Google Cloud IoT Core providers

Version 1.3.0

User's Guide

Aug 23, 2022

[Notes]

[Revision History]

Version	Date	Description
1.0.0	2020-03-05	First edition
1.1.0	2020-09-01	Support receiving message
1.2.0	2021-03-19	Supports TLS 1.2. Change to EXE format.
1.3.0	2022-08-23	Fixed an issue that prevented the message receiving interval from changing.

[Supported Devices]

Model	Version	POINTS OF CAUTION

Contents

1. Introduction

This document is the user's guide of the CAO provider who is responsible for sending Cloud IoT Core and data among the Google Cloud Platform (GCP) services that Google provides in the cloud.

The CAO provider (CaoProvGoogleCloudIoTCore.exe) described in this document is called the Cloud IoT Core provider.

Section 2 provides an overview of Cloud IoT Core providers and more information about variables.0

This provider uses OSS to connect Google Cloud Platform.

Refer to the following site for these.

[M2Mqtt Site Links]

URL: https://github.com/eclipse/paho.mqtt.m2mqtt

[Copyright and License of libcurl.NET]

Copyright (c) Microsoft Corporation

MIT License

https://github.com/Azure/azure-iot-sdk-csharp/blob/master/LICENSE

[Copyright and License of Bouncy Castle]

Copyright (c) 2000 - 2019 The Legion of the Bouncy Castle Inc.

MIT License

https://www.bouncycastle.org

[Copyright and License of jose-jwt]

Copyright (c) 2014-2019 dvsekhvalnov

MIT License

https://github.com/dvsekhvalnov/jose-jwt/blob/master/LICENSE

This app contains deliverables distributed under Eclipse Public License 1. 0 licenses.

https://github.com/eclipse/paho.mqtt.m2mqtt/blob/master/LICENSE

2. Provider Overview

2.1. Introduction

A Google Cloud Platform (GCP) service that Google provides in the cloud. It is a CAO provider that sends Cloud IoT Core and data. The file format is EXE and is dynamically loaded when used by the CAO engine. To use the Cloud IoT Core provider, you must register as shown in Table 2-1. RegistAsm. bat and UnregistAsm. bat are located in the DotNet ¥BAT folder under the folder where you installed the ORiN2SDK.Tables 2-1 Cloud IoT Core Providers21

Tables 2-1 Cloud IoT Core Providers21

File name	CaoProvGoogleCloudIoTCore.exe
ProgID	CaoProv.Google.CloudIoTCore
Registry registration	RegistAsm.bat CaoProvGoogleCloudIoTCore.exe
Deletion of Registry Registration	UnregistAsm.bat CaoProvGoogleCloudIoTCore.exe

2.2. Method Properties

2.2.1. CaoWorkspace::AddController method

Cloud IoT Core providers connect to the Cloud IoT Core by referring to the connection parameters for communication at the time of AddController.

Format AddController(<bstrCtrlName:BSTR>,<bstrProvName:BSTR>,
<bstrPCName:BSTR>,<bstrOption:BSTR>))

BstrCtrlName	: [in] Controller name
BstrProvName	: [in] Provider name. Fixed value = "CaoProv.Google.CloudIoTCore"
BstrPcName	: [in] The name of the provider's running machine
BstrOption	: [in] option string

The following is the list specified in the option string.

Optional strings for table 2-2 CaoWorkspace::AddController22

OPTIONS[1]	Description
@EventDisable=[<Receive messages from cloud>]	When reception is enabled: "False", when reception is disabled: "True". Defaults: False.
BaseURL=[<BaseURL>]	Valid only when HTTP is selected for URL.Protocol to connect to GCP APIs. (Default: https://cloudiotdevice.googleapis.com/v1)
CaCertificates=[<path to the root certificate>]	The full path to the root certificate. Valid only when MQTT is selected as the protocol.
CloudRegion=<CloudRegion>	The region of the Registry created in the Cloud IoT Core.
DeviceID=<DeviceID>	ID of the Device created in Cloud IoT Core.
HttpEventInterval=<HttpEventInterval>	Set the message receiving interval (minutes). Valid only when HTTP is selected as the protocol.
HttpTimeOut=[<HTTP timeout >]	Request timeout in seconds. Valid only when HTTP is selected as the protocol. Enter "0" if there is no timeout period (default: 5)
MqttBridgeHostname=[<MQTT host >]	The MQTT destination to use for the Cloud IoT Core. Valid only when MQTT is selected as the protocol. (Defaults: mqtt.googleapis.com)
MqttBridgePort=[<MQTT port number >]	The number of the MQTT to connect to for the Cloud IoT Core. Valid only when MQTT is selected as the protocol. (Default: 8883)
PrivateKeyFile=<PrivateKeyFile filepath>	The filepath of the private key corresponding to the Device's public key. The private key corresponds to "RS256" and "RS256_X509".
ProjectId=<ProjectId>	IDs of the projects used in the Cloud IoT Core
Protocol=[<Protocol number >]	The protocol used for communication. (1:MQTT, 2:HTTP, Default: 1)

[1] Square brackets ("[]") indicate optional characters.

QoS=[<QoS level>]	QoS level. Valid only when MQTT is selected as the protocol. (0: Level 0, 1: Level 1, Default: 0)
RegistryID=<RegistryID>	ID of the Registry created in Cloud IoT Core.

2.2.2. CaoController::AddVariable method

The AddVariable method of the CaoController class is a method for each provider to create variables objects of their own. Only variables in section 2.3.1 can be used for variable names.2.3.1

Format AddVariable(<bstrVariableName:VT_BSTR>[,<bstrOption:VT_BSTR>])

<bstrVariableName> : [in] Variable name
<bstrOption> : [in] option string

The option string can be:

Optional strings for table 2-3 CaoController::AddVariable23

OPTIONS	Meaning
MessageType=[<MessageType>]	Type of outgoing message. (1:EVENT, 2:STATE, Default: 1)

2.2.3. CaoVariable: get_VariableNames Property

2.3.1

2.2.4. CaoVariable: put_Value

Sets the information corresponding to the variable. See chapter 2.3.1 for the implementation status and setting data of each variable. Some of the available variables that connect to the Cloud IoT Core will communicate, so it may take some time for the process to complete.2.3.1

2.2.5. CaoController::OnMessage events

CaoController classes of OnMessage events occur at the following triggers:

Table 2-3 Message types24

Message type		Trigger for occurrence
1	Cloud IoT Core data reception	Occurs when data is received from the Cloud IoT Core.

2.2.5.1. Receiving events (MQTT)

The following table shows the data formats that can be obtained by messages from the cloud.

The messages that can be received are Config, Command and Error.

Number : Received message number

Value : Contents of received messages

DateTime : Timestamped

Description : Topic name at the time of reception

2.2.5.2. Receiving events (HTTP)

The following table shows the data formats that can be obtained by messages from the cloud.

The messages that can be received are Config.

Number : Received message number

Value : Contents of received messages

DateTime : Timestamped

Description : -

2.3. List of Variables

2.3.1. CaoController classes

Table List of 2-4 CaoController Class User Variables25

Variable name	Data Type	Description	Attribute		OPTIONS
			Get	Put	MessageType
*	VT_BSTR	Sends JSON strings to the Cloud IoT Core.	-	○	○

2.4. Error Codes

Cloud IoT Core providers define their own error codes. For information about ORiN2 common error, see the error code chapters in the ORiN2 Programming Guide.

Table 2-5 List of unique error codes26

Error name	Error Number	Description
CloudRegionNull	0x80100001	The AddController option "CloudRegion" has not been entered.
DeviceIdNull	0x80100002	The AddController option "DeviceId" has not been entered.
PrivateKeyFileNull	0x80100004	The AddController option "PrivateKeyFile" has not been entered.
PrivateKeyFileNotExist	0x80100005	PrivateKeyFile not found.
PrivateKeyFileIllegal	0x80100014	PrivateKeyFile is invalid. Make sure that "------BEGIN PRIVATE KEY------" is started.
ProjectIdNull	0x80100006	The AddController option "ProjectId" has not been entered.
ProtocolIncorrect	0x80100007	AddController option "Protocol" is invalid.
RegistryIdNull	0x80100008	The AddController option "RegistryId" has not been entered.
CaCertificatesNull	0x80100009	The AddController option " CaCertificateCert" has not been entered.
CaCertificatesNotExist	0x8010000A	CaCertificates not found.
MqttBridgePortIncorrect	0x8010000B	AddController option "MqttBridgePort" is invalid.
MqttBridgePortOutRange	0x8010000C	AddController option "MqttBridgePort" is out of range.
QoSOutRange	0x8010000D	The AddController option "QoS" has not been entered.
RequestTimeOutIncorrect	0x8010000E	AddController option "RequestTimeOut" is invalid.
RequestTimeOutOutRange	0x8010000F	The AddController option "RequestTimeOut" has not been entered.
ConnectFailed	0x80100010	CONNECTION FAILURE

HttpConnectionFailed	0x80100016	Failed to connect with Http. Take corrective action based on the displayed Http error code.
MessageTypeIncorrect	0x80100011	AddVariable option "MessageType" is invalid.
PublishMessageFailed	0x80100012	Failed to send message.
FailedToCreateJWT	0x80100015	Failed to create JWT. Please check if the PrivateKeyFile is correct.
MqttClientDisconnect	0x80100013	MQTT clients not found. Try the AddController again.