How to Connect your Industrial Assets to Microsoft Azure Event Grid using N3uron's MQTT Client Module



Azure Event Grid and N3uron

In one of our previous articles <u>MQTT: The Universal Messaging Protocol for Cloud Providers and</u> <u>IloT Systems</u>, we explored the significance of MQTT in the Industrial Internet of Things (IIoT) and its smooth integration with Azure IoT Hub. Now, let's delve into a practical guide on setting up and connecting your Industrial assets to <u>Azure Event Grid</u> using <u>N3uron's</u> MQTT Client module.

N3uron facilitates the seamless implementation of solutions for Industrial IoT and DataOps. When integrated with Azure Event Grid's microservices, it significantly simplifies decision-making based on your operational data.

Some of the key features that make N3uron the optimal software platform for developing IIoT and DataOps solutions include:

• Edge driven: It is designed to be deployed on the plant floor to process data close to the source.

- Report by exception: Only relevant changes in data are transmitted.
- Open Architecture: It is built on modern technologies and uses open standards.

• Lightweight: N3uron not only supports lightweight data transmission protocols such as MQTT and Sparkplug but its Sparkplug module fully implements the Sparkplug specification.

• Accessibility:N3uron's Data Model is 100% accessible by any other consumers.

• **Interoperability:** With <u>nearly 50 modules</u>, which can be stacked as required to meet any project needs, N3uron provides complete interoperability.

• **Scalability:** N3uron is designed to seamlessly deploy distributed architectures with several hundred or thousand nodes and you can connect several nodes in a matter of minutes, using N3uron Links, scale architectures and consolidate namespaces very easily. A single node can seamlessly manage several hundred thousand tags and a link's throughput surpasses 100k events/second.

Ranging from traditional industrial protocols such as Modbus, DNP3, OPC UA, or OPC DA to more conventional protocols like <u>MQTT, Sparkplug</u> or <u>REST</u>, N3uron provides a turnkey connectivity solution for the Industrial Internet of Things (IIoT). Nevertheless, N3uron is not only a connectivity platform, but it is mainly meant to build and deploy an enterprise Unified Namespace (UNS) by modelling, aggregating, standardizing, and contextualizing data on the plant floor from a multitude of sources whether that will be PLCs, databases, manufacturing execution systems, SCADAs or ERPs just to name a few, and make this data available to other third-party applications running either on-premise or in the cloud.



In the center, the Microsoft Azure Event Grid logo, surrounded by four distinct industrial sites utilizing N3uron Platform with MQTT Client Module, interfacing with various Sensors and PLCs. Above, logos of Azure Functions, Event Hubs, Logic Apps, Blob Storage, Webhooks, and Power Automate, illustrating comprehensive industrial data integration and automation.

N3uron and Azure Event Grid Requirements

It is assumed that you already have an Azure subscription. If not, you can create one at <u>https://</u> <u>azure.microsoft.com/en-us/free/search/</u>.

• Familiarize yourself with Event Grid: If you're new to Azure Event Grid, we recommend reading the <u>Event Grid overview</u> before diving into this article to better understand the concepts.

• Check Firewall Settings: Ensure that port 8883 is open in your firewall. The MQTT protocol, which is used in this article, communicates over port 8883. Note that some corporate network environments might have this port blocked.

• Obtain an X.509 Client Certificate: You'll need an X.509 client certificate to generate the thumb-

print and authenticate the client connection. Ensure you have this certificate in place for a seamless experience. If you don't have it, this article will show you how to create a self-signed X.509 Client certificate.

If you haven't downloaded N3uron yet, you can do so at <u>https://n3uron.com/downloads/</u>. If this is the first time you are installing N3uron, our <u>Quick User Guide</u> will guide you through the entire installation process.

We highly recommend using an external MQTT client to test your configuration. For this article, we utilized <u>MQTT Explorer</u>, although you are free to use your preferred MQTT client application.

Setting up an Azure Event Grid

Creating a new Event Grid Namespace

• Step 1: Log into Microsoft Azure and go to the Azure Portal.

Click on the link to get to the Microsoft Azure Portal.

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The screenshot exhibits the Microsoft Azure Portal interface.

• Step 2: Once logged in, you'll need to create the Azure resources that your device, in our case a **N3uron** node, will require in order to connect to the Azure Event Grid and start exchanging messages.

• Step 3: Navigate to the search bar, enter Event, and subsequently choose Event Grid Namespaces from the dropdown menu.

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The image displays the 'Event Grid Namespaces' option in the dropdown menu of Microsoft Azure.

• Step 4: In the Overview page, select +Create in any of the Namespaces cards available in the MQTT events or Custom events sections.

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Available partners	Azure service events		
Partner topics	Subscribe to events published by Azure services.		
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E Partner namespaces			
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	Publish and deliver application events and enable downstream solu	tion to subscribe to them.	
	Namespaces (preview)	Topics	🔄 Domains
	Build message driven applications with flexible consumption	Publish and subscribe your application events. Learn more 🕫	Build event driven solutions for many application group
	patterns and protocols. Learn more 🕫		scale. Learn more nº

The picture displayis how to create a new Event Grid Namespace in Microsoft Azure.

• Step 5: In the Basics tab, complete the fields as follows:

- **Subscription:** Select the subscription to use for your hub. In this example, we have selected Azure subscription 1.

– Resource Group: Select a resource group or create a new one. To create a new one, select Create new and fill in the name you want to use. To use an existing resource group, select the specific resource group. For more information, see <u>Manage Azure Resource Manager resource groups</u>. In this example, we have selected CS N3uron.

- Name: Enter a name for your Namespace. In this example, we have named it NS-N3uron.

- Region: Select the region you want your hub to be located in. Select the location closest to you.

– Availability zones: Select the checkbox if available. To learn more about it, follow this link, <u>What</u> <u>are availability zones?</u>.

Throughput units: This setting controls the capacity of your Event Grid. To learn more about it, follow this link, <u>Throughput units</u>.

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Home > Event Grid >	
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cocolion	Namespaces are currently available only in select regions. Learn more
Availability zones ①	

The screenshot displays the 'Basics' tab within the 'Create Namespace' window of Microsoft Azure's Event Grid.

• Step 6: On the Review + create tab, review your settings and select Create.

		Q
Home > Event Grid >		
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Enable user assigned identity	Disabled	
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The image shows the 'Review + create' tab within the 'Create Namespace' window of Microsoft Azure's Event Grid.

Configure Namespaces settings

• Step 1: In the Overview page, select View in any of the Namespace cards available in the MQTT events or Custom events sections.

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≡ Microsoft A	zure 🔎		
Home > Event Grid	Inventication between MQIT clients and severiess architectures for event-driven app Build event-driven solutions with Azu Azure Event Grid enables pub-sub messaging between MQIT clients a MQTT events Publish and subscribe messages between MQIT clients. Mamespaces (preview) Azure Event Grid Namespace enables MQIT support and pull syle delivery of discrete events. Learn more of Azure Service events Mater Service events Subscribe to events published by Azure services. Mater asks based on Azure service events. Learn more of Automate tasks based on Azure service events. Learn more of Azure Tereste (no View)	itations nd push-pull style delivery of discrete events.	
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	Build message driven applications with flexible consumption patterns and protocols. Learn more r [®]	Publish and subscribe your application events. Learn more O	Build event driven solutions for many application grou scale. Learn more r ^a

The picture illustrates the configuration process for a new Event Grid Namespace in Microsoft Azure.

• Step 2: Select the namespace from the list of resources in the subscription.

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lome > Event Grid		
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tion.

• Step 3: Enable MQTT in your configuration.

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🗲 Events	Subscription ID :			MQTT : Enabled
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Picture showing how to enable MQTT in your Event Grid configuration within Microsoft Azure.

• **Step 4:** Check the option **Enable MQTT** and specify the desired number of client sessions for each authentication name. For this example, we will configure 4 client sessions per authentication name.

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Home > Event Grid Namespaces (previ NS-N3uron Confign Event Grid Namespace	ew) > NS-N3uron uration ☆ …
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Enable MQTT and selecting the 'Maximum client sessions per authentication name' option to configure 4 client sessions in Microsoft Azure Event Grid.

Configure Publishing and Subscribing to MQTT messages

• Note:

If you don't already have a certificate, you can create a sample certificate using the <u>step CLI</u>. Please follow this link for further information, <u>Quickstart: Publish and subscribe to MQTT messages on</u> <u>Event Grid Namespace</u>.

Generate Sample Client Certificate and Thumbprint

In this example, we will use self-signed X.509 certificates to generate the thumbprint and authenticate client connections for three different clients:

- client-n3uron-pub: This client has publisher permissions.
- client-n3uron-sub: This client has subscriber permissions.
- client-app: This client also has subscriber permissions.

• **Step 1:** To create root and intermediate certificates, run the following command. Remember the password for the next step.

```
step ca init -deployment-type standalone -name MqttAppSamplesCA
-dns localhost -address 127.0.0.1:443 -provisioner
MqttAppSamplesCAProvisioner
```

• Step 2: Use the CA files generated to create a certificate for the first client, client-n3uron-pub. Ensure you specify the correct paths for the cert and secrets files in the command.

```
step certificate create client-n3uron-pub client-n3uron-pub.pem
client-n3uron-pub.key -ca .step/certs/intermediate_ca.crt
-ca-key .step/secrets/intermediate_ca_key -no-password
-insecure -not-after 8760h
```

• **Step 3:** Use the CA files generated to create a certificate for the second client, client-n3uron-sub. Be sure to use the correct paths for the cert and secrets files in the command.

```
step certificate create client-n3uron-sub client-n3uron-sub.pem
client-n3uron-sub.key -ca .step/certs/intermediate_ca.crt
-ca-key .step/secrets/intermediate_ca_key -no-password
-insecure -not-after 8760h
```

• **Step 4:** Use the CA files generated to create a certificate for the third client, client-app. Make sure to specify the correct paths for the cert and secrets files in the command.

```
step certificate create client-app client-app.pem client-app.key
-ca .step/certs/intermediate_ca.crt -ca-key
.step/secrets/intermediate_ca_key
-no-password -insecure -not-after 8760h
```

Create Clients in Event Grid Namespace

• Step 1: On the left menu, select Clients in the **MQTT section**.On the Clients page, select the + Client on the toolbar.

• Step 2: On the Clients page, select the + Client on the toolbar.

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= Microsoft Azure	لر		
Home > Event Grid Namespaces (previe	aw) > NS-N3uron		
NS-N3uron Clients	¢ …		
	Clients		
🛞 Overview	View, create, delete, and update your clients. Learn more		
Activity log			
Access control (IAM)	Search to find client by name		
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📍 Access keys	Client-N3uron-Sub		
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Clients			
S Client groups			
Topic spaces			
Permission bindings			
-> Routing			

Screenshot illustrating the process of creating clients in Event Grid Namespace within Microsoft Azure.

• Step 3: Go to the Create Client page, and fill in the following fields as follows:

- Client Name: Client names must be unique within a namespace. In this example, Client-N3uron-Pub.

- Description: Provide a short description for your client. In this case, Client N3uron Publisher.

- Client Authentication Name: The client authentication serves as a unique identifier for the client. In this example, client-n3uron-pub.

Client Certificate Authentication Validation Scheme: Choose thumbprint-based authentication.
 Primary Thumbprint: To obtain the Primary Thumbprint, execute a command inside the directory where your client-n3uron-pub.pem file is located, then copy the string returned by the command and paste it.

step certificate fingerprint client-n3uron-pub.pem

- Secondary Thumbprint: Leave it empty.
- Connection Status: Enabled.
- + Add Key: attribute = type, Type = String, Value = pub.

Microsoft Azure	<u>م</u>
Home > NS-N3uron Clients > Update client ··· Client-N3uron-Pub	
Client Name *	Client-N3uron-Pub 🗸
Client Description	Client N3uron Publisher
Client Authentication Security allow yo identify to authenticate the client. Client Authentication Name Client Certificate Authentication Validation Scheme * Primary Thumbprint *	client-n3uron-pub // Thumbprint Match // // // // // // // // // // // // //
Secondary Thumbprint	Enter a thumbprint value
Connection Status Client Attributes ① Client attributes represent a set of key-va on common attribute values.	Enabled

Screenshot displaying the Create Client page in Microsoft Azure Event Grid.

• **Step 4:** Continue with the same process for the other two clients, Client-N3uron-Sub and Client-App adjusting the respective information.

Create topic spaces

- Step 1: On the left menu, select Topic spaces in the MQTT section.
- Step 2: On the Topic spaces page, select + Topic space on the toolbar.

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Screenshot illustrating the process of creating topic spaces in Microsoft Azure Event Grid.

- Step 3: Provide a name for the topic space, on the Create topic space page.
- Step 4: Select + Add topic template.
- Step 5: Enter N3uron/# for the topic template, and then select Create to create the topic space.



Screenshot illustrating the process of creating topic spaces in details in Microsoft Azure Event Grid.

Creating client groups

Client groups allow you to group a set of clients together based on common characteristics. The primary purpose of client groups is to simplify the configuration of authorization. You can grant authorization to a client group for publishing or subscribing to a specific topic space. This means that all clients within the client group are authorized to perform the publish or subscribe actions on the specified topic space. Previously, we added an attribute to our clients. Client attributes consist of key-value pairs, and we will use the '**type' attribute** to create permission bindings later.

• Step 1: Under Client groups, select + Client group.

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≡ Microsoft Azure	م
Home > NS-N3uron S NS-N3uron Client Event Grid Namespace	groups 🛧 …
 ✓ Search « ✓ Overview ✓ Activity log 	Client groups Client groups allow you to group clients that need publish/subscribe access to the same topic spaces. You can group your clients using a group query based on client attribut + Client groups \bigcirc Refresh \Re Give feedback
Access control (IAM) Tags Events	Group Name Sall
Settings	cg-pub gc-sub
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Clients Client groups	
 Topic spaces Permission bindings 	
- Routing	

Screenshot highlighting the selection of + Client group under Client groups.

• Step 2: Add a client group name for cg-pub (client group publisher). In the query use attributes. type = "pub" and Description = Client group with publishing permissions.

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Microsoft Azure Mone > NS-NBuron NS-NBuron Starkh Search Access control (IAM) Search Access control (IAM) Configuration Dropics MOTT Configuration Clients Collent groups Collent g	✓ Search resources, services, and docs (G+/) groups ★ Client groups Client groups allow you to group clients that need publish/subscribe access to the same topic spaces. You can group your clients us + Client groups Group Name Sall cgrpub ge-sub	Couple Clear group Clear group Clear group with publishing permissions Clear group with publishing permissions			×
Permission bindings Routing Monitoring Metrics Help Support a Traubleshootion		Save Cancel			

Screenshot showcasing the addition of a client group named 'cg-pub' (client group publisher).

• Step 3: Add client group name for cg-sub (client group subscriber). In the query use attributes. type = "sub" and Description = Client group with subscription permissions.

Microsoft Azure	Search resources, services, and docs (G+/)	Σ 🕼 Ο	© (©
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monitoring áí Metrics			

Screenshot featuring the addition of a client group named 'cg-sub' (client group subscriber).

Configuring Access Control Using Permission Bindings

- Step 1: On the left menu, select Permission bindings in the MQTT section.
- Step 2: On the Permission bindings page, select + Permission binding on the toolbar.

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≡ Microsoft Azu	re	R	
Home > NS-N3uron Permis Event Grid Namespace	esion bindings * ··· Permission bindings Permission bindings enable you to grant access for	a specific client group to either publish or subscribe on a specific topic space. Learn more	
Activity log Activity log Access control (IAM) Tags	+ Permission binding 🖒 Refresh 🖗 Give	feedback	
Events	Name	Client group name	Topic space name
Settings	pub-binding	k 3≻pub	N3uronTopicSpace
 Scale Identity Configuration Properties Eventing 			
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Screenshot emphasizing the selection of Permission bindings in the MQTT section from the left menu.

- Step 3: Configure the permission binding as follows:
- Provide a name for the permission binding. In this case, pub-binding.
- For the client group name, select cg-pub.

– For the Topic space name, select the topic space you created in the previous step. In this example, N3uronTopicSpace.

- Grant the Publisher permission to the client group on the topic space.



Screenshot showcasing the addition of a permission binding using the + Permission binding option on the Permission bindings page.

- Repeat Step 3 for the subscribers. Configure the permission binding as follows:
- Provide a name for the permission binding. In this case, sub-binding.
- For the client group name, select cg-sub.
- For the Topic space name, select the topic space you created in the previous step. In this case, N3uronTopicSpace.
- Grant the Subscribe permission to the client group on the topic space.



Screenshot configuring permission bindings for 'pub-binding' (publishers) and 'sub-binding' (subscribers).

Start Configuring the N3uron IIoT Platform

Log into the N3uron IIoT Platform Using a Web Browser.

If this is your first time accessing N3uron, open your web browser and type <u>http://localhost:8003</u>. By default, the **User** and **Password** are **admin** and **n3uron** respectively.

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E DEMO AZURE EVENTGRID			N3uron
	<i>b</i>		
	Nauron		
	Username		
	Password:		
	Password		
	Log in		

Screenshot illustrating the initial step of the login process to N3uron IIoT Platform configuration.

• Note:

In this example, we will configure two N3uron nodes. In one of them, we will create an MQTT Publisher client, and in the other, an MQTT Subscriber client.

Create a Module Instance Within N3uron's WebUI Interface for a Publisher

- Step 1: In the Navigation panel, select Config.
- Step 2: In the Explorer panel, select Modules.
- Step 3: Click on the Model menu and select New Module.
- Step 4: The instance can be given any name but for this example, we will use MqttClient.



Screenshot illustrating the process of creating a module instance for a publisher within N3uron's WebUI interface.

• **Step 5:** Provide a name for the module, in this case, MqttClient, and set the module type as Mqtt-Client. Leave the rest of the properties as their default values and click Save.



Screenshot showcasing the configuration of module properties for 'MqttClient' within N3uron's WebUI interface.

Configuring N3uron's MQTT Module within the WebUI's Explorer Panel for a Publisher

- Step 1: In the Explorer panel, select the MQTT instance you have just created.
- Step 2: Click on the Model menu bottom bar and select New Connection.
- Step 3: Provide a name for the new connection. In this example, AZURE_EG.
- Step 4: Configure the connection properties as follows:

Version: Microsoft Azure Event Grid (Preview) allows choosing between MQTT v3.1.1 and MQTT v5 on TCP port 8883. Choose MQTT 3.x.

- Destination Broker: Select Microsoft Azure.

- Username: Enter the Client Authentication Name configured for your publisher client. In this case, client-n3uron-pub.

- **Password:** Leave this field empty.
- Certificate: Select your X.509 certificate file. In this case, client-n3uron-pub.pem.
- Private key: Select your X.509 private key file. In this case, client-n3uron-pub.key.
- Protocol: Select MQTTS.

– Broker URL: Enter the Hostname of your Azure Event Grid MQTT broker. In this case, ns-n3uron. westeurope-1.ts.eventgrid.azure.net.

HTTP hostname : ns-n3uron.westeurope-1.eventgrid.azure.net MQTT hostname : ns-n3uron.westeurope-1.ts.eventgrid.azure.net Availability zones : Enabled MQTT : Enabled		N3uron ×
HTTP hostname : ns-n3uron.westeurope-1.eventgrid.azure.net MQTT hostname : ns-n3uron.westeurope-1.ts.eventgrid.azure.net Availability.zones : Enabled MQTT : Enabled		N3uron ×
HTTP hostname : ns-n3uron.westeurope-1.eventgrid.azure.net MQTT hostname : ns-n3uron.westeurope-1.ts.eventgrid.azure.net Availability zones : Enabled MQTT : Enabled		X JSON View
HTTP hostname : ns-n3uron.westeurope-1.eventgrid.azure.net MQIT hostname : ns-n3uron.westeurope-1.ts.eventgrid.azure.net Availability zones : Enabled MQIT : Enabled		JSON View
Chart type General O Errors O Latency	Timespan	See all metrics
Men 30 6 ÁM	12 PM	UTC-0100

Screenshot depicting the configuration of N3uron's MQTT Module for a publisher within the WebUI's Explorer Panel.

- Port: 8883.
- Client-ID: In this case, client-n3uron-pub.

Note:

If you choose to allow more than one client session per authentication name in your MQTT settings, you can utilize the same username and certificates with other clients as long as you don't exceed the client session quota per authentication name. Remember to adjust the Client-ID for the other clients, such as '**client-n3uron-pub-1**', and so forth.

• Leave the rest of the properties as their default values and click on Save.

			Nau	ro
			Nju	
			Configuration	
	Property	Value	Out	put
	▲ ZURE_EG	<₽ Connection>		
	Enable MQTT connection	Yes	✓ true	
	Version	MQTT 3.X	♥ 4	
	Destination broker	Microsoft Azure		
	 Authentication 			
	Authentication mode	Password - Certificate	 passwordCertificate 	
	Username	client-n3uron-pub	client-n3uron-pub	
	Password			
	Certificate	<embedded file=""></embedded>	<pre>*** <embedded file=""> [size: 980.00 Bytes]</embedded></pre>	
	Private key	<embedded file=""></embedded>	<pre> <embedded file=""> [size: 304.00 Bytes]</embedded></pre>	
	CA certificate	<no file="" selected=""></no>	<pre> <no file="" selected=""></no></pre>	
	Reject Unauthorized	Yes	true true	
	Connection options			
= Model	Protocol	MQTTS	mqtts	
A ZZ AZURE EG	Broker URL	ns-n3uron.westeurope-1.ts.eventg	id.azure.net ns-n3uron.westeurope-1.ts.eventgrid.azure.net	
D (1) Publisher	Port	8883	8883	
	Clean session	Yes	▼ true	
	-Client ID	client-n3uron-pub	client-n3uron-pub	
	Reconnect period	30000	30000	
	Keep-alive interval	60	60	
	Interval between messag	es 0	0	
	4 Last will and testament			
	Enable	No	✓ false	
	Topic			
	Pavload			
	- Ouglity of service	005 0	· 0	
	Retain flag	False	 false 	
	4 Agents			
	A (7) Publisher	< (T) Publisher>		
	Push interval	5000	5000	
	Mode	Events	v events	
	Topic	N3uron	Nauron	
	OoS	005 0	▼ 0	
	Retain flag	No	▼ faLse	
	Message ontions			
	b Store & Fooward	10		
	Message format			
	P Wessage format			

Screenshot displaying the configuration of MQTT settings within N3uron's WebUI Explorer Panel for a publisher.

Publishing Data via N3uron to Azure Event Grid

• Step 1: Within the Model panel, right-click on the AZURE_EG Connection you have just configured, select New Publisher, and give it a name. In this example, we will simply use Publisher.

• **Step 2:** Click on it and add a name in the **Topic** field. To publish an MQTT message to Azure Event Grid MQTT broker, you must use the same topic you have configured in your Event Grid Namespace's **Topic Space**. In this case, the topic is called N3uron.

- Step 3: In the message format settings, choose the following:
- Serialization: JSON.

– Data Structure: Compact. Doing this will help reduce the message size and, consequently, lower bandwidth usage. To <u>learn more</u> about this, please follow this link.

- Date format: In this case UNIX Epoch.
- Compression: None.
- Encoding: UTF-8.

• Step 4: Click on the Tag Filter button, select New Tag Filter, and change the default name. In this example, we have used TagFilter. Leave Mode, Path, and Regex pattern as their default values.

With this configuration, every tag configured in N3uron will be published to our Azure Event Grid MQTT broker.

			Ċ Ê D	+
			N3uro	on
			Configuration	
Templates	Property	Value		
	A D Publisher	< (Publisher>		
2	Push interval	5000	5000	
	Mode	Events	events ■	
	Topic	N3uron	N3uron	
	QoS	QoS 0	▼ 0	
	Retain flag	No	✓ false	
	▲ Message options			
	Max events per message	e 1000	1000	
	▲ Store & Forward	Û		
	Enable	Yes	true true	
	Path			
	Max. days in disk	15	15	
	Message format			
Model	Serialization	JSON		
AZURE EG	Data structure	Compact	compact	
Publisher	Date format	UNIX Epoch	🗢 epoch	
	Compression	None	none	
	Compression level	None	∞ 0	
	Encoding	UTF8	✓ utf8	
	▲ Tag Filters			
	▲ 🛇 TagFilter	< 🛇 TagFilter>		
	Mode	Include	<pre>include</pre>	
	Path	1	▶ /	
	Regex pattern	.*	.*	

Screenshot illustrating the process of publishing data from N3uron to Azure Event Grid.

• Step 5: In the Explorer panel, select Tags.

• Step 6: In the Model menu, right-click on the folder icon, select New Tag, and give it a name. In this example, we will use Process_Value.

• **Step 7:** Within the **Configuration** panel, set the following properties using the values shown below, leaving the rest of them as their default values:

- Type: Number.
- Simulation/Enabled: Yes.

			C	
				N3uror
				Configuration
Templates	Property	Value		
	▲ ♥ Process_Value	< 🛇 Tag>		
	Туре	Number	🗢 number	
	Format	Default	<pre><null></null></pre>	
	Deadband	0.0u	0.0u	
	-Client access	Read/Write	🗢 RW	
	Persistency mode	None	V 0	
	▲ Details			
	Description			
	Engineering unit	ts		
	Default value	<null></null>	<null></null>	
	▲ Simulation ♥			
	Enabled	Yes	🗢 true	
	Assigned views	***		
Model	▷ Scaling			
/	▲ Source			
D Process_Value	Enabled	No	🗢 false	
	Module type	None	♥	
	Module name	None	♥	
	▷ History			
	 Alarms & Events 			

Create a Module Instance within N3uron's WebUI Interface for a Subscriber

- Step 1: In the Navigation panel, select Config.
- Step 2: In the Explorer panel, select Modules.
- Step 3: Click on the Model menu and select New Module.
- Step 4: The instance can be given any name but for this example, we will use MqttClient.



Screenshot depicting the process of creating a module instance for a subscriber within N3uron's WebUI interface.

• **Step 5:** Provide a name for the module, in this case MqttClient, set the module type, in this case MqttClient. Leave the rest of the properties as their default values and click **Save**.



Screenshot showcasing the configuration of the 'MqttClient' module for a subscriber within N3uron's WebUI interface.

Configuring N3uron's MQTT Module within the WebUI's Explorer Panel for a Subscriber

- Step 1: In the Explorer panel, select the MQTT instance you have just created.
- Step 2: Click on the Model menu bottom bar and select New Connection.
- Step 3: Give the new connection a name. In this example, it has been named AZURE_EG.
- Step 4: Configure the connection properties:

– Version: Microsoft Azure Event Grid (Preview) allows to use between MQTT v3.1.1 and MQTT v5 on TCP port 8883. In this case, MQTT 3.x.

- Destination Broker: Microsoft Azure Event Grid (Preview) allows to use between Microsoft Azure re or Custom. In this case, Microsoft Azure.

– Username: Here write **Client Authentication Name** you configured as your subscriber client. In this case, **client-n3uron-sub**.

- Password: Leave the password empty.
- Certificate: Select your X.509 certificate file. In this case, client-n3uron-sub.pem.
- Private key: Select your X.509 private key file. In this case, client-n3uron-sub.key.
- Protocol: Select MQTTS.

– Broker URL: Enter the Hostname of your Azure Event Grid MQTT broker. In this case, ns-n3uron. westeurope-1.ts.eventgrid.azure.net.

		Ċ	1 O	+
			N3	uron
				×
Q	HTTP hostname : ns-n3uron.westeurope-1.eventgrid.azure.net MQIT hostname : ns-n3uron.westeurope-1.ts.eventgrid.azure.net Availability zones : Enabled MQTT : Enabled			JSON View
Chart type General ()	Errors 🔿 Latency		Timespan I day	See all metrics
Mon 30	6 ÁM.		12 PM	UTC+01:00

Screenshot illustrating the configuration of N3uron's MQTT Module for a subscriber within the WebUI's Explorer Panel.

- Port: 8883.
- Client-ID: In this case, client-n3uron-sub.

Note:

If you choose to allow more than one client session per authentication name in your MQTT settings, you can utilize the same username and certificates with other clients as long as you don't exceed the client session quota per authentication name. Remember to adjust the Client-ID for the other clients, such as '**client-n3uron-sub-1**', and so forth.

• Leave the rest of the properties as their default values and click on Save.

			5	1 0 +
				Nauron
			Configuration	
Templates	Property	Value		Output
	▲ ZURE EG	<₽ Connection>		
	Enable MOTT connection	Yes	true true	
	Version	MOTT 3.X	▽ 4	
	Destination broker	Microsoft Azure		
	4 Authentication			
	Authentication mode	Password - Certificate	passwordCertificate	
	Username	client-n3uron-sub	client-n3uron-sub	
	Password			
	Certificate	<embedded file=""></embedded>	··· <embedded file=""> [size: 980.00 Byte</embedded>	5]
	Private key	<embedded file=""></embedded>	··· <embedded file=""> [size: 304.00 Byte</embedded>	5]
	CA certificate	<no file="" selected=""></no>	<no file="" selected=""></no>	
	Reject Unauthorized	Yes	▼ true	
	Connection options			
Model	Protocol	MQTTS	mqtts	
URE EG	Broker URL	ns-n3uron.westeurope-1.ts.eventgri	d.azure.net ns-n3uron.westeurope-1.ts.eventgri	d.azure.net
ubscriber	Port	8883	8883	
	Clean session	Yes	▼ true	
	Client ID	client-n3uron-sub	client-n3uron-sub	
	Reconnect period	30000	30000	
	Keep-alive interval	60	60	
	Interval between messages	0	0	
	Last will and testament			
	Enable	No		
	Topic			
	Payload			
	-Quality of service	QoS 0	~ 0	
	Retain flag	False	false	
	Agents			
	4 🕢 Subscriber	< Subscriber>		
	Topic	N3uron	N3uron	
	QoS	QoS 0	▽ 0	
	⊳ Keep-alive			
	▷ Message format			
	▷ Data parser			

Screenshot displaying the extension of configuring N3uron's MQTT Module for a subscriber within the WebUI's Explorer Panel.

Subscribing to Data from Azure Event Grid via N3uron

• Step 1: Within the Model panel, right-click on the AZURE_EG Connection you have just configured, select New Subscriber, and give it a name. In this example, we will simply use Subscriber.

• **Step 2:** Click on the newly created subscriber and specify a name in the **Topic** field. To publish an MQTT message to Azure Event Grid MQTT broker, you must use the same topic you have configured in your Event Grid Namespace's **Topic Space.** In this case, the topic is called N3uron.

- Step 3: In the message format settings, choose the following;
- Encoding: UTF-8.
- Compression: None.
- Deserialization: JSON.
- Step 4: Leave the remaining of the settings as default.

				C	
					Nauron
					i i julioni
					Configuration
8	Templates	Property	Value		
		Subscriber	< Subscriber>		
		Topic	N3uron	N3uron	
		QoS	Qos 0	0	
		A Keep-alive	No	a falsa	
		Timoout	60000	50000	
		A Message format	00000	00000	
		Encoding	UTE8	↓ utf8	
		Compression	None	none	
		Deserialization	JSON		
		▲ Data parser	j		
		Туре	MqttClient JSON	mqttJson	
	Model				
i ≓ Až	ZURE_EG				
Ð	Subscriber				
		11			

Screenshot depicting the process of subscribing to data from Azure Event Grid via N3uron.

• Step 5: In the Explorer panel, select Tags.

• Step 6: In the Model menu, right-click on the folder icon, select New Tag, and give it a name. In this example, we will use Subscribed_Value.

• **Step 7:** Within the **Configuration** panel, set the following properties using the values shown below, leaving the rest of them as their default values:

Type: Number.
Source:
Enable: Yes.
Module type: MqttClient.
Module name: MqttClient.
Config:
Subscriber: AZURE_EG/Subscriber.
Tag Address: /Process_Value.

N3uron www.n3uron.com How to Connect your Industrial Assets to Microsoft Azure Event Grid using N3uron's MQTT... Page 35

				Nauror
				Configuration
Templates	Property	Value		
Model	 Subscribed_Value Type Format Deadband Client access Persistency mode Details Simulation Assigned views Scaling Source Enabled Module type Module name Config 	e <© Tag> Number Default 0.0u Read Only None Yes MqttClient MqttClient	number Knull> 3.0u 3 3 5 true true true lqttClient	
/ > Subscribed_Value	Subscriber Tag address	AZURE_EG/Subscriber /Process_Value	AZURE_EG/Subscribe /Process_Value	r
	Alarms & Events	**		

Subscribing to Data from Azure Event Grid via your MQTT Client App

• Step 1: Open your favourite MQTT client app (in this case we will use <u>MQTT Explorer</u>) and configure your subscription as follow:

- Name: In this case Azure-EG-App.
- Validate certificate: Enable it.
- Encryption(tls): Enable it.
- Protocol: mqtt://.

- Host: Enter the Hostname of your Azure Event Grid MQTT broker. In this case, ns-n3uron.westeurope-1.ts.eventgrid.azure.net.

- Port: 8883.

- Username: Here write the Client Authentication Name you configured as your subscriber client. In this case, client-app.

- Click on **ADVANCED** button.
- Topic: +Add N3uron as topic.
- QoS: 0.

– MQTT Client ID: In this case client-app. If you are using multiple clients with the same Client Authentication Name, please make sure to change the Client ID accordingly. For example, you can use 'client-app-1,' 'client-app-2,' and so on.

- Click on **CERTIFICATES** button.
- Client Certificate: Choose your .pem file. In this case client-app.pem.
- Client Key: Choose your .key file. In this case client-app.key.
- Save your configuration.

• Step 2: Connect your favourite MQTT app or in this case **MQTT Explorer** to Azure **Event Grid Broker**, and you should receive messages from the topic you are subscribed to..

vigation	2 Tag groups								Tag list		-
Data	/	Q. Regex filter	A Proof filter Sublevils O Hag								
Real Time		Name 1	Value	Units Quality	link	Timestamp	Type	Access		Description	
🗠 Historical		Process_Value	80903	Good	C Local	2023/10/29 22:28:23:003	number	RW			
🗘 Alarms											
'은 Real Time											
Historical											
System											
🛃 Diagnostics 🚍											
Config											
Licensing											
S User											
&* Logout											
									G		

Screenshot illustrating the process of subscribing to data from Azure Event Grid via an MQTT Client App.

Conclusion on How to Exchange Data with Azure Event Grid Using N3uron's MQTT Client Module

This article has demonstrated how straightforward it is to seamlessly integrate your industrial assets without compromising security, constructing robust data pipelines and engineered event-driven architectures by combining N3uron MQTT Client module and Azure Event Grid. The next step will be to harness the full potential of N3uron's capabilities and the Azure cloud computing infrastructure within your application.

For further information, please visit our knowledge base.

Discover for yourself why N3uron is one of the most versatile Industrial IoT platforms. With unlimited tags, connections, clients, and more, you can connect to virtually everything using OPC UA, DA, MQTT, Sparkplug, Modbus, DNP and many more. Download our free <u>trial</u> today!