

Enabling Configurable Data Transmission With Moxa IIoT Gateways

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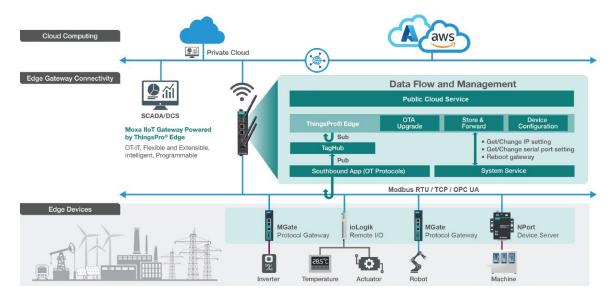
1 Overview

With industrial IoT (IIoT) applications all the rage, the gateways that sit between the "things" and the Internet have become extremely important. A gateway acquires data from sensors and actuators in the field, and then transfers the data to the cloud, enabling smooth data flow from field to cloud. To ensure the stability of the data flow, all aspects of the system, including data acquisition, message payloads, and publishing messages at requested intervals for cloud applications, must be properly configured. Although many systems use a "fixed configuration" for data transmission, this option lacks flexibility and the capability to efficiently adapt to a variety of IIoT applications. This is particularly true for complex OT-IT protocol conversions, in which data exchange and data processing must be completed before data is sent to the cloud.

That's where ThingsPro Edge comes in. ThingsPro Edge supports configurable data transmission, using **message groups** and **custom payload**, to make it easier for users to overcome any issues that arise with respect to data exchange and the adaptation of the payload format for cloud applications.

2 Moxa IIoT Gateway Software—ThingsPro Edge

ThingsPro Edge software is an application that runs on Moxa's IIoT gateways to help you transform your edge computer into a secure and reliable IIoT gateway best suited for your business needs. To make configurable data transmission a reality, ThingsPro Edge uses the TagHub data repository to store all acquired data. ThingsPro Edge supports a variety of methods for retrieving data from the TagHub repository, making it easy for you to customize your device-to-cloud message payload



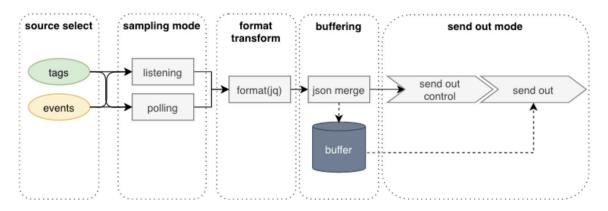
Things Pro Edge in IIoT Applications

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3 Configurable Data Transmission

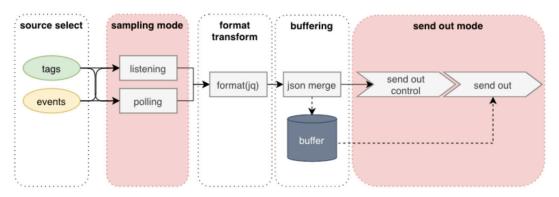
ThingsPro Edge uses a five-stage configuration strategy that allows users to efficiently adapt the configuration to a variety of IIoT applications. The five stages are referred to as **source select, sampling mode, format transform, buffering**, and **send out mode**. ThingsPro Edge also provides two outstanding features, **Message Groups** and **Custom Payload**, discussed in detail below.



Data Transmission with ThingsPro Edge

3.1 Message Groups

The ability to specify which tags and events should be included in a telemetry message (source select), using the tags to specify conditions for acquiring data (sampling mode), and sending out the messages based on a given time interval or size (send out mode), allow users to categorize messages into well-defined **Message Groups**.



For source selection, system status and events of the gateway are selectable via a dropdown list, and users can also add the telemetry message.

Basic Settings	2 Message Tags	3 Properties Optional
Select Tags	Default Payload	Enable Custom Payload
Info: Select one or more tag provider and select tags to map data.	null	
Providers		
events, system	Tags	
Search		
SELECT ALL CL	EAR	
> 🗌 [system] status	0	
> 🗌 [system] network		
> 🗌 [system] storage		

Sampling mode has four options. In each case, all or some of the data is buffered when it is received, and then only data that is buffered is published after an entire message group has been received.

No.	Mode	Description	
1	All Values	All of the data is buffered and then published.	
2	Latest Values	Only data received in the last sampling period is buffered and	
		then published.	
3	All Changed Values	All data values that have changed compared with the latest	
		values are buffered and then published.	
4	Latest Changed Values	Only data that is received in the last sampling period and that	
		has changed compared with the latest values is buffered and	
		then published.	

Moxa Tech Note

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reate New Telemetry Message				
2 Transmission Setting	3 Confirm			
All Values				
Latest Values				
All Changed Values				
Latest Changed Values				
	CANCEL NEXT >			
	All Values Latest Values All Changed Values			

The "send out mode" is used to define how a message group is formed. The three options for "send out mode" are **interval** (time), **size**, and **immediately**. Enable **Custom sampling rate from acquired data** to specify the sampling frequency.

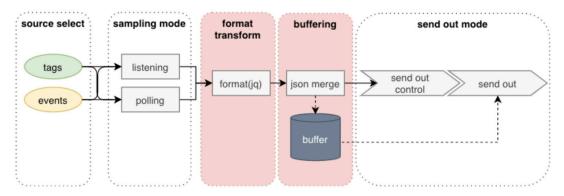
Publish Mode By Interval Immediately By Size	Publish Mode O By Interval O Immediately By Size	Publish Mode O By Interval By Size
Publish Interval (sec) 60 Sampling Mode All Changed Values Custom sampling rate from acquired data	Publish Size (bytes) 4096 Sampling Mode All Changed Values Custom sampling rate from acquired data Idle Timer (sec) ③ Enable idle timer 60	Sampling Mode Image: Sampling Mode Image: Sampling Mode Image: Minimal Publish Interval (sec) (a) Image: Sampling Mode Image: Sampling Mode

In addition to message groups, ThingsPro Edge allows users to create messages for specific purposes. For example, a device's status could be monitored frequently within a short time period, whereas environmental data (temperature, for example) could be sampled over a longer time period.

Service Name			Status		
Azure IoT Device			O Disconnect		
Telemetry Message	Store and Forward	Device Manage	ment		
					+ MESSAGE
Output Topic	Status	Polling Interval (sec)		Send Threshold	
Modbus_Meter	Enable	10		4096 bytes or 20 seconds	:
/device1	Enable	60		4096 bytes or 60 seconds	:

3.2 Custom Payload

Once the tags and events are selected, ThingsPro Edge supports using a jq filter¹ to transform the default payload to your desired payload schema. This operation is called **Custom Payload**. ThingsPro Edge can also merge the tags, using the transformed payload, into buffered messages. This action is called a **JSON merge**.



ThingsPro Edge offers a web GUI to apply a jq filter, making it possible to transform the default payload and display the output. After the tags or events are selected, a default

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¹ *jq filter is a lightweight and flexible command-line JSON processor.* <u>*Click here for detailed information.*</u>



Basic Settings		2 Message Tag
elect Tags	Default Payload	Enable custom payloa
Info: Select ane or more tag providers to get their tags, and select tags to map data. voides system	_ "cpuUsage": { ⇒ "values": [{	

payload will be shown in the area on the right side of the GUI.

Select the **Enable custom payload** checkbox to display a text field for entering the jq filter. You can enter **[.]** to display the output within an array, as shown below.

eate New Telemetry Message		2 Message Tag
Select Tags	jq Filter How to apply jq filter⊠	
Info: Select one or more tag providers to get their tags, and select tags to map data.	[.]	TEST
Providers system • • Selected Tags 35 Tag cpuUsage (+1 other) •	Custom Payload Result [[[[[dataType": "uint64", "dataValue": 11, "provName": "system", "srcName": "system", "tagName": "publage", "ts": 158165960300000], [[dataType": "uint64".]	🔽 Enable custom payloa
< BACK		CANCEL SUBMIT

ThingsPro Edge provides several keys that can be used to customize your format.

No.	Кеу	Description	
1	prvdName	Provider name of tag	
2	srcName	Source name of tag	
3	tagName	Tag name	
4	dataValue	Tag value	
5	ts	Time stamp when the tag value is collected	
6	dataType	Data type of tag value. (e.g.: int64)	

For example, suppose the tag contains the following keys and values:

```
{
  "dataType": "int32",
  "dataValue": 11,
  "prvdName": "modbus_tcp_master",
  "srcName": "A1",
  "tagName": "status",
  "ts": 1581659603000000
}
```

Suppose we are using the following jq filter:



The transformed result will look like this:

```
{
   "device": "A1",
   "tag": [
        {
            "name": "status",
            "value": 11
        }
    ],
   "timestamp": "2020-11-10T03:58:16Z"
}
```

For **JSON merge**, one of two modes can be used to merge tags into buffered messages.

• Object Override

This mode is used to only record the last value. The payload is formatted by the following jq filter:

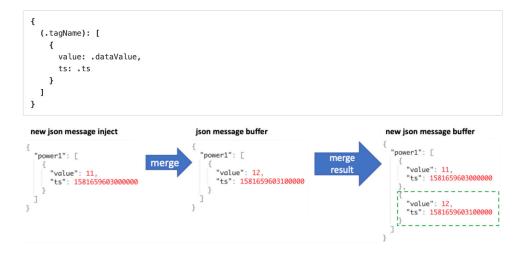


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• Array Append

This mode creates an array of tag data, with the latest data appended to data that was already received.

The payload is formatted by the following jq filter:



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