

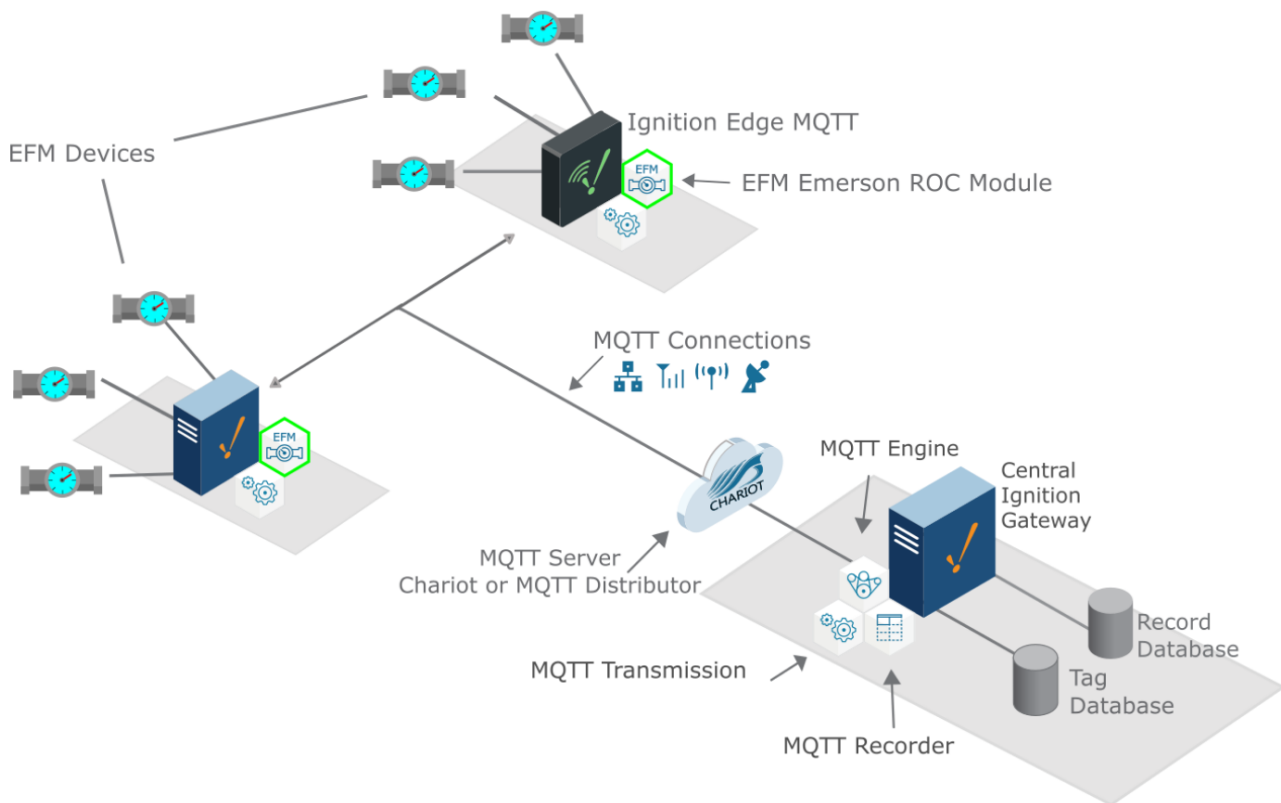
# Sending ROC History to a Central Ignition Gateway

## Prerequisites

- [Installing Ignition](#)
- [Installing the following MQTT Modules](#) on two Ignition systems
  - Ignition System 1 (Central Ignition Gateway)
    - MQTT Distributor
    - MQTT Engine
    - MQTT Recorder
  - Ignition System 2 (Remote/Edge Ignition Gateway)
    - MQTT Transmission
    - EFM Emerson ROC driver module

## Overview

The EFM Emerson ROC module is capable of polling history data from a ROC device based on a specified polling rate. With MQTT Transmission, this history data can be published as Sparkplug records to an MQTT server. Any client subscribed on Sparkplug RECORD messages can receive these objects. In addition, MQTT Engine when combined with MQTT Recorder can also receive these messages and store these objects in a configured Ignition gateway database. The following drawing shows the general architecture used to do this. This tutorial outlines the process of getting history to the central Ignition gateway.



## Sending ROC History to a Central Ignition Gateway

We must configure a total of five Cirrus Link modules on two different Ignition gateways to get history data flowing from an Emerson ROC device to a central database. These are:

- Central Ignition Gateway
  - MQTT Distributor
  - MQTT Engine
  - MQTT Recorder
- Remote/Edge Ignition Gateway
  - MQTT Transmission
  - EFM Emerson ROC

The configuration of each of these modules is covered below based on the Ignition gateway they're installed on.

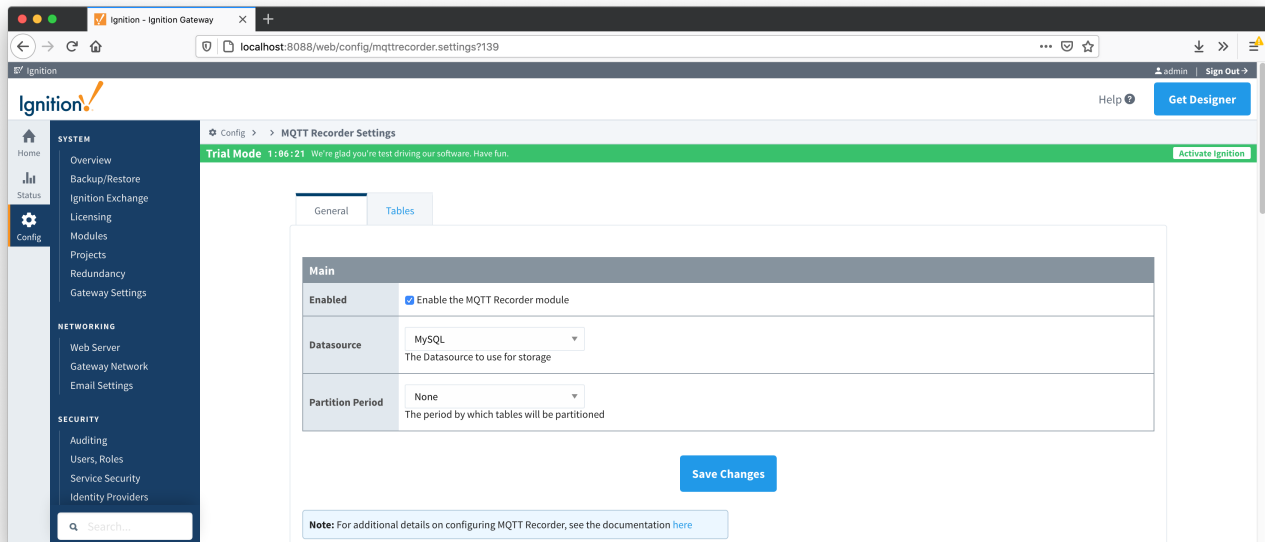
## Central Ignition Gateway Setup

MQTT Distributor can be left in its default configuration.

MQTT Engine can also be left in its default configuration.

MQTT Recorder requires that a database be set up in Ignition. That can be done as described in the 'Connect to a Database' section [here](#). Note Ignition supports additional database types. For more detailed information about supported types, take a look at the information provided [here](#). Once a database is set up, MQTT Recorder can be configured. Do so by opening the Ignition Gateway Web UI and browsing to the Configure tab at the top of the screen and then selecting 'MQTT Recorder Settings' as shown in the lower left below.

Once there, select a Datasource as shown in the image below. This drop-down will be populated with any database connections set up in Ignition. Optionally, a Partition Period can be selected to segregated tables by time periods.

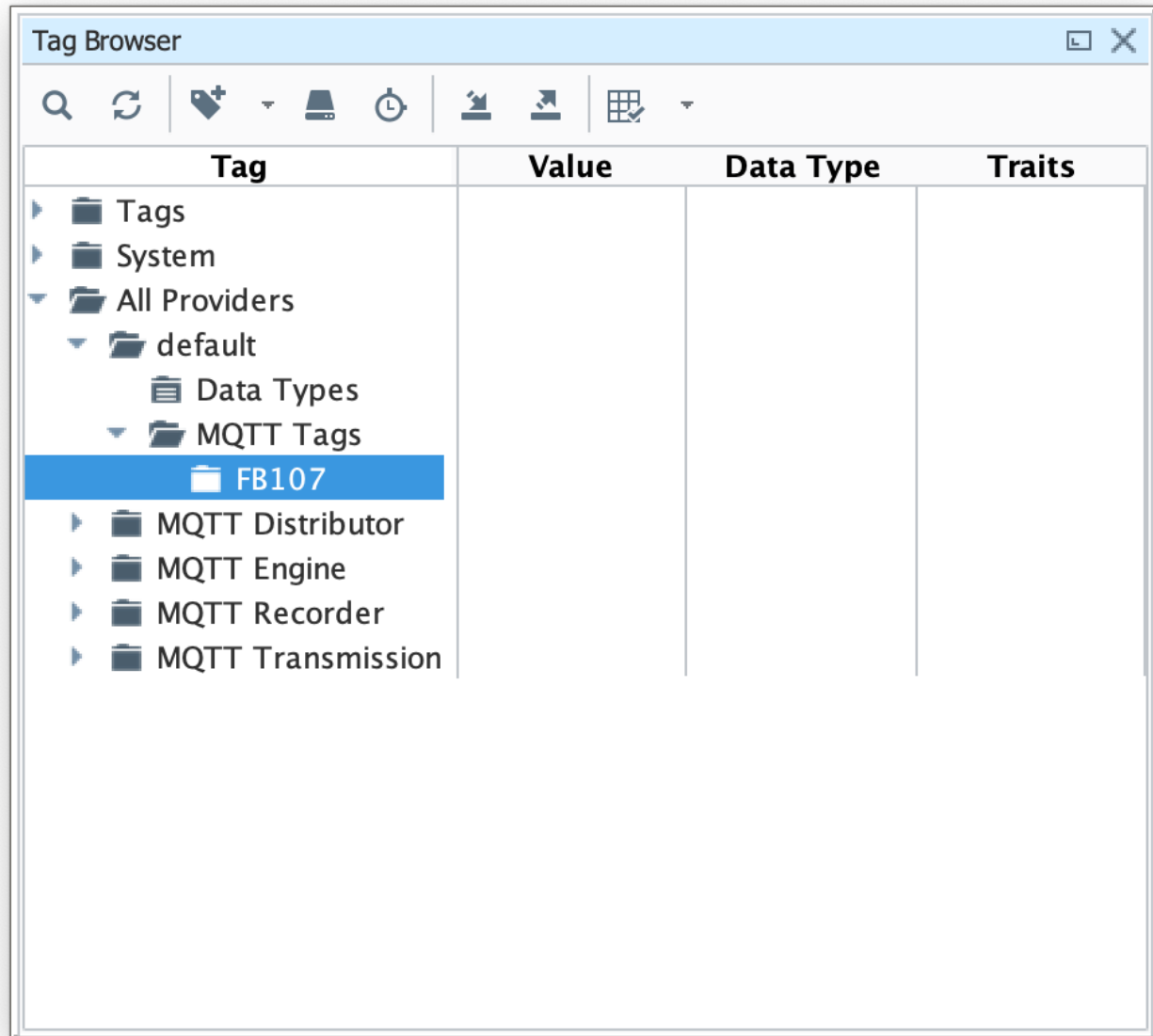


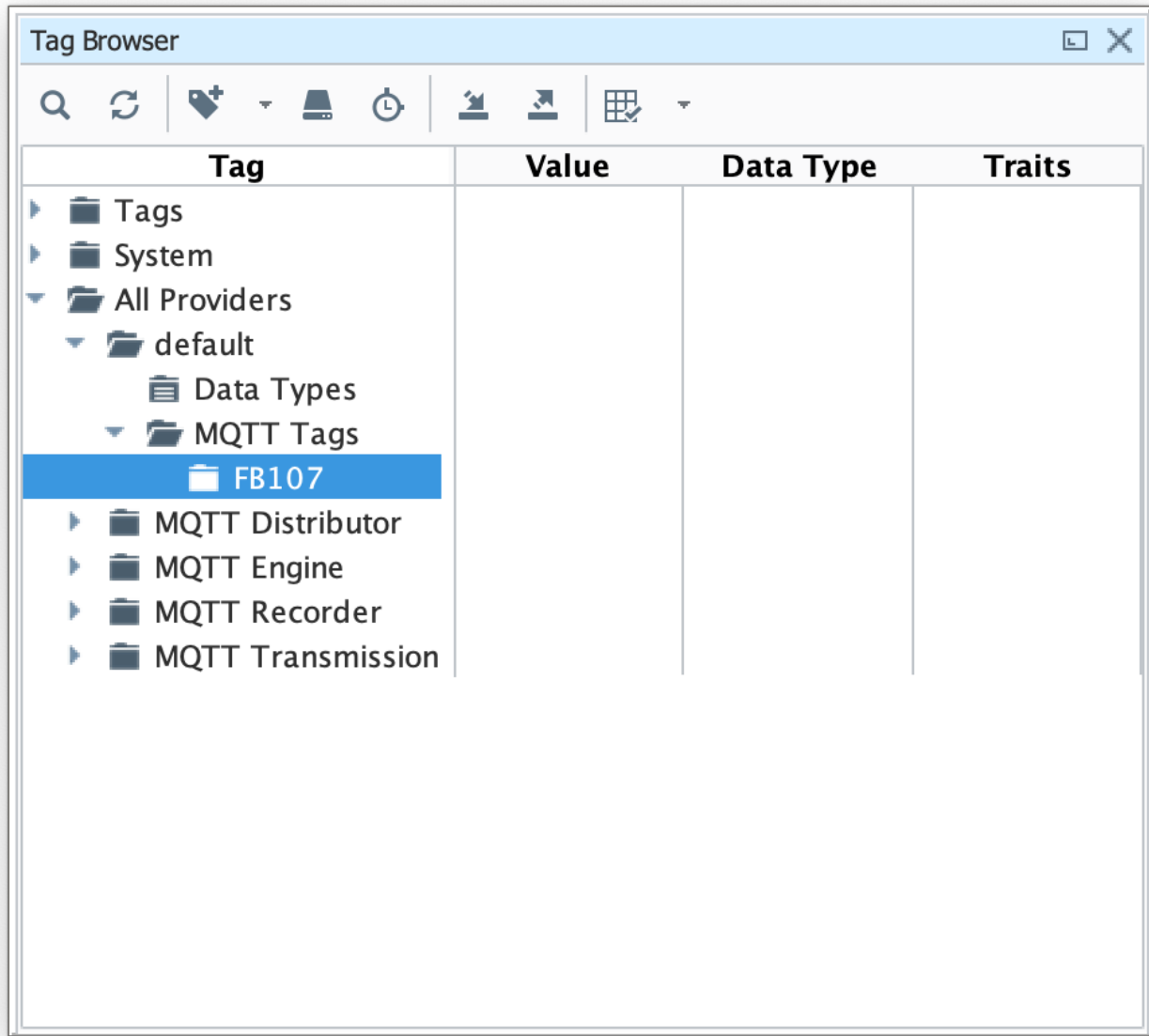
At this point, the Central Ignition Gateway with MQTT Distributor, MQTT Engine, and MQTT Recorder is fully configured and ready to receive MQTT Sparkplug messages from the Remote/Edge Ignition Gateway. MQTT Distributor listens on TCP port 1883 by default for inbound MQTT connections. Make sure the Operating System's Firewall, Antivirus, and Malware protection services allow inbound connections on port 1883/TCP before proceeding.

## Remote/Edge Ignition Gateway Setup

With the Central Ignition Gateway ready to receive MQTT/Sparkplug RECORD objects, the EFM Emerson ROC and MQTT Transmission modules can be configured on the Remote/Edge Ignition Gateway.

Start by configuring the MQTT Transmission module. Do so by opening Ignition Designer and creating a tag structure similar to what is shown below with [default]MQTT Tags/FB107 folders:





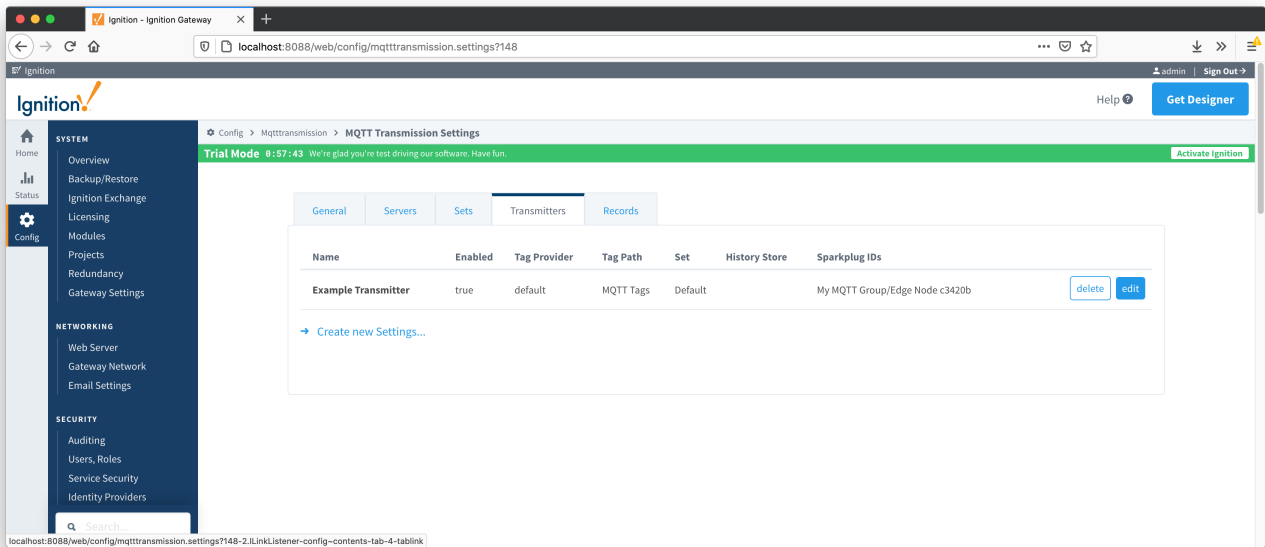
Note this structure is based on usage of the 'Example Transmitter' in MQTT Transmission in Ignition8. So, the directory structure is very important. Note the structure.

- [tag provider]MQTT Tags/[Device ID]/...

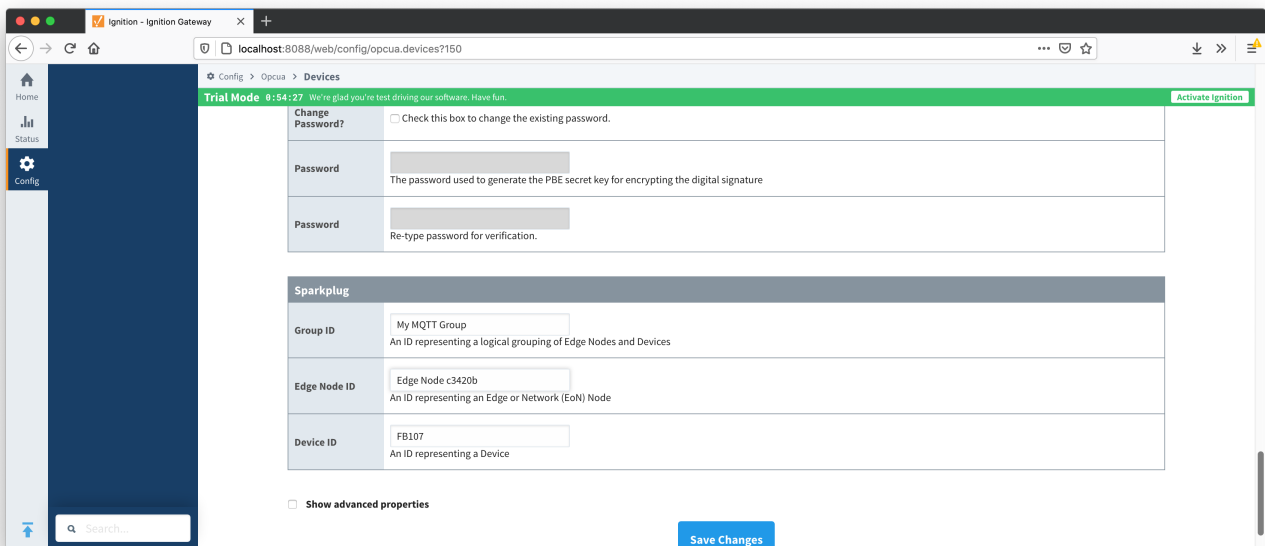
In the example below this implies the following definitions:

- [Device ID] = FB107

Note since we are using the 'Example Transmitter' of Ignition8 we also need to set the Group ID and Edge Node ID in the Example Transmitter. To do so, go to MQTT Transmission Settings on the left Ignition Gateway Web UI navigation panel. Then select the 'Transmitters' tab as shown below:

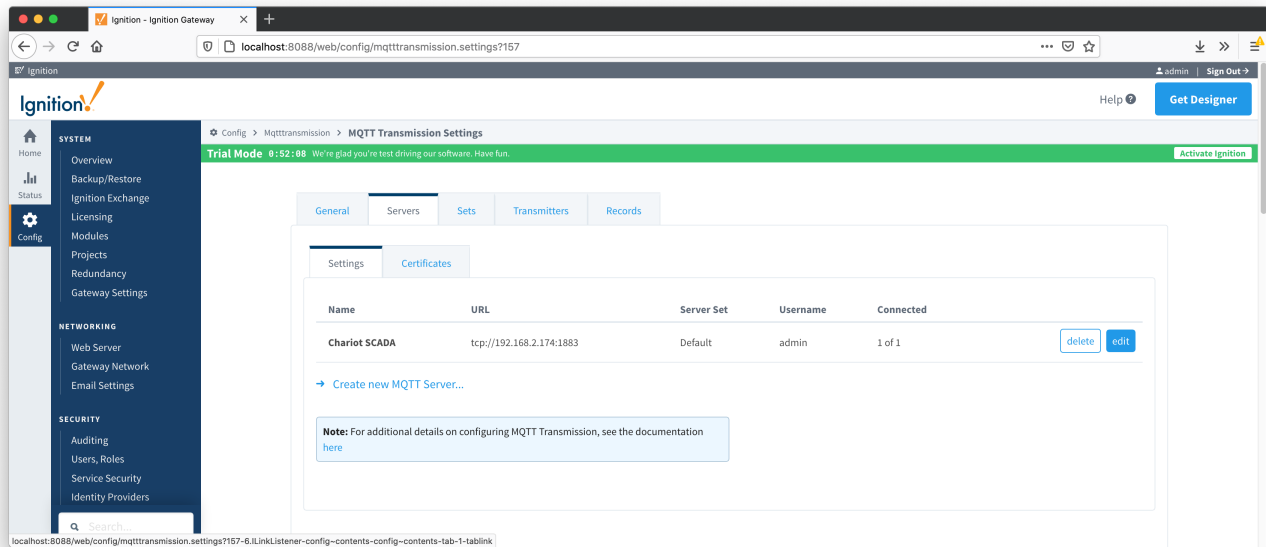


Not  
e that the 'Sparkplug IDs' are 'My MQTT Group/Edge Node c3420b' in this example. These exact values will be used for the EFM Emerson ROC connection Sparkplug parameters to tell the EFM Emerson ROC which MQTT Transmission Transmitter configuration to use and, in turn, which MQTT connection to use to send the alarm data on. So, to match the Transmitter configuration in this example, we must set the Sparkplug IDs in the Emerson ROC driver instance as shown below. Note the Group ID and Sparkplug ID are defined in the MQTT Transmission Transmitter configuration. The Device ID is being picked up from the Ignition default Tag Provider tag tree.



Next the MQTT Transmission server configuration must be modified to point to the Central Ignition Gateway we set up earlier. To do so, in the Ignition Gateway Web UI browse to the Configure tab on the top and then to MQTT Transmission Settings in the lower left as shown below.

In the MQTT Transmission Settings configuration, click the Servers tab. Then click 'edit' on the Chariot SCADA MQTT Server definition. Modify the URL to match the URL of the Central Ignition Gateway. In this example, MQTT Distributor is installed on a Central Ignition Gateway at the IP address of 192.168.2.174. Once the URL is modified to match the configuration, there should be a '1 of 1' in the Connected column as shown below.



The next step is configuring the EFM Emerson ROC module. This is done as described in the [Emerson ROC Configuration](#) manual. In going through the basic setup and configuration for History configuration the following steps must be performed:

1. Define the global TLP definitions available for all ROC devices in this Ignition instance
2. Upload the Configuration Mappings for all ROC devices in this Ignition instance
3. Upload the Periodic Mappings for all ROC devices in this Ignition instance
4. Create the base device connection to the ROC
  - a. The 'Minute History Scan Rate' in this connection configuration must be greater than zero to tell the driver to poll for minute history data at the specified rate
  - b. The 'Periodic History Scan Rate' in this connection configuration must be greater than zero to tell the driver to poll for periodic history data at the specified rate
  - c. The 'Daily History Scan Rate' in this connection configuration must be greater than zero to tell the driver to poll for daily history data at the specified rate
  - d. Set the Sparkplug Group ID, Edge Node ID, and Device ID that represent this device. These will be used again later in the MQTT Transmission configuration.
5. Specify the subset of global TLP definitions that this specific ROC uses

These steps can be skipped if not configuring the driver to poll for TLP data:

1. Create TLP Template(s) which define groups of TLPs should be polled as a logical group
2. Create TLP Poll Group(s) which specify the logical parameters associated with a given TLP Template
3. Use Ignition designer to pull tags into a tag provider

At this point the EFM Emerson ROC driver is configured and is polling for history data at the rate specified in the EFM Emerson ROC device configuration.

MQTT Transmission is connected to the MQTT Server and as a result MQTT Engine is receiving tag change events. In addition, because an EFM Emerson ROC device has been created and configured with the same Sparkplug Group ID, Edge Node ID, and Device ID, history data will also be pushed to the MQTT server as Sparkplug RECORD objects. When new history data is polled by the EFM Emerson ROC driver, they will be published to the MQTT server, consumed by MQTT Engine, passed on to MQTT Recorder, and then inserted into the specified database. Below are a few views of some history records using a third party database viewing tool.

(MySQL 5.7.18) Localhost/test/rs\_efm\_meter\_history\_daily

test

Select Database Structure Content Relations Triggers Table Info Query

Filter

Search: rs\_id

rs_id	rs_type	rs_group	rs_edge_node	rs_device	rs_record_time	rs_recorder_time	rs_fields
1	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15949603930000	1596578043821	flo_o0 9,m
2	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15949620000000	1596578043822	flo_o0 9,m
3	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15950214450000	1596578043823	flo_o0 9,m
4	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15950484000000	1596578043824	flo_o0 9,m
5	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15951348000000	1596578043824	flo_o0 9,m
6	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15952212000000	1596578043825	flo_o0 9,m
7	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15953076000000	1596578043826	flo_o0 9,m
8	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15953940000000	1596578043826	flo_o0 9,m
9	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15954804000000	1596578043827	flo_o0 9,m
10	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15955340390000	1596578043827	flo_o0 9,m
11	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15955668000000	1596578043828	flo_o0 9,m
12	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15956532000000	1596578043828	flo_o0 9,m
13	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15957396000000	1596578043829	flo_o0 9,m
14	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15958260000000	1596578043830	flo_o0 9,m
15	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15959124000000	1596578043831	flo_o0 9,m
16	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15959988000000	1596578043834	flo_o0 9,m
17	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15960852000000	1596578043834	flo_o0 9,m
18	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15961716000000	1596578043834	flo_o0 9,m
19	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15962310800000	1596578043835	flo_o0 9,m
20	EFM_METER_HISTORY_DAILY	My MQTT Group	Edge Node c3420b	FB107	15962731165000	1596578043836	flo_o0 9,m

TABLE INFORMATION

- created: 8/4/20
- updated: 8/4/20
- engine: InnoDB
- rows: 35
- size: 64.0 KIB
- encoding: latin1
- auto\_increment: 36

35 rows in table

(MySQL 5.7.18) Localhost/test/rs\_efm\_meter\_history\_minute

test

Select Database Structure Content Relations Triggers Table Info Query

Filter

Search: rs\_id

rs_id	rs_type	rs_group	rs_edge_node	rs_device	rs_record_time	rs_recorder_time	rs_fields
1	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965775600000	1596577500501	flo_o0 9,m
2	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965776200000	1596577500502	flo_o0 9,m
3	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965776800000	1596577500502	flo_o0 9,m
4	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965777400000	1596577500503	flo_o0 9,m
5	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965778000000	1596577500504	flo_o0 9,m
6	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965778600000	1596577500505	flo_o0 9,m
7	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965779200000	1596577500506	flo_o0 9,m
8	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965779800000	1596577500507	flo_o0 9,m
9	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965780400000	1596577500508	flo_o0 9,m
10	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965781000000	1596577500509	flo_o0 9,m
11	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965781600000	1596577500510	flo_o0 9,m
12	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965782200000	1596577500511	flo_o0 9,m
13	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965782800000	1596577500512	flo_o0 9,m
14	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965783400000	1596577500513	flo_o0 9,m
15	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965784000000	1596577500514	flo_o0 9,m
16	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965784600000	1596577500515	flo_o0 9,m
17	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965785200000	1596577500516	flo_o0 9,m
18	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965785800000	1596577500517	flo_o0 9,m
19	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965786400000	1596577500518	flo_o0 9,m
20	EFM_METER_HISTORY_MINUTE	My MQTT Group	Edge Node c3420b	FB107	15965787000000	1596577500519	flo_o0 9,m

TABLE INFORMATION

- created: 8/4/20
- updated: 8/4/20
- engine: InnoDB
- rows: 60
- size: 96.0 KIB
- encoding: latin1
- auto\_increment: 61

60 rows in table

(MySQL 5.7.18) Localhost/test/rs\_efm\_meter\_history\_periodic

test

Select Database Structure Content Relations Triggers Table Info Query

TABLES

rs\_efm\_meter\_alarm  
rs\_efm\_meter\_configuration  
rs\_efm\_meter\_event  
rs\_efm\_meter\_history\_daily  
rs\_efm\_meter\_history\_minute  
**rs\_efm\_meter\_history\_periodic**  
sqlt\_data\_6\_2019\_06  
sqlt\_data\_6\_2019\_07  
sqlt\_data\_6\_2019\_08  
sqlt\_data\_6\_2019\_09  
sqlt\_data\_6\_2019\_10

TABLE INFORMATION

created: 8/4/20  
updated: 8/4/20  
engine: InnoDB  
rows: 4,200  
size: 2.5 MiB  
encoding: latin1  
auto\_increment: 4,201

Search: rs\_id

rs_id	rs_type	rs_group	rs_edge_node	rs_device	rs_record_time	rs_recorder_time	rs_fielc
1	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593625622000	1596578023547	flo_o0
2	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593625622000	1596578023548	segme
3	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593625622000	1596578023549	segme
4	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593625622000	1596578023550	segme
5	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593625622000	1596578023551	segme
6	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593626400000	1596578023552	flo_o0
7	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593626400000	1596578023553	segme
8	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593626400000	1596578023554	segme
9	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593626400000	1596578023555	segme
10	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593626400000	1596578023556	segme
11	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593630000000	1596578023557	flo_o0
12	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593630000000	1596578023558	segme
13	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593630000000	1596578023559	segme
14	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593630000000	1596578023560	segme
15	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593630000000	1596578023561	segme
16	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593633600000	1596578023562	flo_o0
17	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593633600000	1596578023563	segme
18	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593633600000	1596578023564	segme
19	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593633600000	1596578023565	segme
20	EFM_METER_HISTORY_PERIODIC	My MQTT Group	Edge Node c3420b	FB107	1593633600000	1596578023566	segme

Rows 1 - 1,000 of 4,200 from table

## 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](mailto:support@cirrus-link.com)
- Sales questions
  - Email: [sales@cirrus-link.com](mailto:sales@cirrus-link.com)
  - Phone: +1 (844) 924-7787
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