Application Note

► icónics

July 2018

Description: This document shows how to publish the data from local device to Amazon Cloud via MQTT Protocol using IoTWorX.

OS Requirement:

 IoT Gateway: Windows 10 IoT or Windows 10 Enterprise

General Requirement: Basic knowledge of MQTT and IoTWorX architecture, IoTWorX license.

Introduction

IoTWorX bridges the gap between an on-premises communications networks and cloud-based deployment platforms like Amazon Cloud. The IoT Gateway, which can be considered an "Edge Device", provides data connectivity between on-premises end devices and the cloud. Targeting process, factory, and building automation as well as other industries, IoTWorX installs with on-premises communications includes BACnet, SNMP, Modbus, and OPC. The Amazon cloud communication path is highly secure and is based on Message Queuing Telemetry Transport (MQTT) and a publish/subscribe ("pub/sub") mechanism.



Figure 1 - IoT Gateway Architecture

One feature of local MQTT broker is called 'Bridge' and will enable you to connect your local MQTT broker to AWS IoT so they can exchange MQTT messages. This will enable your objects to communicate in a bi-directional fashion with AWS IoT and benefit from the power of the AWS Cloud.

Benefits

The IoT Gateway Suite provides manufacturers and facility managers with a flexible platform to create Internet of Things applications. ICONICS offers several key IoT technologies, including rich connectivity to things (OPC, OPC UA, BACnet, SNMP, Modbus), secure cloud communications and built-in realtime visualization and analytics. With simple setup and configuration, users can easily create remote monitoring and analytics solutions that meet their innovative business requirements for collaboration and shared insight across geographies.

Prerequisites and use

Before beginning IoT Gateway Suite Setup, please ensure you have procured the necessary software & license (ICONICS IoT Gateway Suite Software and IoTWorX license) and optional hardware (IoT Gateway Device). Once these prerequisites are prepared, you can begin provisioning and configuring your IoT Gateway Suite solution. Use the instructions below to begin:

Initial Resource Setup

1. In the Amazon portal, click Onboard then Get Started.

		Connect to AWS IoT	
delated Margan M	Yas		
	Configuring a device Common a device or pour computer to ABS toT using the computer wayed for ABS toT Device SERS.	AWS IOT Button The ANS IOT Button is a single-gargoes device that sends a recessage to MVS IoT with a press of a batton.	AWS IoT Starter Kit Brows ABS IoT Starter Kit that were made for conversing to ABS IoT and getting started with the service.
	Get Martial	Configure a bottom	Browne Harter Ma

Figure 2 - AWS IoT on Amazon

2. There will be wizard that walks you through creating a "Thing" (device). Generally, the default settings are fine.

Select the platform and SDK that best se Choose a platform	uits how you are connecting to A	WS IoT.	
Linux/OSX	>	Windows	>
Choose a AWS IoT Device SDK Node.js	>	Python	>
Java	>		
Some prerequisites to consider: the device should have Node.js and NPM	Installed and a TCP connection	to the public internet on port 8883.	

Figure 3 - Using wizard to create a Thing (device)

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3. Give your Thing a name.

119 IJ3		
A thing is the representation and record of your phy device needs a thing to work with AWS IoT. Creating	sical device in the cloud. Any physical a thing will also create a thing shadow.	Choose an existing thing instead?
Name		
MyNewThing		
Show optional configuration (this can be done late	er) 🔹	

Figure 4 - Giving name to your device

4. Download the connection kit.

ownload a connection	kit		
e following AWS IoT resources will	be created:		
A thing in the AWS IoT registry	MyNewThing		
A policy to send and receive messages	MyNewThing-Policy	Preview policy	
he connection kit contains:			
A certificate and private key	MyNewThing.cert.pem, My	NewThing.private.key	
AWS IoT Device SDK	Node.js SDK		
A script to send and receive messages	start.ps1		
Before your device can connect and p Download connection kit for Windows	ublish messages, you will need to down	load the connection klt.	
		Baci	Next step

- 5. Extract connects of the package
- 6. On a machine with OpenSSL

(https://slproweb.com/products/Win32OpenSSL.html) run following command:

"openssl pkcs12 -export -inkey MyNewThing.private.key -in MyNewThing.cert.pem out MyNewThing.p12"

Replace "MyNewThing" with the name of your Thing. You will be prompted to create a password, after which, a <*yourThingName>.p12* file will be created.

7. Use Local UI to import the certificate to the Local Machine - Personal store.

	Diagnostics -				
Home / Provi	sioning / Certific	ate Setup			
Certificate	Store				
Please, select 'Browse Certif Note: Only the	the certificate stor icates' button the e certificates with	e to browse for ava get the certificates Server Authenticatio	ilable certificates or in the given certific in key usage are re	n IoT Gateway ate store. trieved from t	. Choose Store Location and the Certificate Store with the selected location. Then click on he Certificate Store and listed here.
Store Locatio	on:				Select the Certificate Store:
 Current U: Local Mac 	ser hine				no Store Location selected *
Browse Cert	ificates				Clear Certificates Cach
The selected of Note: The cert	ertificate will be se ificate for commun	t for the Server Tran nication between 107	sport (as Transport Gateway device an	settings in Fra d IoT Hub cou	ImeWorX Server Location) or for OPC UA applications. Id be set only during provisioning phase. It could be done on Provisioning Device Setup page.
Select the use	age of the certifica	ite: None		۳	
Select the usi Select the cer	age of the certifica tificate:	no Certif	cate available 🔻	•	Activate Certificate
Select the usi Select the cer Remove ce	age of the certifica tificate: rtificate from Sett	no Certif	cate available ¥ the certificate will i	• be removed fr	Activate Centricate on the selected server settings (by usage) and that settings will be reverted to the defaults.
Select the usi Select the cer Remove ce Certificate	age of the certifica tificate: rtificate from Sett Import	no Certif	cate available ▼	be removed fr	Actuale Certificate on the sector settings (by usage) and that settings will be reverted to the defaults.
Select the usi Select the cer Remove ce Certificate The new certif Machine' store	spe of the certificat tificate: rtificate from Sett Import locate will be import location.	te: None no Certif ings The use of ted to the certificate	cate available the certificate will i store selected abov	te removed fra be removed fra re. If no Certifi	Activate Certificate on the selected server settings by usage) and that settings will be reverted to the defaults. Control Store is setected, then the certificate will be imported into 'Personal' above in the Local
Select the usi Select the cer Remove ce Certificate The new certif Machine' store Certificate fil	spe of the certificat tificate: rtificate from Sett Import locate will be import location. e to import:	ted to the certificate	cate available the certificate will i the selected abov	• be removed fri e. If no Certifi	Activate Certificate on the seatched server settings (by usage and that settings will be reverted to the defaults. cate Store is selected, then the certificate will be imported into 'Personal' store in the Local
Select the usi Select the cer Remove ce Certificate The new certif Machine' store Certificate fill Choose Fi	spe of the certificat tificate: rtificate from Sett Import location. e to import: e MyNewThing.	ted to the certificate	cate available	• be removed fri e. If no Certifi	Activate Cardincate on the searched server settings by usage and that settings will be reverted to the selecuts. cate Store is selected, then the centificate will be impacted into Personal' store in the Lecal
Select the usi Select the cer Remove ce Certificate The new certif Machine' store Certificate fill Choose Fi Certificate pa	spe of the certifica tificate: rtificate from Sett Import locate will be impor location. e to import: MyNewThing. sssword: (if appli	ted to the certificate p12 cable)	cate available	• be removed fri ve. If no Certifi	Athete Certificate on the selected server settings by usage and that settings will be reverted to the defaultu cate Store is selected, then the certificate will be imported into Personal store in the Local
Select the usi Select the cel Remove ce Certificate The new certif Machine' store Certificate fil Certificate fil Certificate pa certificate	spe of the certifica tificate: tificate from Sett Import laceton. e to import: e to import: MyNewThing. sseword: (if appli ficate	ted to the certificate p12 cable)	cate available	• be removed fri re. If no Certifi	Activate Cardificate on the selected server settings (by usage) and that settings will be reverted to the selecuts. cate Store is selected, then the centificate will be imported into 'Personal' store in the Local

- 8. In Workbench where you have an IoT project with your device, you will create a new MQTT broker under that device:
 - Change Protocol to Secured MQTT ("mqtts:")
 - Enter the appropriate server URL (such as somestring.iot.us-east-2.amazonaws.com)
 - Specify a client ID for your device
 - Change Security Mode to TLS ver. 1.2 (recommended)
 - Check the Enable Client Certificate Button
 - Click the Browse Certificate button next to the Client Certificate field
 - Select the AWS IoT Certificate in the Local Machine Personal store (that you recently imported)
 - Apply the changes
- 9. Next create a new Publisher Connection for your device that uses this MQTT broker and the JSON encoder. Specify some Real Time Publish List.

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$rac{1}{2}$ AWSconnection $rac{2}{2}$ X		
Publisher Connection Name:	AWSconnection	[Lanner2580-Jan1
General Settings		~
 The connection is enable Enable compatibility with 	rd n ICONICS clients	
Connection Type:	MQTT	Ŧ
Encoder:	JSON	• 🛛 🔪
Heartbeat Rate:	$20 \Rightarrow$ (seconds, 0 = no timeout)	
Publish Lists		^
Real Time Publish List:	LEC2580PL	• C 🏷 🕇
Historical Publish List:	None	- C 🍃 🕇
Analyzer Publish List:	None	- C 🗋 +
MQTT Basic Settings		
Device ID:	LEC2580	
MQTT Broker:	AWSbroker (mqtts:)	• 🖸 🍃
Base Topic:	Base	
Quality of Service:	At Most Once	٣
Retain Message		

Figure 7 - Publisher Connection with MQTT Broker & JSON Encoder

 Now your IoTWorX device should be publishing to AWS IoT. To test it, go to the Test page in the AWS IoT portal and subscribe to the "#" (all) topic. You should see messages received from your device at your specified publish rate.

Montry Sales/plane # Depart Date Put Service 3 Sales/Plane 4 service 3 Sales/Plane 4 service 3 Put Put Sales/Plane 4 service 3 Put Sales/Plane 4 service 3 Put Put Sales/Plane 4 service 3 Put Put Sales/Plane 4 service 3 Put
Name Angen Salashi ta stagin Angen Salashi Sangin Palah ta stagin Angen Salashi Sangin Salashi S
Exas/LEC2580/defia Jun 15,201812-853.944-000 Expent (""""""""""""""""""""""""""""""""""""

Figure 8 - Testing IoTWorX device publishing with AWX IoT

11. To receive these messages into GENESIS64, you can create a subscriber connection. You can create a new broker on the subscriber node with similar settings as the one created before, but specifying a different client ID. Then you would associate that broker with a new subscriber connection that uses a matching decoder.

🚏 AWSsubscriber 脊 🗙			×			
Subscriber Connection Name: AW	Ssubscriber		[W10FCQA1]			
General Settings			-			
The connection is enabled						
✓ Enable compatibility with ICONICS clients						
Connection Type:	MQTT		*			
Early Start:	0 ‡	(minutes)				
Default Decoder:	JSON	•	0 D			
Dynamic Subscription Life Time:	5 🗘	(minutes)				
Keep Alive Timeout:	60 ‡	(seconds, 0 = no timeout)				
MQTT Basic Settings			•			
MQTT Broker:	AmazonBroker (mqtts	5:)	ମ 🖒			
Base Topic:	Base					
Quality of Service:	At Most Once		٣			

Figure 9 - Subscriber Connection with MQTT Broker & JSON Decoder

After the subscriber connection is completed, you should be ready to see your data. You can verify it with the Data Explorer:

Data Explorer by ICONICS, Inc.											-	
Search:	P	÷.	Drag a col	umn header a	nd drop it here to group t	y that column						
* 🐺 LEC2580 🔸 📑 Published Data via Static List *		т	Name T	Value T	Timestamp T	Quality T	Data Type T	Access T	User Access T	Tag	-τ	
★ Favorites		-	intW	3	1/12/2018 4:02 PM	Good	builtln: Int16	RIW	R W HR HW	iot:AWSsubscriber/LEC2580	√intW	_
4 👼 My Computer		_	ramp1	61.5	1/15/2018 2:04 PM	Good	builtin: Double	R	RWHRHW	iot:AWSsubscriber/LEC2580.	/ramp1	_
Assets		_	ramp2	90.375	1/15/2018 2:04 PM	Good	builtin: Double	R	RWHRHW	iotAWSsubscriber/LEC2580	/ramp2	
4 K Internet of Things		_	rampo	41.29313	1/15/2010 2:04 PM	0000	CONTIN: DOUDIE		K W HK HW	Totikingsoupscriper/Ltc.2000	ramps	_
4 7 AWS where there												
A 1 LEC2380		_										
All Available Data		_										
Published Data via Dynamic List		_										
Published Data via Static List												
intW		_										
► mamp1												
Image:												
ramp3												
Statistics												

Figure 10 - Browsing published data in Data Explorer