastPageUrl": "/api/device?pageNumber=7&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "FirstPageAbsoluteUrl": "http://hostname:5230/api/device?pageNumber=1&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "PreviousPageAbsoluteUrl": "http://hostname:5230/api/device?pageNumber=2&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "NextPageAbsoluteUrl": "http://hostname:5230/api/device?pageNumber=4&pageSize=5&dbHost=hostname&version=1.0.0.0",
    "LastPageAbsoluteUrl": "http://hostname:5230/api/device?pageNumber=7&pageSize=5&dbHost=hostname&version=1.0.0.0"
  },
```

Data Types

Before you use the API, it is important to understand each data type the API can access.

Devices

All of the data that the API accesses will be related to a corresponding device such as an SEL-735 Power Quality and Revenue Meter, an SEL-3530 Real-Time Automation Controller, or any other device for which TEAM has collected data.

The API uniquely identifies each device by the DeviceId property.

DeviceId is the primary parameter that the API requires to return data for many of the following explained data types.

Operations

GetSingleDevice (Single Record Request)

Returns a single device matching the provided DeviceId. Returns `404: Not Found` error if the device ID does not exist.

Required Parameters

Id: the ID of the device to retrieve.

Example Requests

HTTP Request

```
GET /api/device/{Id}
```

Strongly Typed Request (C#)

```
GetSingleDeviceResponse response = client.Get(new GetSingleDevice {Id=deviceId});
```

Response Data (JSON)

```
{
  "Data": {
    "UniqueDeviceId": "",
    "DbHost": "",
    "DeviceManagerLocation": "",
    "DeviceId": "int",
    "DeviceName": "",
    "DeviceType": "",
    "IsInService": false,
    "SerialNumber": "",
    "FirmwareVersion": "",
    "PartNumber": "",
    "FidString": "",
    "Description": "",
    "StationName": "",
    "RecorderConfigTimeSource": "",
    "RecorderConfigWiringForm": "",
    "RecorderConfigDeviceIdentifier": "",
    "RecorderConfigDeviceSerialNumber": "",
    "RecorderConfigDeviceType": "",
    "RecorderConfigFirmwareIdentifier": "",
    "RecorderConfigTerminalIdentifier": "",
    "MeteringPointId": "int",
    "IsCommissioned": false,
    "IsEnabled": false,
    "MeteringPointName": "",
    "Notes": "",
    "TimeZoneName": ""
  }
```

The API populates the following properties only if a Profile Collection Polling job has been created for the given device and data have been collected:

- RecorderConfigTimeSource
- RecorderConfigWiringForm
- RecorderConfigDeviceIdentifier
- RecorderConfigDeviceSerialNumber
- RecorderConfigDeviceType
- RecorderConfigFirmwareIdentifier
- RecorderConfigTerminalIdentifier

GetAllDevices (Paginated Record Collection Request)

Returns a collection of devices.

Optional Parameters

- **PageSize**: size of pages into which the API splits the response. If the client does not provide this information, the API uses 1 (first page).
- **PageNumber**: number of page to return. If the client does not provide this information, the API uses 1000.

Example Requests

HTTP Request

```
GET /api/device/
```

Strongly Typed Request (C#)

```
GetAllDevicesResponse response = client.Get(new GetAllDevices());
```

Response Data (JSON)

```
"Data": [
    {
     ...a device
    },
    {
      ...another device
    },
    {
      ...another device
    }
  ],
```

SER Events

Operations

GetSer (Paginated Record Collection Request)

Returns a collection of SER events.

Optional Parameters

- **PageSize**: the size of pages into which the API splits the response. If the client does not provide this information, the API uses 1000.
- **CustomParameters**: a dictionary of key value pairs to support additional parameters that future API versions or SEL Engineering Services, Inc. (SEL ES) custom solutions might use.
- **DbHost**: specifies the hostname of a server containing a database that TEAM uses. If the client does not provide this information, the API uses the default database host the API Configuration Page specifies.
- **DeviceIds[ ]**: a list of device IDs for which the API returns data. If the client does not provide this information, the API uses all device IDs.
- **EndDate**: the end date at which the API stops searching for records. If the client does not provide this information, the API uses the date of the newest record matching the request.
- **PageNumber**: the page number the API returns. If the client does not provide this information, the API uses 1 (first page).
- **StartDate**: the start date from which the API begins searching records. If the client does not provide this information, the API uses the date of the oldest record matching the request.
- **Version**: specifies the version of the API to which the client wants to make the request. If the client does not provide this information, the API uses the currently installed API version.

Example Requests

HTTP Request

```
GET /api/serevent/?DeviceIds=251,261
```

Strongly Typed Request (C#)

```
GetSerResponse response = client.Get(new GetSer());
```

Response Data (JSON)

```
"Data": [
    {
      "UniqueSerId": "",
      "SerId": "",
      "Timestamp": "",
      "Element": "",
      "State": "",
      .... all device properties
    },
    {
      ...another record
    },
    {
      ...another record
    }
  ],
```

VSSI Events

Operations

GetVssiEvent (Paginated Record Collection Request)

Returns a collection of VSSI detail events.

Optional Parameters

- **PageSize**: the size of pages into which the API splits the response. If the client does not provide this information, the API uses 1000.
- **CustomParameters**: a dictionary of key value pairs to support additional parameters that future API versions or SEL ES custom solutions might use.
- **DbHost**: specifies the hostname of a server containing a database TEAM uses. If the client does not provide this information, the API uses the default database host the API Configuration Page specifies.
- **DeviceIds[ ]**: a list of device IDs for which the API returns data. If the client does not provide this information, the API uses all device IDs.
- **EndDate**: the end date at which the API stops searching for records. If the client does not provide this information, the API uses the date of the newest record matching the request.
- **PageNumber**: the page number the API returns. If the client does not provide this information, the API uses 1 (first page).
- **StartDate**: the start date from which the API begins searching records. If the client does not provide this information, the API uses the date of the oldest record matching the request.
- **Version**: specifies the version of the API to which the client wants to make the request. If the client does not provide this information, the API uses the currently installed API version.

Example Requests

HTTP Request

```
GET /api/vssievent/?DeviceIds=251,261
```

Strongly Typed Request (C#)

```
GetVssiEventResponse response = client.Get(new GetVssiEvent());
```

Response Data (JSON)

```
"Data": [
    {
     "UniqueVssiEventId": "",
     "VssiEventId": "",
     "Timestamp": "",
      "Ia": 0,
      "Ib": 0,
      "Ic": 0,
      "Ig": 0,
      "INeutral": 0,
      "VbaseA": 0,
      "Va": 0,
      "VbaseB": 0,
      "Vb": 0,
      "VbaseC": 0,
      "Vc": 0,
      "Vs": 0,
      "PhAState": "",
      "PhBState": "",
      "PhCState": "",
      "Status": "",
      .... all device properties
    } ,
    {
      ...another record
    },
    {
      ...another record
    }
  ],
```

VSSI Summary

Operations

GetVssiSummary (Paginated Record Collection Request)

Returns a collection of VSSI summary records.

Optional Parameters

- **PageSize**: the size of pages into which the API splits the response. If the client does not provide this information, the API uses 1000.
- **CustomParameters**: a dictionary of key value pairs to support additional parameters that future API versions or SEL ES custom solutions might use.
- **DbHost**: specifies the hostname of a server containing a database TEAM uses. If the client does not provide this information, the API uses the default database host the API Configuration Page specifies.
- **DeviceIds[ ]**: a list of device IDs for which the API returns data. If the client does not provide this information, the API uses all device IDs.

- **EndDate**: the end date at which the API stops searching for records. If the client does not provide this information, the API uses the date of the newest record matching the request.
- **PageNumber**: the page number the API returns. If the client does not provide this information, the API uses 1 (first page).
- **StartDate**: the start date from which the API begins searching records. If the client does not provide this information, the API uses the date of the oldest record matching the request.
- **Version**: specifies the version of the API to which the client wants to make the request. If the client does not provide this information, the API uses the currently installed API version.

Example Requests

HTTP Request

```
GET /api/vssisummary/?DeviceIds=251,261
```

Strongly Typed Request (C#)

```
GetVssiSummaryResponse response = client.Get(new GetVssiSummary());
```

Response Data (JSON)

```
"Data": [
    {
      "UniqueVssiSummaryId": "",
      "VssiSummaryId": "",
      "EventType": "",
      "Timestamp": "",
      "EventDuration": "",
      "DurationInMilliseconds": 0,
      "EventDepth": 0,
      "PhAVbase": 0,
      "VaMin": 0,
      "VaMax": 0,
      "PhBVbase": 0,
      "VbMin": 0,
      "VbMax": 0,
      "PhCVbase": 0,
      "VcMin": 0,
      "VcMax": 0,
      "IticRegion": "",
      "VssiEventUrl": ""
      .... all device properties
    },
    {
      ...another record
    },
    {
      ...another record
    }
  ],
```

If a VSSI summary event lasted longer than 1,000 hours, EventDuration and DurationInMilliseconds will be null.

Profile Channels

Operations

GetSingleProfileChannel (Single Record Request)

Returns a single profile channel matching the provided channel ID. Returns `404: Not Found` error if channel ID does not exist.

Required Parameters

- **Id**: the ID of the profile channel to retrieve.
- **CustomParameters**: a dictionary of key value pairs to support additional parameters that future API versions or SEL ES custom solutions might use.
- **DbHost**: specifies the hostname of a server containing a database that TEAM uses. If the client does not provide this information, the API uses the default database host the API Configuration Page specifies.
- **Version**: specifies the version of the API to which the client wants to make the request. If the client does not provide this information, the API will use the currently installed API version.

Example Requests

HTTP Request

```
GET /api/profilechannel/{id}
```

Strongly Typed Request (C#)

```
GetSingleProfileChannelResponse response = client.Get(new GetSingleProfileChannel { Id = ChannelId });
```

Response Data (JSON)

```
{
  "Data": {
    "UniqueProfileChannelId": "",
    "RecorderConfigurationId": 0,
    "AcquisitionRate": 0,
    "RecorderId": 0,
    "CurrentTransformerRatio": 0,
    "NeutralCurrentTransformerRatio": 0,
    "PotentialTransformerRatio": 0,
    "PrimaryToSecondaryConversionFactor": 0,
    "SecondaryToPrimaryConversionFactor": 0,
    "ChannelId": 0,
    "ChannelName": "",
    "ChannelFunction": "",
    "ChannelNumber": 0,
    "DisplayName": "",
    "ProfileChannelScaleFunction": "",
    "ProfileChannelDescription": "",
    "ProfileChannelUnits": "",
    "ChannelType": "",
    "Phase": "",
    "ProfileChannelCategory": "",
    "ProfileChannelUpdateRate": "",
    ... all device properties
  },
```

GetAllProfileChannels (Paginated Record Collection Request)

Returns a collection of profile channels.

Optional Parameters

- **PageSize**: the size of pages into which the API splits the response. If the client does not provide this information, the API uses 1000.
- **CustomParameters**: a dictionary of key value pairs to support additional parameters that future API versions or SEL ES custom solutions might use.
- **DbHost**: specifies the hostname of a server containing a database that TEAM uses. If the client does not provide this information, the API uses the default database host the API Configuration page specifies.
- **DeviceIds[ ]**: a list of device IDs for which the API returns data. If the client does not provide this information, the API uses all device IDs.
- **PageNumber**: the page number the API returns. If the client does not provide this information, the API uses 1 (first page).
- **Version**: specifies the version of the API to which the client wants to make the request. If the client does not provide this information, the API uses the currently installed API version.

Example Requests

HTTP Request

```
GET /api/profilechannel/
```

Strongly Typed Request (C#)

```
GetAllProfileChannelsResponse response = client.Get(new GetAllProfileChannels());
```

Response Data (JSON)

```
"Data": [
    {
     ... a profile channel
    },
    {
      ...another profile channel
    },
    {
      ...another profile channel
    }
  ]
```

Profile Samples

Operations

GetProfileSamples (Paginated Record Collection Request)

Returns a collection of profile sample records.

Required Parameters

- **ChannelId**: the ID of the profile channel for which the client wants the API to retrieve samples.

Optional Parameters

- **TransformerRatioScalingMode**: determines if the returned data are scaled in Primary or Secondary mode. If the client does not provide this information, the API defaults to Primary.
- **SampleMultiplier**: a scalar value by which the API multiplies the value of each record. If the client does not provide this information, the API defaults to 1.
- **StartDate**: the start date from which the API begins searching records. If the client does not provide this information, the API uses the date of the oldest record matching the request.
- **EndDate**: the end date at which the API stops searching for records. If the client does not provide this information, the API uses the date of the newest record matching the request.
- **PageSize**: the size of pages into which the API splits the response. If the client does not provide this information, the API uses 1000.
- **PageNumber**: the page number the API returns. If the client does not provide this information, the API uses 1 (first page).

Example Requests

HTTP Request

```
GET api/profilesample/245?TransformerRatioScalingMode=Secondary&SampleMultiplier=0.7
```

Strongly Typed Request (C#)

```
GetProfileSamplesResponse response = client.Get(new GetProfileSamples {
  TransformerRatioScalingMode = TransformerRatioScalingMode.Secondary,
  SampleMultiplier = 0.7,
  ChannelId = 245
});
```

Response Data (JSON)

```
"Data": [
    {
      "UniqueProfileSampleId": "",
      "ProfileSampleId": "",
      "SampleMultiplier": 0,
      "TransformerRatioScalingMode": "",
      "Value": 0,
      "Timestamp": "",
      "DstInEffect": "",
      "PowerFailure": false,
      "ClockResetForward": false,
      "ClockResetBackward": false,
      "SkippedInterval": false,
      "TestMode": false,
      "DataOverwrite": false,
      .... all profile channel properties
    } ,
    {
      ...another record
    },
    {
      ...another record
    }
  ],
```

Event Reports

Operations

GetEventReport (Paginated Record Collection Request)

Optional Parameters

- **DbHost**: specifies the hostname of a server containing a database TEAM uses. If the client does not provide this information, the API uses the default database host the API Configuration Page specifies.
- **DeviceIds**: a list of device IDs for which the API returns data. If the client does not provide this information, the API uses all device IDs.
- **PageSize**: the size of pages into which the API splits the response. If the client does not provide this information, the API uses 1000.
- **CustomParameters**: a dictionary of key value pairs to support additional parameters that future API versions or SEL ES custom solutions might use.
- **EndDate**: the end date at which the API stops searching for records. If the client does not provide this information, the API uses the date of the newest record matching the request.
- **PageNumber**: the page number the API returns. If the client does not provide this information, the API uses 1 (first page).
- **StartDate**: the start date from which the API begins searching records. If the client does not provide this information, the API uses the date of the oldest record matching the request.
- **Version**: specifies the version of the API to which the client wants to make the request. If the client does not provide this information, the API uses the currently installed API version.

Example Requests

HTTP Request

```
GET api/eventreport/
```

Strongly Typed Request (C#)

```
GetEventReportResponse response = client.Get(new GetEventReport()
{
  EventReportId = 4;
});
```

Response Data (JSON)

```
"Data": [
   {
     "UniqueDeviceEventId": "",
     "DeviceEventId": 0,
     "Rid": "",
     "Tid": "",
     "Mid": "",
     "Fid": "",
     "MaxFaultCurrents": "",
     "RetrievalCmdUsed": "",
     "Timestamp": "",
     "RetrievedTimestamp": "",
     "EventType": "",
     "Targets": "",
     "FileType": "",
     "FilePathAndName": "",
     "AcknowledgedByUser": false,
     "EventNumber": 0,
     "EventFileUrl": ""
   },
   {
     ...another record
   },
   {
     ...another record
   }
]
```

GetEventFile (Paginated Record Collection Request)

Required Parameters

EventReportId: The ID of the event file to retrieve.

Example Requests

HTTP Request

```
GET api/eventfile/{EventReportId}
```

Strongly Typed Request (C#)

```
GetEventFile request = client.Get(new GetEventFile()
{
  EventReportId = 5
});
```

Response Data

The .zip file with Event File attachment.

Cached Data

The API offers improved performance by caching the following responses:

- GetSingleDevice
- GetAllDevices
- GetSingleProfileChannel
- GetAllProfileChannels

Operations

DeleteCache

Deletes all cached responses.

Required Parameters

There are no required parameters.

Example Requests

HTTP Request

```
DELETE /api/cache
```

Strongly Typed Request (C#)

```
client.Delete(new DeleteCache());
```

Technical Support

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

Schweitzer Engineering Laboratories, Inc.
2350 NE Hopkins Court
Pullman, WA 99163-5603 U.S.A.
Tel: +1.509.338.3838
Fax: +1.509.332.7990
Internet: selinc.com/support
Email: info@selinc.com

⚠WARNING
Operator safety may be impaired if the device is used in a manner not specified by SEL.

⚠AVERTISSEMENT
La sécurité de l'opérateur peut être compromise si l'appareil est utilisé d'une façon non indiquée par SEL.

SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE Hopkins Court • Pullman, WA 99163-5603 U.S.A.
Tel: +1.509.332.1890 • Fax: +1.509.332.7990
selinc.com • info@selinc.com