# Sending OPC Tag Data with Transmission

Prerequisites:

- Knowledge of Ignition and Module installation process: Cirrus Link Module Installation
- Install the following MQTT Modules
  - MQTT Distributor
    - v4.0.X if using Ignition 8.0.x
    - MQTT Engine
      - v4.0.X if using Ignition 8.0.x
    - MQTT Transmission
      - v4.0.X if using Ignition 8.0.x
- A device that supports Modbus over TCP

#### Overview:

Transmission is an MQTT module for Ignition that can convert Ignition tag data and tag change events into MQTT messages to be consumed by MQTT Engine or other MQTT clients. This tutorial will show how to configure MQTT Transmission to send OPC tag data in Ignition as MQTT messages via MQTT Distributor to MQTT Engine where they will be displayed.

The topology of this example shows MQTT Distributor, MQTT Engine, and MQTT Transmission all running in the same Ignition instance. This is done for simplicity of the tutorial. But, this isn't required or even intended to be a real use case. In a more realistic scenario MQTT Transmission and MQTT Engine would be located on separate machines.

#### Variations:

This tutorial shows how to use OPC tags and MQTT Transmission to generate MQTT messages based on tag change events. However, the tag source does not have to be an OPC tag. Instead, as long as the tag structure for MQTT Transmission is followed, any Ignition tag can be used to generate MQTT messages and/or be controlled via MQTT messages.

#### Sending OPC Tag Data with Transmission:

The first step is to configure the tag provider in Ignition in a way that MQTT Transmission understands. Start by configuring your OPC server, client, and tags. This can be done using the Inductive Automation documentation here. Once this is done, the Tag Provider needs to be set up in Ignition via the Ignition Designer. Using a Web Browser, browse to the Ignition Gateway on your Ignition Gateway. If it is running on your development machine, that is: ht tp://localhost:8088. You should see this:

nitionV.		Help V Get Design						
A Home	Get Started  de 1:03:42. We're elad you're test driving our software. Have fun.	Activate Ig						
S	Download Ignition Designer Launcher							
3	Ignition Designer Launcher         Download the Ignition Designer Launcher to create or modify your projects.         Download							
	Download Application Launchers							
	Vision Client Launcher Download the Native Client Launcher to open Vision clients from any Ignition Gateway.	Perspective Session Launcher Launch a Perspective session directly in your browser or download the native application.						
	Download Vision Client Launcher	View Projects						
	Take advantage of our tools to get designing quickly and take your ideas from concept to reality. hundreds of short videos covering the basics of Ignition.	The User Manual is a wealth of easily searchable knowledge and the Inductive University has           INDUCTIVE         Inductive University           UNIVERSITY         IU has more than 600 searchable videos and 20 courses to help you learn how to use Ignition at your own pace on any device.						
	Product Documentation Learn more about each Igntion module and what you can do with it.	Appendix A complete reference for components, expressions, and scripting functions in Ignition.						

Near the upper right corner, click 'Get Designer'. This will take you to a screen to select the version of the Designer to download based on your operating system. Follow the instructions to download and install and then start the designer, showing a login screen like this:

Ignition Designer Laun	cher		(i) About	🔅 Setting
⊞ My Designers	[	Filter Designers	Add	d Designer
Ignition.local http://localhost:8088	I			
Launch	•			

Press "Launch" to start the designer:

Ignitio	n des	signer	,
Use of this application is subject to the acceptance of the terms and conditions set forth in the accompanying <u>license agreement</u>	Username   Password		
		Login	Cancel
Copyright © 2003–2	020 Inductive Automati	on All rights reserved	

This will bring you to a new Window where you can select an Ignition Project or create a new one. Create a new project by giving it a name and clicking 'New Project'.

		Ignition designer	
🕂 <u>N</u> ew Proj	iect Q <sub>7</sub> Fi	lter Projects	道 Import Project
Name	Title	Inheritable Inheritance Hierarchy	Actions
test			OPEN

This tutorial will use the "default" Tag Provider. Expand 'All Providers' in the Tag Browser and select 'default'. Note that if Ignition Edge is being used, the tag provider will be named 'edge'.

Tag Browser			
Q C 🔍 - 🔳 💿	-) 0- 1 ₪ -		
Tag	Value	Data Type	Traits
<ul> <li>Tags</li> <li>System</li> <li>Vision Client Tags</li> <li>All Providers</li> <li>default</li> <li>MQTT Distributor</li> <li>MQTT Engine</li> <li>MQTT Transmission</li> </ul>			

With 'default' (or 'edge') selected, click the 'OPC' icon in the Tag Browser icon list:



This will open a new window as shown below. If the OPC server and client were set up and configured properly, you should see something similar to the following:

OPC Browser	ΞX					
lF - C						
🕶 🌳 Ignition OPC UA Server						
🕶 🔄 Devices						
- 🌀 [TestDevice]						
Diagnostics]						
🔻 🔄 Unitld 1						
√→ <sup>1</sup> / <sub>2</sub> 1.x1−1.x10						
▶-⊚ 1.x1						
▶-⊚ 1.x10						
► 📎 1.x2						
► 📎 1.x3						
► 📎 1.x4						
► 📎 1.x5						
► 📎 1.x6						
► 📎 1.x7						
►-`` 1.x8						
►-'\> 1.x9						
Vnitld 2						
▶-Щ 2.y1-2.y10						
▶— 🔄 Server						

Note there is a device with an attached PLC and two sets of registers. Yours will look different based on the device you are using and how it is configured. At this point, we can do the following:

- Select the device (TestDevice in this case) and drag it into the Tag Browser under the 'default' Tag Provider.
   Rename the "\_TestDevice\_" folder to "Tutorial Tags".
   Rename the "UnitId 1" and "UnitId 2" folders to "PLC1" and "PLC2".
   Delete the "\_Diagnostics\_" folder as it is not used in this tutorial.

This is shown below:

ag Browser Q. 그 🐨 🗸 🔳 💩 🖃	G ⊞ -			
	Value	Data Type	Traits	
Tags	Func	Data Type	mants	
Svstem				
Vision Client Tags				
All Providers				
<ul> <li>default</li> </ul>				
📋 Data Types				
MQTT Tags				
👻 🗁 Tutorial Tags				
PLC1				
1_x1-1_x10				
1_x1 OPC		Boolean		
1_x2 OPC		Boolean		
▶ 🎙 1_x3 OPC		Boolean		
▶ 🔖 1_x4 OPC		Boolean		
▶ 🎙 1_x5 OPC		Boolean		
▶ 🔖 1_x6 OPC		Boolean		
1_x7 OPC		Boolean		
1_x8 OPC		Boolean		
▶ 🦠 1_x9 OPC		Boolean		
1_x10 OPC		Boolean		
PLC2				
2_y1-2_y10				
▶ 🎙 2_y1 OPC	0	Short		
▶ 🦠 2_y2 OPC	0	Short		
▶ 🦠 2_уЗ ОРС	0	Short		
▶ 🔖 2_y4 OPC	0	Short		
▶ 🎙 2_y5 OPC	0	Short		
▶ 🔖 2_y6 OPC	0	Short		
> 2_y7 OPC	0	Short		
▶ 🔖 2_y8 OPC	0	Short		
▶ 🎙 2_y9 OPC	0	Short		
> 2_y10 OPC	0	Short		
MQTT Distributor				
MQTT Engine				
MQTT Transmission				

The folder structure of these Tags should be carefully noted so that MQTT Transmission can be configured correctly to monitor the Tags.

With the Tags set up, MQTT Transmission can now be configured. Do so by browsing to the the Configure section of the Ignition Gateway web UI and selecting 'MQTT Transmission -> Settings' on the left:

This tutorial uses the default MQTT Server of MQTT Distributor:

→ C' û	0 i) localhost:8088/web/config/mqtttransmission.settings?16 90% 🗵 🏠	II\ 🗉 🛎 🛈 👬
gnition		Ladmin   Sign C
		Help @ Get Designe
rion¥.		incip •
SYSTEM	Config > Mqtttransmission > MQTT Transmission Settings	
Overview	Trial Mode 0:28:36 We're glad you're test driving our software. Have fun.	Activate Igni
Backup/Restore		
Ignition Exchange	Connect Connect State Tennenittee Descript	
Licensing	General Servers Sers Hanshitters Records	
Modules		
Projects	Name URL Server Set Username Certificate Files Connected	
Gateway Settings	Chariot SCADA tcp://localhost:1883 Default admin 1 of 1	delete edit
NETWORKING		
Web Server	→ Create new MQ11 Server	
Gateway Network		
Email Settings	Note: For additional details on configuring MQTT Transmission, see the	
	uocumentation nere	
SECURITY		
Auditing		
Users, Roles		
Search		

Under the Transmitters tab, a new Transmitter will need to be created. Click on the "Create new Setting..." link as shown below:

$\rightarrow$ C' $\hat{\mathbf{u}}$	Ū	<ol> <li>localhos</li> </ol>	t:8088/web/d	config/mqtttr	ansmission.setti	ngs?17		90% … 🕑	☆	\ ⊡	۲	Ű
Ignition	_										🕹 admin   🖇	Sign O
vition										Help 🕜	Get Des	igne
	<b>*</b> C = 1	C- > M-14	NOTT 1		attin an							
SYSTEM	Trial	ng > Mqtttransmi	Ssion > MQIII	ransmission s	fettings						Activat	o Ignit
Overview	TTAL	100e 0.27.00	we re glad you re i	est unving our soi	itware. Have full.						Activat	r igint
Ignition Exchange				_								
Licensing		General	Servers	Sets	Transmitters	Records						
Modules												
Projects		Name		Enabled	Tag Provider	Tag Path	Set	History Store	Sparkplug IDs			
Redundancy		Example Tr	ansmitter	true	default	MOTT Tags	Default			dele	te edit	
Gateway Settings						- 0					_	
NETWORKING		→ Create ne	w Settings									
Web Server												
Gateway Network												
Email Settings												
SECURITY					•							

Modify the following settings:

**Tag Settings** 

- Name: Tutorial Transmitter
- Tag Provider: default
  Tag Path: Tutorial Tags

### Sparkplug Settings

• Group ID: Tutorial Group

• Edge node ID: Tutorial Edge

(leave all other setting as defaults)

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ition			Help 🛛 Get Design						
SYSTEM	<pre>\$ Config &gt; Mqtttransmission &gt;</pre>	MQTT Transmission Settings							
Overview	Overview Trial Mode 9:12:24 We're glad you're test driving our software. Have fun.								
Backup/Restore									
Ignition Exchange	General Se	rvers Sets Transmitters Records							
Modules									
Projects									
Redundancy	Tag Settings								
Gateway Settings	Name	Tutorial Transmitter							
NETWORKING	Name	A unique name for the Transmitter							
Web Server	Enabled	Z Enable Transmitter							
Gateway Network									
Email Settings	Tag Provider	default							
SECURITY		The Name of the tag provider							
Auditing									
Users, Roles	Tag Path	A path to the root folder where the tag tree starts (optional)							
Service Security									
Security Levels	To De de Dedad	1000							
Security Zones	Tag Pacing Period	The waiting period in milliseconds after an initial tag change event before publishing all changed tags (default: 1,000)							
DATABASES									
Connections	Set	Default v							
Drivers		ine MQTT Server Set to use with this Transmitter							
Store and Forward		0							
ALARMING	Discovery Delay	The Transmitter Discovery Delay in milliseconds. This is useful when using MQTT Engine as the tag provider							
General		(default: 0)							
Journal	Aliased Tags	Use aliases for tag names to optimize payload sizes when publishing data							
Notification									
Schedules	Compression	NONE  The algorithm to use for compressing navloads before publishing							
		The algorithm to use for compressing puryours before publishing							
TAGS	Block Commands	Block incoming commands (writes) to Edge Node and Device Tags							
History	Convert UDTs	Converts UDT members to normal Tags before publishing							
Realtime									
OPC CLIENT	Publish UDT Definitions	C Publish UDT Definitions in BIRTH							
OPC Connections									
OPC Quick Client									
Q Search	History Settings								

Click "Save Changes" to see the new Transmitter was successfully created.

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ini	tion									Help 🕜	¢	iet Desi	gner
ł.	SYSTEM	🌣 Confi	g > Mqtttransmission > MQT	Transmissio	on Settings								
ne	Overview	Trial M	ode 1:59:32 We're glad you'r	e test driving ou	ir software. Have fun.							Activate	Ignitio
d I	Backup/Restore												
tus	Ignition Exchange		General Servers	Sets	Transmitters	Records							
i fia	Licensing												
	Projects			Cottings "T	storial Transmitte								
	Redundancy		Successivity updates	i settings i t		-							
	Gateway Settings		Name	Enabled	Tag Provider	Tag Path	Set	History Store	Sparkplug IDs				
	NETWORKING		Example Transmitter	true	default	MQTT Tags	Default			d	lelete	edit	
	Web Server												
	Gateway Network		Tutorial Transmitter	true	default	Tutorial Tags	Default		Tutorial Group/Tutorial Edge		lelete	edit	
	Email Settings		→ Create new Settings										
	SECURITY		<ul> <li>Create new Settings</li> </ul>										
	Auditing												
	Users, Roles												
	Service Security												
	Identity Providers												

This new Transmitter will scan the Tags in the "Tutorial Tags" folder and publish them to MQTT Engine using the hard coded Group and Edge Node IDs that were configured in the Transmitters settings. Since the Device ID was left blank in the Transmitter settings, they will be scanned from the Tag Tree. Each Folder in the "Tutorial Tags" folder will be considered a device. For this tutorial the devices will be "PLC1" and "PLC2".

In Designer force MQTT Transmission to update by toggling the "Refresh" Tag shown below:

Tag Browser			E X						
Q ♡ ♥ - ■ ◎ -D 단 ⊞ -									
Tag	Value	Data Type	Traits						
<ul> <li>Tags</li> <li>System</li> <li>Vision Client Tags</li> <li>All Providers</li> <li>default</li> <li>MQTT Distributor</li> <li>MQTT Engine</li> <li>MQTT Transmission</li> <li>Data Types</li> <li>Transmission Control</li> <li>Last Refresh Memory</li> <li>Refresh Memory</li> <li>Transmission Info</li> </ul>	2020-01-2	DateTime Boolean							

Note that Designer must be in read/write mode. Do so by selecting these two buttons in the top menu of Designer:



At this point, you should be able to expand the "MQTT Engine" Tag provider and see all of the tags in MQTT Engine:

	₩		
	±27 *	Data Tana	Turita
Tags         System         Vision Client Tags         All Providers         Image: Image Image Image Image Image         Image Image Image Image Image Image Image         Image	Value	Data Type Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean	Traits
<ul> <li>2_y1 Memory</li> <li>2_y2 Memory</li> <li>2_y3 Memory</li> </ul>	0	Short Short Short	
<ul> <li>\$ 2_y4 Memory</li> <li>\$ 2_y5 Memory</li> <li>\$ 2_y6 Memory</li> </ul>	0 0 0	Short Short Short	
<ul> <li>\$ 2_y7 Memory</li> <li>\$ 2_y8 Memory</li> <li>\$ 2_y9 Memory</li> <li>\$ 2_y10 Memory</li> </ul>	0 0 0	Short Short Short Short	
<ul> <li>Device Info</li> <li>Engine Info</li> <li>Message Diagnostics</li> <li>MQTT Transmission</li> </ul>			

In addition to the tags being displayed in Engine, they are also writable if this enabled in MQTT Engine. By default, MQTT Engine blocks command messages from being sent to devices. To enable this feature, in the Ignition web console browse to the MQTT Engine Module Settings.

Make sure the "Block Node Commands" and "Block Device Commands" settings are disabled, as shown below.

→ C <sup>4</sup> C <sup>6</sup>	}	0 i localhost:808	B/web/config/mqttengine.settings?23	C O i		
ition			Help 😡	Get Designe		
SYSTEM	\$	Config > Mqttengine > MQ	T Engine Settings			
Overviev	, 🗖	I Mode 1:51:31 We're glad you're test driving our software. Have fun. Activate Igni				
Backup/	Restore					
Ignition I	Exchange	Constal				
Licensing	3	General Se	vers manespaces			
Modules						
Redunda	incy	Main				
Gateway	Settings	Enabled	Enable the MQTT Engine			
NETWORKIN	G					
Web Serv	/er	Primary Host ID				
Gateway	Network		I ne Primary Host ID to allow connecting clients to ensure they remain connected to this application (optional)			
Email Se	ttings					
SECURITY		Group ID Filters	A comma separated list of Group IDs to listen for (optional)			
Auditing						
Users, Ro	oles	Charlist Assess				
Service S	iecurity	Charlot Access				
Identity	Providers	Chariot Cloud	Charlot Cloud Access Key The optional Charlot Cloud Access Key used for Cirrus Link hosted Charlot MQTT Servers (optional)			
Security	Levels	Access Key				
Security	zones	et al trebuilt				
DATABASES		Secret Key	The optional Chariot Cloud Secret Key used for Cirrus Link hosted Chariot MOTT Servers (optional)			
Connecti	ions					
Drivers Store and	d Forward	Miscellaneous				
ALARMING		Block Node				
General		Commands	Concertante calle intre calle intres			
Journal		Block Device	Block Device			
Notificat	ion	Commands				
On-Call F	Rosters	Block Property	C Plack incoming Tax preparty changes			
Schedule	25	Changes	block incoming tag property changes			
TAGS						
History		File Policy	The policy for handling incoming files			
Realtime						
OPC CLIENT		File Location				
OPC Con	nections		The directory to store files in when using the "Store" file policy (optional)			
OPC Oui	-k Client	Store Historical	Store Historica			
		Events	Enable the writing of historical change events directly to the History provider instead of updating the Tag value			

Note that after updating the MQTT Engine settings, the Tags in the Tag Browser under the MQTT Engine Tag Provider may become Stale. This is because the primary host ID is not set up on both MQTT Engine and MQTT Transmission which is outside of the scope of this Tutorial. To get around this, manually toggle the MQTT Transmission "Refresh" Tag as shown above.

Now attempt to write to any output Tags that are available on the OPC device, via the corresponding Tag in the MQTT Engine Tag Provider.

Tag Browser							
Q ♡ ♥ - ■ ◊ -D C+ ⊞ -							
Tag	Value	Data Type	Traits				
<ul> <li>System</li> <li>System</li> <li>Vision Client Tags</li> <li>All Providers</li> <li>default</li> <li>MQTT Distributor</li> <li>MQTT Engine     <ul> <li>Data Types</li> <li>Edge Nodes</li> <li>My MQTT Group</li> <li>Tutorial Group</li> <li>Tutorial Edge</li> <li>Node Control</li> <li>Node Info</li> <li>PLC1</li> <li>1_x1 Memory</li> <li>1_x2 Memory</li> <li>1_x3 Memory</li> <li>1_x4 Memory</li> <li>1_x5 Memory</li> <li>1_x6 Memory</li> <li>1_x8 Memory</li> <li>1_x8 Memory</li> <li>1_x9 Memory</li> <li>1_x10 Memory</li> <li>1_x10 Memory</li> <li>1_x10 Memory</li> <li>1_x10 Memory</li> <li>Message Diagnostics</li> <li>MQTT Transmission</li> </ul></li></ul>		Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean Boolean					



Note there is some delay in the response. This is due in part to MQTT Transmissions 'Tag Pacing Period'. This is the delay for MQTT messages to wait before being sent to allow multiple change events to buffer before putting them into a single MQTT message. This can be changed in the MQTT Transmission module's Transmitter configuration in the Ignition web console.

## **Additional Resources**

- Inductive Automation's Ignition download with free trial 
   https://inductiveautomation.com/downloads/
- Azure Injector download with free trial
- https://inductiveautomation.com/downloads/third-party-modules
   Questions about this tutorial?
- Check out the Cirrus Link Forum: https://forum.cirrus-link.com/
   Contact support: support@cirrus-link.com
- Sales questions
  - Email: sales@cirrus-link.com
  - Phone: +1 (844) 924-7787
- About Cirrus Link
  - https://www.cirrus-link.com/about-us/