

Publishing using the MQTT Transmission UNS Transmitter

Overview

The MQTT Transmission UNS Transmitter is an agent that monitors tags and publishes them as MQTT Messages with a JSON payload to an MQTT Server.

It is ideal for lightweight IT deployments where minimal data points are required by Enterprise consuming clients and is generally used on the IT side of an OT/IT infrastructure.

- The UNS Transmitter creates an MQTT Client(s)
- After connection to the MQTT server, data can only be published from the MQTT Client to the MQTT Server
 - The UNS Transmitter MQTT Client has no subscriptions and so will not receive commands from Enterprise consuming clients
- Uses LWT to maintain system state awareness
 - Publishes a [properties message](#) for each tag on a client connection
- Data can be published as QoS0, QoS1 or QoS2
- Is limited to publishing a single [data message](#) for each tag change event
 - The published messages can be consumed by any MQTT Client
 - The topic is the identified Ignition tag path
 - The payload contains only the tag name, dataType, value, timestamp and quality formatted as JSON
- Publishes the leaf tags of Ignition UDTs (a.k.a. Sparkplug Templates) and the structure of the UDT (i.e. UDT name itself and folders in the UDT) become topic tokens

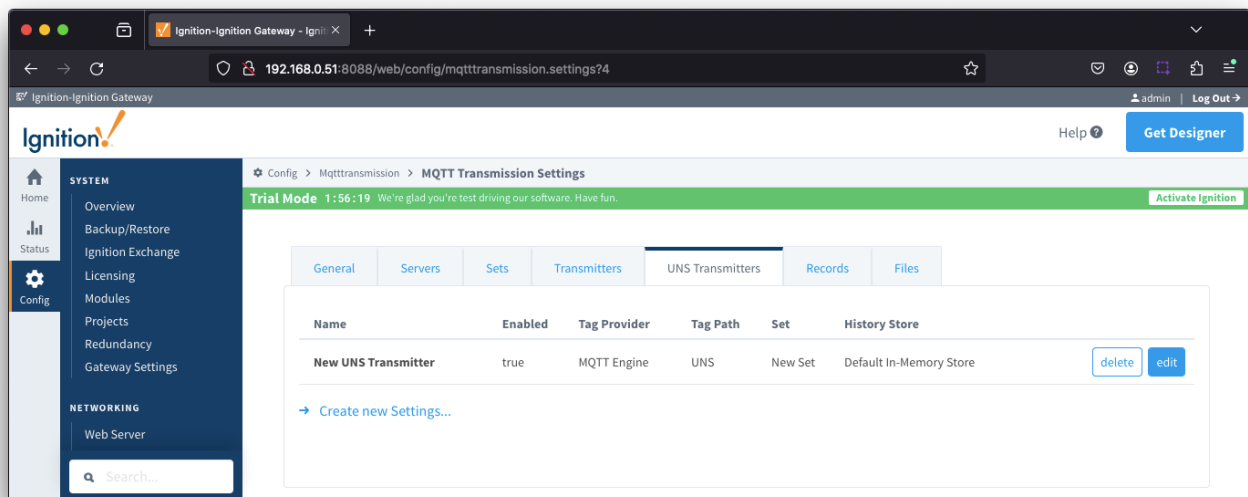


The 'topic per datapoint' strategy is very expensive from a resource perspective on both the MQTT clients as well as the MQTT Server.

Review [Which MQTT Transmission Transmitter should I use](#) to make sure you are using the appropriate MQTT Transmission Transmitter for your application.

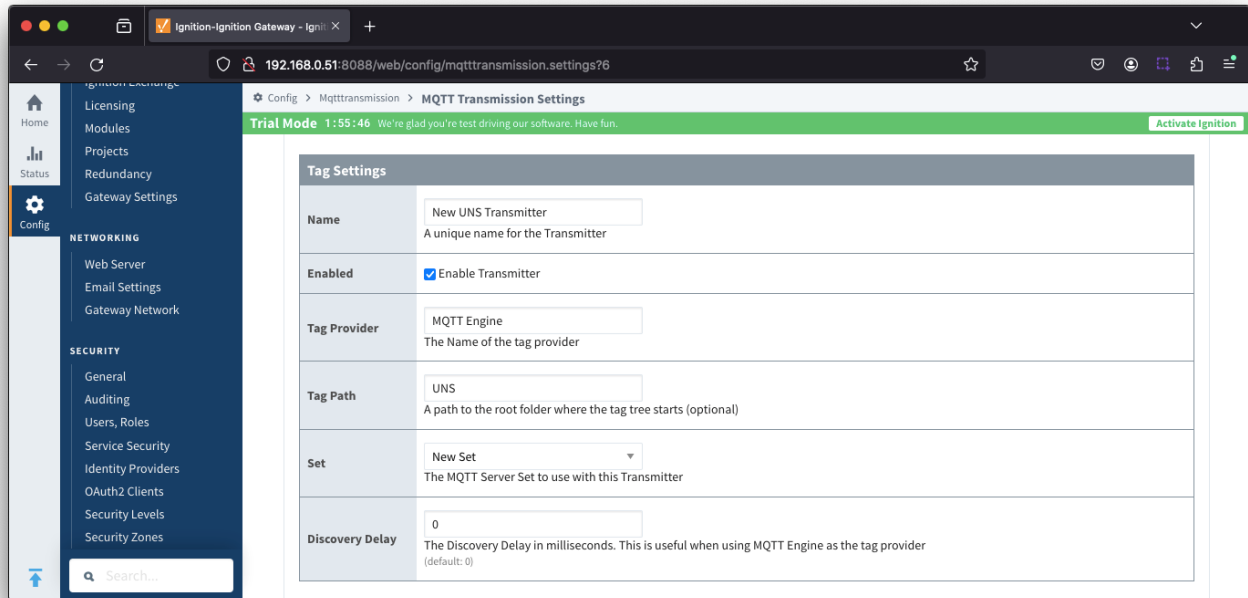
Configuration

Configuration is set under the MQTT Transmission > UNS Transmitter tab



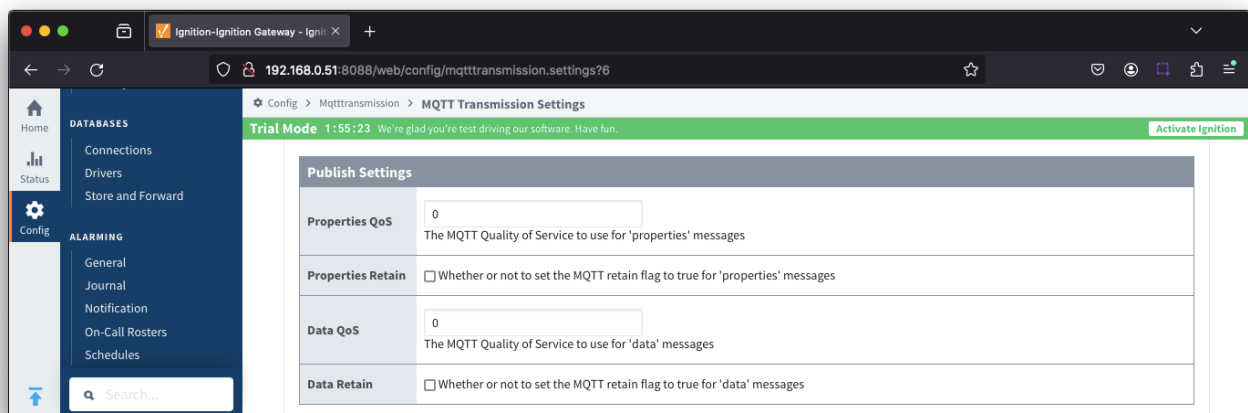
The configuration sections available are [Tag Settings](#), [Publish Settings](#), [History Settings](#) and [Advanced Settings](#).

UNS Transmitters - Tag Settings



- **Name**
 - Unique name for the UNS Transmitter
- **Enabled**
 - Checkbox to enable/disable the UNS Transmitter. Selected by default.
- **Tag Provider**
 - The name of the tag provider that Transmission will monitor.
- **Tag Path**
 - Optional path to the root folder where the tag tree starts.
 - Transmitters also support a multi-tag path configuration. Reference the [Transmitters with Multi-Tag Paths](#) tutorial for configuration assistance.
- **Set**
 - The Set that the UNS Transmitter client will connect to.
- **Discovery Delay**
 - An optional startup delay, in milliseconds, to wait before scanning for Tags to monitor. This is useful when Tags are dynamically created on initial startup, as is the case when using the MQTT Engine module.

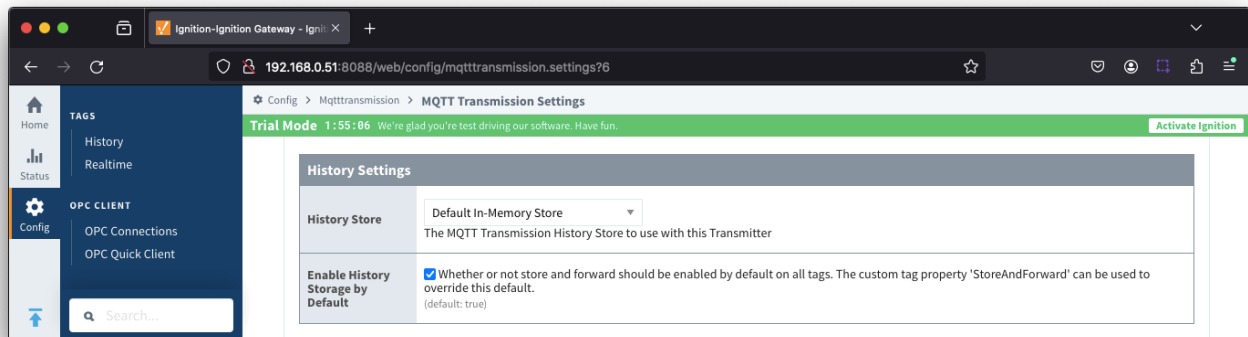
UNS Transmitters - Publish Settings



- **Properties QoS**
 - The MQTT Quality of Service to use for 'properties' messages
- **Properties Retain**

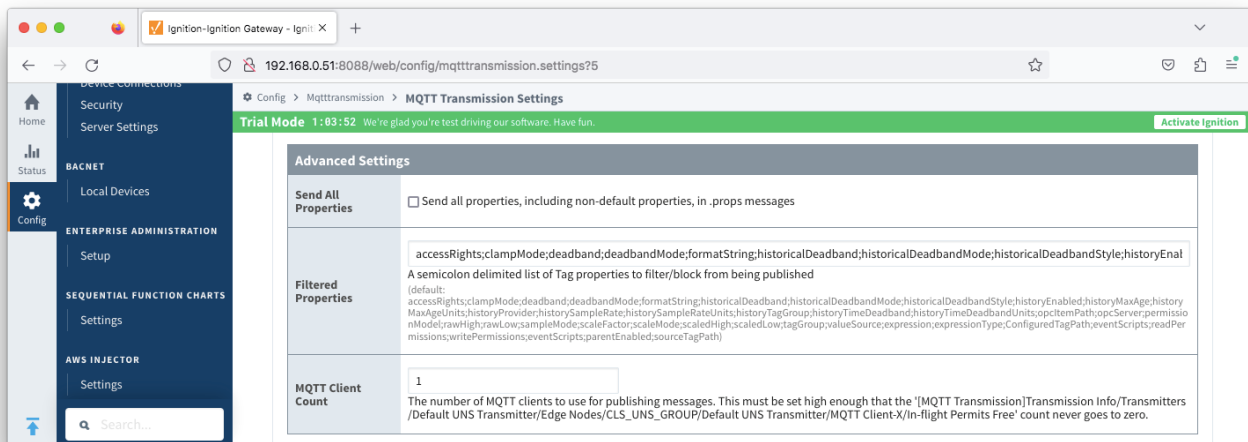
- Whether or not to set the MQTT retain flag to true for 'properties' messages
- **Data QoS**
 - The MQTT Quality of Service to use for 'data' messages
- **Data Retain**
 - Whether or not to set the MQTT retain flag to true for 'data' messages

UNS Transmitters - History Settings



- **History Store**
 - The MQTT Transmission History Store to use with the UNS Transmitter.
- **Enable History Storage by Default**
 - Checkbox to enable/disable store and forward for all tags. Selected by default.
 - Store and forward controls whether or not a tag is stored in the configured History Store when Transmission is offline. To override the global setting, individual tags will require a [custom tag property](#) 'StoreAndForward' (type: boolean) to be created and set to the reverse state of the global setting.

UNS Transmitters - Advanced Settings



- **Send All Properties**
 - Send all properties, including default properties, in .props messages
- **Filtered Properties**
 - A semicolon delimited list of Tag properties to filter/block from being published
 - By default the filtered properties list contains:

```
accessRights;clampMode;deadband;deadbandMode;formatString;historicalDeadband;
historicalDeadbandMode;historicalDeadbandStyle;historyEnabled;historyMaxAge;historyMaxAgeUnits;
historyProvider;historySampleRate;historySampleRateUnits;historyTagGroup;historyTimeDeadband;
historyTimeDeadbandUnits;opcItemPath;opcServer;permissionModel;rawHigh;rawLow;sampleMode;
scaleFactor;scaleMode;scaledHigh;scaledLow;tagGroup;valueSource;expression;expressionType;
ConfiguredTagPath;eventScripts;readPermissions;writePermissions;eventScripts;parentEnabled;
sourceTagPath
```

- Tag properties are only published if different from the default Ignition tag property settings.
- **MQTT Client Count - added in 4.0.31**
 - The number of MQTT clients to use for publishing messages. This must be set high enough that the '[MQTT Transmission] Transmission Info/Transmitters/Default UNS Transmitter/Edge Nodes/CLS_UNG_GROUP/Default UNS Transmitter/MQTT Client-X /In-flight Permits Free' count never goes to zero.

How it Works

For each tag, identified under the configured Tag Path, the UNS Transmitter will publish two MQTT messages:

- A data message published for each tag when QualifiedValue of the tag changes
- A properties message published for each tag on every client connection.

The UNS Transmitter will use the namespace unsAv1.0 and will prefix this to all publishes from the MQTT Transmission UNS Transmitter



The UNS namespace may be disabled [via script](#) using the "UseTopicPrefixToken" parameter

UNS Message Formats

UNS Data Message

A single MQTT message is published for each tag when the QualifiedValue of the tag changes

- Topic
 - Ignition tag path starting at the Tag Path defined in the UNS transmitter
 - unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Cooler/Fan Speed
- Payload
 - JSON formatted payload containing tag name, dataType, value, timestamp and qualityCode
 - {"name":"Enterprise/Site 1/Area 1/BMS/Rooftop/Cooler/Fan Speed","dataType":"Int32","value":120,"timestamp":1727215043878,"qualityCode":192}

Ignition Tag Data Type	dataType in message
Byte	Int8
Short	Int16
Integer	Int32
Long	Int64
Float	Float
Double	Double
Boolean	Boolean
String	String
DateTime	DateTime
Byte Array	Int8Array
Short Array	Int16Array
Integer Array	Int32Array
Long Arrau	Int64Array
Float Array	FloatArray

Double Array	DoubleArray
Boolean Array	BooleanArray
String Array	StringArray
DateTime Array	DateTimeArray
Binary Data	Int8Array
Dataset	DataSet
Document	String

UNS Properties Message



A single MQTT message, containing the tag properties, is published for each tag on every client connection.



Tag properties are only included if different from the default Ignition tag property settings unless configuration property [Send All Properties](#) is True

- Topic
 - Ignition tag path starting at the Tag Path defined in the transmitter extended by .props
 - unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Cooler/Fan Speed.props
- Payload
 - JSON formatted payload containing non default or custom property values
 - {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 A"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}

Examples

Using the UNS Transmitter to publish from MQTT Engine

Let's take a look at an example of how a UNS Transmitter can be used to publish data in a UNS format at MQTT Engine.

In [Creating a UNS Namespace at MQTT Engine](#) we created a UNS namespace at Engine as shown below:

MQTT Engine UNS tag tree

MQTT Engine UNS tag tree Site 1 Area 1 expanded

Tag Browser		
MQTT Engine		
Tags	UDT Definitions	
Tag	Value	Data Type
Edge Nodes		
Engine Control		
Engine Info		
Message Diagnostics		
UNS		
Enterprise		
Site 1		
Area 1		
BMS		
Rooftop		Chiller
Line 1		
Conveyer		Conveyer
Hauloff		Hauloff
Line 2		
CNC		CNC Machine
Conveyer		Conveyer
Lathe		Lathe Machine
Line 3		
Paint Booth		Paint Booth
Area 2		
BMS		
Rooftop		Chiller
Line 1		
Waveform Machine		WaveMachin...
Line 2		
Bunker01		Bunker
DO1_EMU		EMU_V3
Dryer01		Dryer
EO7_EMU		EMU_V3
Extruder07		Extruder
Factory Energy		
Factory 1 Service Meter		KYZ_V3
Site 2		

Tag Browser		
MQTT Engine		
Tags	UDT Definitions	
Tag	Value	Data Type
Edge Nodes		
Engine Control		
Engine Info		
Message Diagnostics		
UNS		
Enterprise		
Site 1		
Area 1		
BMS		
Rooftop		Chiller
Parameters		Docu...
Compressor		Comp...
Parameters		Docu...
Brine Freeze Setpoint	26.5	Float
Control Box Heater	☐	Boole...
Demand Limit Minimum	0	Float
Oil Delta Recovery Speed	53	Integer
Cooler		Cooler
Line 1		
Line 2		
Line 3		
Paint Booth		Paint ...
Area 2		
Factory Energy		
Site 2		

If we set the configuration parameters for the UNS Transmitter such that the Tag Provider is "MQTT Engine" and the Tag Path is = "UNS", a single message will be published each time the Qualified Value changes for a tag below "UNS":

Message examples are:

- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Brine Freeze Setpoint
 - {"name":"Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Brine Freeze Setpoint","dataType":"Float","value":26.5,"timestamp":1727215043878,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Control Box Heater
 - {"name":"Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Control Box Heater","dataType":"Boolean","value":false,"timestamp":1727215043666,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Demand Limit Minimum
 - {"name":"Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Demand Limit Minimum","dataType":"Float","value":0,"timestamp":1727215035612,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Oil Delta Recovery Speed
 - {"name":"Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Oil Delta Recovery Speed","dataType":"Int32","value":53,"timestamp":1727215022878,"qualityCode":192}

On a connect by the UNS Transmitter to the MQTT server, a single properties message will be published for each a tag below "UNS".

Message examples are:

- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Brine Freeze Setpoint.props
 - {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 A"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}
- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Control Box Heater.props
 - {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 A"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}
- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Demand Limit Minimum.props

- {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 A"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}
- unsAv1.0/Enterprise/Site 1/Area 1/BMS/Rooftop/Compressor/Oil Delta Recovery Speed.props
 - {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 A"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}
- unsAv1.0/Enterprise/Site 1/Factory Energy/Factory 1 Service Meter/KYZData/KW.props
 - {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 B"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}
- unsAv1.0/Enterprise/Site 1/Factory Energy/Factory 1 Service Meter/KYZData/KW.props
 - {"SparkplugEdgeNodeId":{"type":"String","value":"Site 1 B"},"SparkplugGroupId":{"type":"String","value":"Enterprise"},"enabled":{"type":"Boolean","value":true},"SparkplugDeviceId":{"type":"String","value":"UNS"}}



The custom tag properties of SparkplugDeviceId, SparkplugEdgeNodeId and SparkplugGroupId were created when enabling UNS at MQTT Engine

Using the UNS Transmitter to publish from the Edge

Let's take a second example of publishing directly from the Edge tags using the Edge tags at Site 1 A from [Creating a UNS Namespace at MQTT Engine](#)

Tag Browser		
Site 1 A		
Tags		UDT Definitions
Tag	Value	Data Type
Enterprise		
Site 1		
Area 1		
BMS		
Rooftop		Chiller
Line 1		
Conveyor		Conveyer
Parameters		Document
Motor AMPS	24.66	Float
Motor RPM	550	Double
String Tag	value	String
Temperature	24.5	Float
Vibration	80.1	Float
Hauloff		Hauloff
Line 2		
CNC		CNC Machine
Conveyor		Conveyer
Lathe		Lathe Machine
Line 3		

If we set the configuration parameters for the UNS Transmitter such that the Tag Provider is "Site 1 A" and the Tag Path is = "", a single message will be published each time the Qualified Value changes for a tag:

Message examples are:

- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Motor AMPS
 - {"name":"Enterprise/Site 1/Area 1/Line 1/Conveyor/Motor AMPS","dataType":"Float","value":24.66,"timestamp":1727215043878,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Motor RPM
 - {"name":"Enterprise/Site 1/Area 1/Line 1/Conveyor/Motor RPM","dataType":"Float","value":550,"timestamp":1727215042222,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/String Tag
 - {"name":"Enterprise/Site 1/Area 1/Line 1/Conveyor/String Tag","dataType":"String","value":"value","timestamp":1727215043156,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Temperature
 - {"name":"Enterprise/Site 1/Area 1/Line 1/Conveyor/Temperature","dataType":"Float","value":24.5,"timestamp":1727215010567,"qualityCode":192}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Vibration

```
◦ {"name":"Enterprise/Site 1/Area 1/Line 1/Conveyor/Vibration","dataType":"Float","value":80.1,"timestamp":172721508741023,"qualityCode":192}
```

On a connect by the UNS Transmitter to the MQTT server, a single properties message will be published for each a tag

Message examples are:

- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Motor AMPS.props
 - {"enabled":{"type":"Boolean","value":true}}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Motor RPM.props
 - {"enabled":{"type":"Boolean","value":true}}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/String Tag.props
 - {"enabled":{"type":"Boolean","value":true}}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Temperature.props
 - {"enabled":{"type":"Boolean","value":true}}
- unsAv1.0/Enterprise/Site 1/Area 1/Line 1/Conveyor/Vibration.props
 - {"enabled":{"type":"Boolean","value":true}}

Extending the MQTT Client count when using the UNS Transmitter

The UNS Transmitter will publish a single [data message](#) for each tag change event.

Depending on the tag count, frequency of tag data changes and the QOS (Quality of Service) used, the number of in-flight messages for any individual MQTT client can become unsupportable leading to lost data.

To mitigate this, the UNS Transmitter configuration allows for additional MQTT Clients to be associated with a single UNS Transmitter with an "MQTT Client Count" property is available under the "Advanced Settings" in the configuration.

For each MQTT Client there is an In-flight Permits Free tag available under the MQTT Transmission > Transmission Info tag path. The MQTT Client Count should be set high enough such that the In-Flight Permits Free information tag for each MQTT Client never goes to zero.

In the image below, the New UNS Transmitter has been configured with an MQTT Client Count of 5 which are assigned as MQTT Client-0 through MQTT Client-4.

Tag Browser		
MQTT Transmission		
Tags	UDT Definitions	
Tag	Value	Data Type
Transmission Control		
Transmission Info		
History Store		
Transmitters		
New UNS Transmitter		
Edge Nodes		
CLS_UNG_GROUP		
New UNS Transmitter		
MQTT Client-0		
In-flight Permits Free	32,768	Integer
MQTT Client ID	MT-a35cc25f-66...	String
Offline DateTime	2025-10-03 12:3...	DateTime
Online	☒	Boolean
Online DateTime	2025-10-03 12:5...	DateTime
Target Server URL	tcp://localhost:18...	String
MQTT Client-1		
MQTT Client-2		
MQTT Client-3		
MQTT Client-4		
Largest Mesg Xmit	2,132	Long
Largest Mesg Xmit Timestamp	2025-10-03 12:5...	DateTime