

# SIEMENS MindConnect provider

Version 1.0.0

User's guide

December 1 2020

【 remarks 】

**【 revision history 】**

Version	Date	Content
1.0.0	03-05-2019	First edition.
	12-01-2020	Fixed an error in the option string of AddVariable.

**【 hardware 】**

Model	Version	Notes

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## 1. Introduction

This is the CAO-provider's User's Guide for sending and receiving data to and from the Siemens MindSphere's MindConnect.

The CAO provider (CaoProvSiemensMindConect.dll) covered in this book is called the MindConnect provider.

Section 2 provides an overview of MindConnect provider and more information on variables. Section 3 lists information required for using the MindConnect provider, such as how to create registered information files used by the MindConnect provider.

MindConnect providers use MindConnectLibrary 3. 1 for communications.

Please refer to the following website for MindConnect Library 3. 1.

Related site link

<https://support.industry.siemens.com/cs/document/109755348/mindconnect-library-3-1-for-mindsphere-3-0-?dti=0&lc=en-WW>

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Related site link

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MindConnect providers use curl-7.52.1 for communications.

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Related site link

<https://curl.haxx.se/docs/copyright.html>

[License of curl-7.52.1]

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## 2. Outline of provider

### 2.1. Outline

The MindConnect provider is a CAO-provider that uses MindConnectLibrary 3. 1 to communicate bi-directionally with the MindSphere's MindConnect. The file format is DLL (Dynamic Link Library), which is dynamically loaded from the CAO-engine during use.

To use MindConnect providers, you must install the ORiN2SDK or manually register the registry by referring to the table below.

**Table2-1MindConnect provider**

File name	CaoProvSIEMENSMindConnect.dll
ProgID	CaoProv.SIEMENS.MindConnect
Registry registration	regsvr32 CaoProv.SIEMENS. MindConnect.dll
Blotting out of registry registration	regsvr32 /uCaoProv.SIEMENS. MindConnect.dll



BaseUrl=[<BaseUrl>]	The reference URLs for connecting to the MindSphere. If omitted, the BaseURL available as of 2018 is defaulted.
---------------------	---

### 2.2.2. CaoController::AddVariable method

The AddVariable methods for CaoController classes are the methods by which their respective providers create variable objects. Only 2.3.1 variables can be used for variable names.

**Format** AddVariable(<bstrVariableName:VT\_BSTR>[,<bstrOption:VT\_BSTR>])

<bstrVariableName> : In variable identifier  
 <bstrOption> : In optional character string

You can specify the synchronization settings for data transmission by using the following optional strings.

**Table2-3Optional character string of CaoController::AddVariable**

Option	Meaning
DataType =< Variable kind >	Specify the kind of the variable. (MSG: Message, BLOB:BLOB, and default: MSG)
DataPointID=<DataPintID>:<DataPintID>: ... : <DataPintID>	The setting is required when the DataType is set to MSG. Specifies the ID of the data point to which the data is to be sent.
ConfigurationID=<ConfigurationID>	The setting is required when the DataType is set to MSG.
FileType=[<FileType>]	Settings can be made when BLOB is specified for DataType. Specifies the type of file to upload.
Version=[< Version >]	Specifies the service version of the data exchange. You do not have the ability to manage the version of the uploaded file.

### 2.2.3. CaoVariable:get\_VariableNames property

Retrieves the variables in section 2.3.1.

### 2.2.4. CaoVariable:get\_Value property

Gets the information that corresponds to the variable. Refer to chapter 2.3.1 for the implementation status of each variable and the acquired data.

### 2.2.5. CaoVariable:put\_Value property

Set the information that corresponds to the variable. Refer to chapter 2.3.1 for the implementation status of each variable and the acquired data. Some of the available variables that are connected to the MindSphere communicate and may take longer to complete.

## 2.3. Variable list

### 2.3.1. CaoController class

**Table2-4CaoController class user variable list**

Variable identifier	Data type	Explanation	Attribute		Option
			get	put	DataType
*	The option: It applies to the specification of DataType.	The option: It applies to DataType.	-	○	○

**Table2-5CaoController class system variable list**

Variable identifier	Data type	Explanation	Attribute	
			get	put
@Library_VERSION	VT_BSTR	Version of MindConnect Library used for provider development.	○	-
@REGISTRATION_ACCESS_TOKEN	VT_BSTR	Latest RAT(Registration Access Token)	○	-

Table2-6 User variable DataType list

Optional name	Data type	Explanation	Attribute	
			get	put
MSG	VT_BSTR  VT_ARRAY	Send messages to the MindConnect in synchronous mode, arranging the values in the order corresponding to the DataPointID specified by the AddVariable method.	-	○
BLOB	VT_BSTR VT_A RRAY	The BLOB data is transmitted to the MindConnect in a synchronous mode. Store the file information in the following order: <Source File Path>[, <Destination File Name>] ※The destination file name can be omitted. If the destination file name is omitted, it is saved as the file name of the source file. ※Specifies up to 260 characters. ※ If there is a file with the same name on the cloud, it is not overwritten.	-	○

### 3. Error code

MindConnect providers have defined their own error codes. For ORiN2 shared error, see the Error Codes section in the ORiN2 Programming Guide.

The following URLs can be used to check the list of error codes displayed in MindConnectLibrary.

[https://developer.mindsphere.io/resources/mindconnect-lib/doxygen/html/mcl\\_common\\_8h.html#acbb627504e693369c88e62fe00946674](https://developer.mindsphere.io/resources/mindconnect-lib/doxygen/html/mcl_common_8h.html#acbb627504e693369c88e62fe00946674)

In the MindConnectLibrary error code list, "MCL\_OK", "MCL\_FAIL", ... , "MCL\_ERROR\_CODE\_END" are listed from the top, and MindConnect providers assign them to "80100000", "80100001", ... , "80100047" in order from the top.

**Table 3-7 Original error code**

Error name	Error number	Description
E_MCL_RATFILE	0x80100100	The registration information file does not exist or acquisition fails. Confirm that there is a registration information file. And confirm that an option is set definitely.
E_MCL_SEMAPHORE	0x80100103	The exclusive control of the registered information file fails. Confirm that other software does not use a registration information file.
E_MCL_USING_RATFILE	0x80100101	The registration information file is in use and cannot be updated. Confirm that other software does not use a registration information file.
E_MCL_UPDATA_NUM	0x80100102	The number of data to be updated exceeds 1050. Set below 1,050 DataPointIDs.

## 4. Appendix

### 4.1. Method of making registered information file

MindConnect providers need Agent registrations (client\_id, client\_secret, registration\_access\_token, registration\_client\_uri) created on the MindSphere. This chapter describes how to retrieve the registration information of the Agent under Offboard and create the registration information files.

#### ■ Obtaining IATs from MindSphere's AssetManager

Issue the OnBoarding key of the BasicAgent from the Asset Manager of the MindSphere to obtain IAT(1). Images are for 2018.

The screenshot shows the MindSphere Asset Manager interface for a BasicAgent. The page title is "Edit boarding configuration". Below the title, there is a "Boarding configuration" section with a note: "In order to use MindConnect Lib, you have to insert the generated onboarding key into your system." A code editor displays a JSON configuration for the agent, with a red box highlighting the "client\_secret" field. To the right of the code editor, there are two buttons: "Generate onboarding key" and "Copy to clipboard". Below the code editor, there is an "Offboard MindConnect Lib" section with a note: "In case you don't want to use the onboarded MindConnect Lib you can offboard it." and an "Offboard" button.

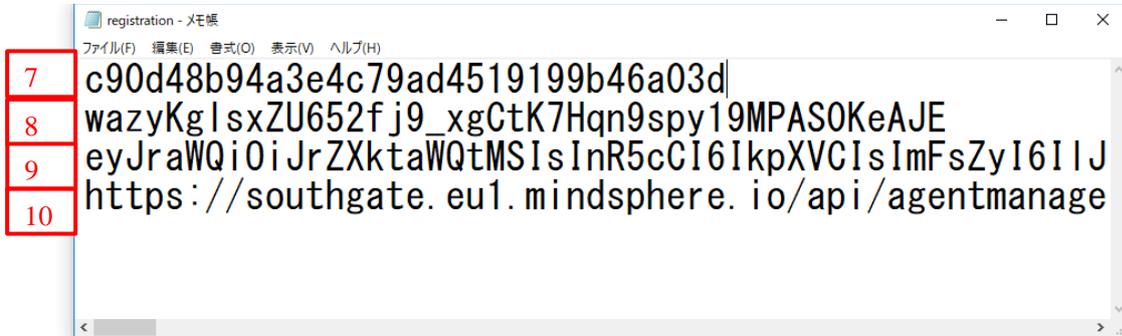
#### ■ Using IAT to Get Registration Information

Examples of procedures for obtaining registration data using Postman (<https://www.getpostman.com/>) are shown below. User registration is requested when the Postman is started for the first time. Perform user registration or close the user registration screen. <https://www.getpostman.com/>

- To the URLs by setting the HTTP request method to POST
  - Enter <https://gateway.eu1.mindsphere.io/api/agentmanagement/v3/register>
  - (2) <https://gateway.eu1.mindsphere.io/api/agentmanagement/v3/register>
- Select the Authorization tabs and paste the IAT(1) in the OnBoarding key to the Type in the Bearer Token,Token (3)
- Select the Headers tabs and specify a application/json to Content-Type,VALUE (4)
- Select the Body tabs, select Raw in the form, and type {} in the body (5).
- When the above setting is completed, press the Send button (6).
- Confirm that the registered information has been correctly acquired (7)-(10)



The registration information file is created in the form of a text file (.txt). Enter client\_id(7), client\_secret(8), registration\_access\_token(9), and registration\_client\_uri(10) in order from the first line in the text file. At this time, the characters in the double quotation are pasted. Be sure to insert a new line at the end of each line.



```
7 c90d48b94a3e4c79ad4519199b46a03d
8 wazyKgl sxZU652f j9_xgCtK7Hqn9spy19MPAS0KeAJE
9 eyJraWQiOiJrZXktaWQtMSIsInR5cCI6IkpXVCIsImFsZyI6IiJ
10 https://southgate.eu1.mindsphere.io/api/agentmanage
```

#### 4.2. RAT update timing

MindConnect providers perform KeyRotation (updating RAT) at the following times:

- When the AddController succeeds
- The first time the data (or file) is raised on that day.

#### 4.3. Using limit of MindConnect provider

There are the following limits on using MindConnect provider.

- The smallest downlink distance depends on the environment such as networks. A recommended value is once for ten seconds.
- The maximum setting possibility number of DataPoint is 1050, but the number that I can use really depends on contents and the environment of data to send.