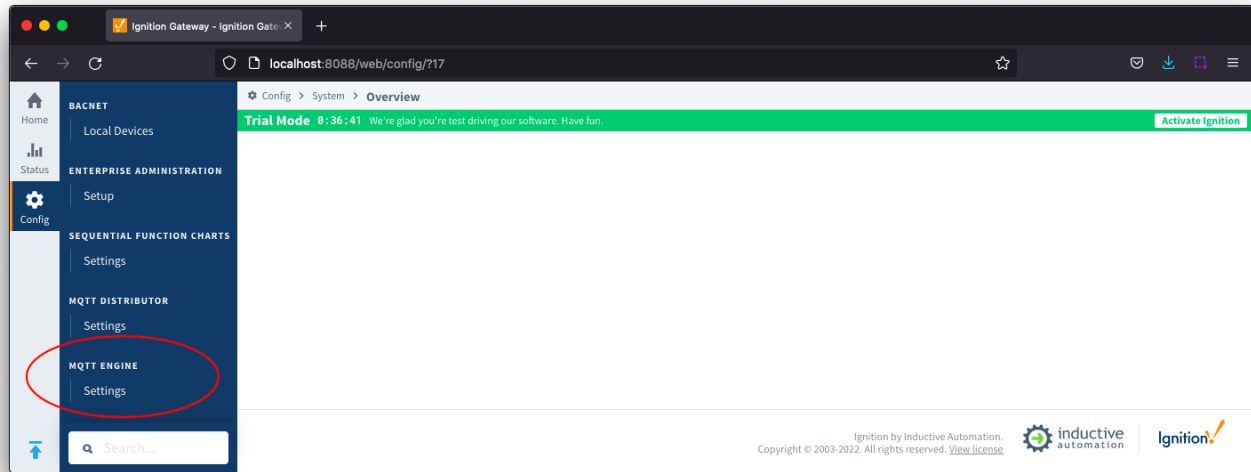


# ME: Configuration

MQTT Engine provides a configuration section to the Ignition Gateway and this can be seen in the left side bar of the Ignition Gateway web UI.

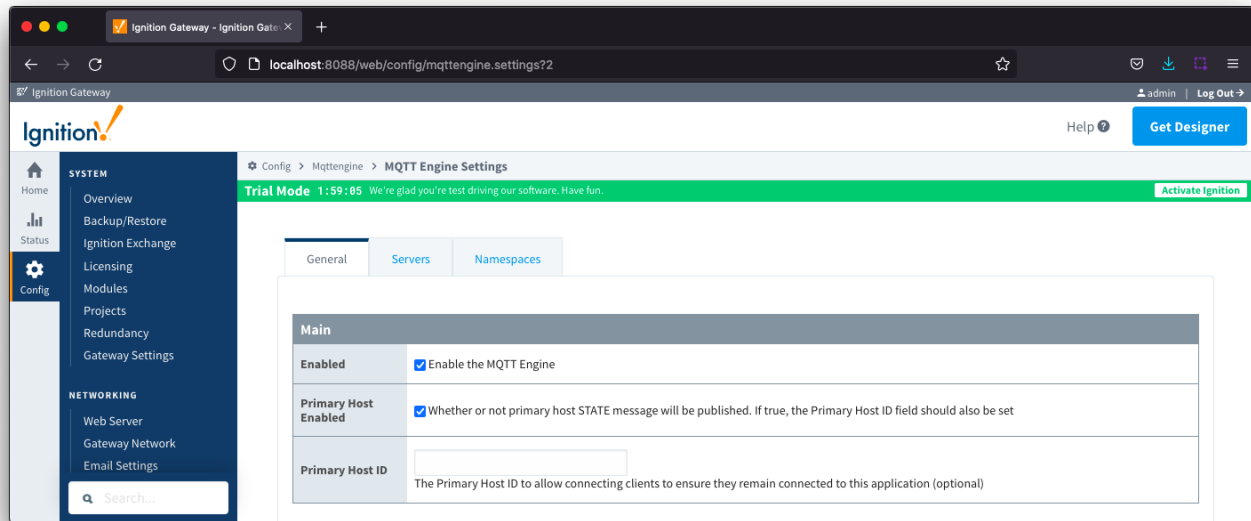


The configuration options for each of the three tabs - [General](#), [Servers](#), and [Namespaces](#) - are detailed below.

## General

The configuration sections available are [Main](#), [Command Settings](#), [Miscellaneous](#) and [Advanced](#).

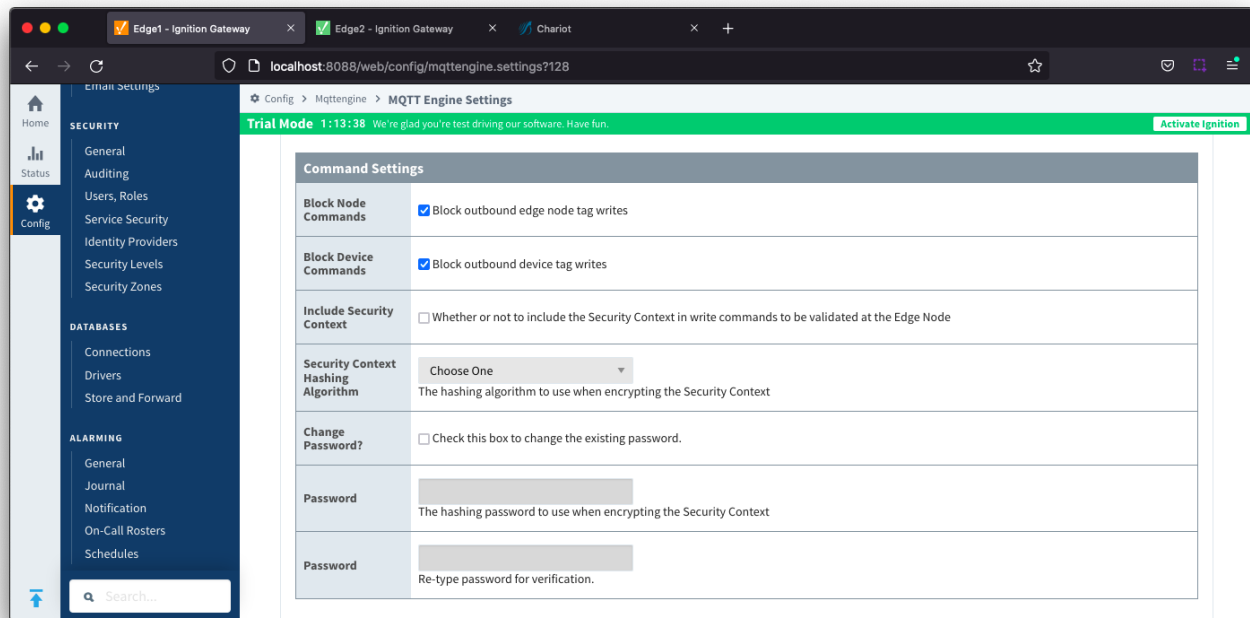
### General - Main



- **Enabled**
  - Whether or not the MQTT Engine module is enabled and connecting to configured MQTT Servers.
- **Primary Host Enabled**
  - Whether or not primary host STATE message will be published. If true, the Primary Host ID must also be set.
  - When enabled, the MQTT Engine will publish it's connection state on a topic that contains the **Primary Host ID**. In the event that MQTT Engine becomes disconnected from the server, a death certificate will be published on the same topic, setting the state to 'offline'. Any connecting client that subscribes on the state topic will then be notified of the MQTT Engine state.
- **Primary Host ID**

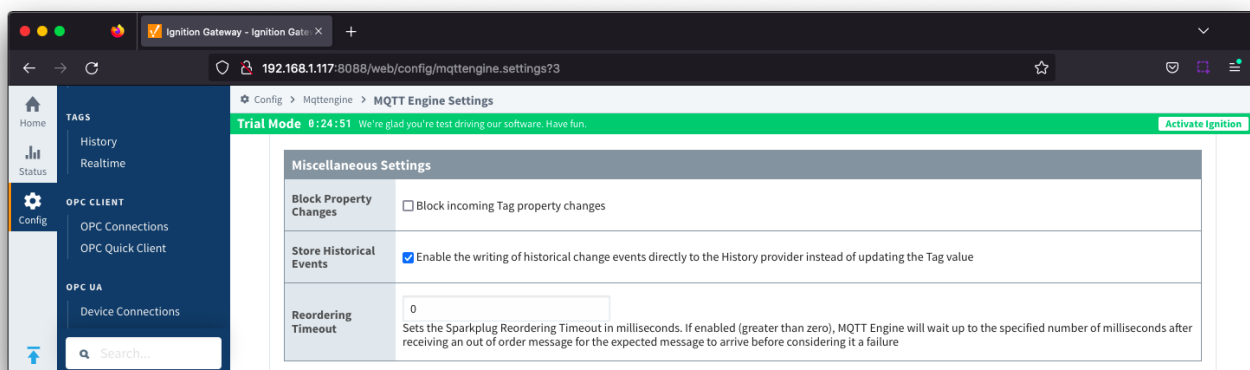
- The primary host ID to allow connecting clients to ensure they remain connected.
- This must contain only letters, numbers, or any of the following special characters: . \$ % @ ! - \_ ^ \*

## General - Command Settings



- **Block Node Commands**
  - Whether or not to block outgoing commands from MQTT Engine to Edge Nodes. This is true by default and provides a security mechanism for preventing accidental outgoing commands from MQTT Engine.
- **Block Device Commands**
  - Whether or not to block outgoing commands from MQTT Engine to Devices. This is true by default and provides a security mechanism for preventing accidental outgoing commands from MQTT Engine.
- **Include Security Context**
  - Whether or not to include the Security Context in write command to be validated at the Edge Node. This is deselected by default.
  - Reference the [Ignition MQTT Security Context](#) HowTo for additional details on how to use this configuration.
- **Security Context Hashing Algorithm**
  - Hashing algorithm to use when encrypting the Security Context. Options include SHA\_1, SHA\_224, SHA\_256, SHA\_384 and SHA\_512
- **Change Password?**
  - Checkbox to allow existing password to be changed
- **Password**
  - Password to be used when encrypting the Security Context

## General - Miscellaneous



- **Block Property Changes**

- Whether or not to block incoming properties from modifying MQTT Engine tag properties. This is false by default so property changes will be applied if not included in the Filtered Property list under 'Advanced'.
- **Store Historical Events**
  - Whether or not to write historical change events directly to the Historian (if history is enabled on a Tag) instead of updating the live Tag value.
  - **Note: Store and Forward does not guarantee all data is stored and forwarded. There are some edge cases that are not currently handled with regard to data loss in the event of connection failures related to MQTT keep alive timeouts. This window of potential missed data can be reduced by decreasing MQTT Transmission and MQTT Engine configurable keep alive timeouts.**
- **Reordering Timeout**
  - Sets the Sparkplug Reordering Timeout in milliseconds.
  - When enabled (greater than zero), MQTT Engine will wait up to the specified number of milliseconds after receiving an out of order message for the expected message to arrive before considering it a failure.



If upgrading from a pre 4.0.14 module with a "reorderingTimeout" custom property configured, the upgrade will migrate the value for the custom property to the Reordering Timeout property.

## General - Advanced



These are advanced settings/features and they **should be left with default values in almost all cases**. Please be careful when changing these settings from their default values.

The screenshot shows the Ignition Gateway web interface. The left sidebar contains navigation links: Home, Local Devices, Setup, Settings, and a search bar. The main content area is titled 'MQTT Engine Settings' and displays a table of advanced settings. The settings are as follows:

| Advanced Settings                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Enable Tag Latching                | <input type="checkbox"/> Enable latching on tags to synchronize MQTT Engine tag updates with events in Ignition projects. This will impact overall system performance when enabled.                                                                                                                                                                                                                                                                                     |
| Latch Timeout                      | 2000<br>The amount of time to wait for the latch to be released by the Ignition project component in milliseconds before timing out (default: 2,000)                                                                                                                                                                                                                                                                                                                    |
| Latch Tags                         | <input type="text"/><br>A semicolon separated list of comma separated trigger tag/latch tag pairs (e.g. 'trigger1,latch1;trigger2,latch2; ...')                                                                                                                                                                                                                                                                                                                         |
| Filtered Properties                | accessRights;clampMode;deadband;deadbandMode;formatString;historicalDeadband;historicalDeadbandMode;historicalDeadbandStyle;historyEnabled;<br>A semicolon delimited list of Tag properties to filter/ignore on received Tags                                                                                                                                                                                                                                           |
| Enable BD Sequence Validation      | <input checked="" type="checkbox"/> Enables/disables BIRTH/DEATH sequence number validation as required by the Sparkplug specification. Only disable if you have non-conforming Sparkplug Edge Nodes                                                                                                                                                                                                                                                                    |
| Enable Metric Timestamp Validation | <input checked="" type="checkbox"/> Enables/disables validation of metric timestamps against the current tag value timestamp before writing. If enabled, tag writes will only occur if the new incoming metric timestamp is newer than the current tag timestamp.                                                                                                                                                                                                       |
| Custom Properties                  | <input type="text"/><br>Custom properties to provide to MQTT Engine. Typically this is not used.                                                                                                                                                                                                                                                                                                                                                                        |
| Primary Host Control Tags          | <input type="text"/><br>A semicolon separated list of comma separated Primary Host control tag triples (e.g. 'fullTagPath1,tagType1,tagValue1;fullTagPath2,tagType2,tagValue2; ...'). The control tags will need to exist, have a Good quality, have the specified tag DataType and specified tag value before the Primary Host will connect and publish its STATE message. Supported tag DataTypes are: Byte, Short, Integer, Long, Float, Double, Boolean and String. |

- **Enable Tag Latching**
  - Whether or not to enable Tag latching to synchronize MQTT Tag updates with events in Ignition.
- **Latch Timeout**
  - The amount of time to wait for a Tag latch to be released before timing out.
- **Latch Tags**
  - A semicolon separated list comma separated list of Trigger Tag and Latch Tag pairs.
- **Filtered Properties**
  - A semicolon delimited list of Tag properties to filter/ignore on received Tags.
  - By default the filtered properties list contains: accessRights;clampMode;deadband;deadbandMode;formatString;historicalDeadband;historicalDeadbandMode;historicalDeadbandStyle;historyEnabled;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 from Transmission if different from the default Ignition tag property settings and are only published in BIRTH messages.

- **Enable BD Sequence Validation**
  - Whether or not to enable BIRTH/DEATH sequence number validation (required by Sparkplug specification).
- **Enable Metric Timestamp Validation**
  - Enables/disables validation of metric timestamps against the current tag value timestamp before writing. If enabled, tag writes will only occur if the new incoming metric timestamp is newer than the current tag timestamp.
- **Custom Properties**
  - Do not use unless instructed to by Cirrus Link personnel.
- **Primary Host Control Tags**
  - A semicolon separated list of comma separated Primary Host Control tags triples (e.g., tagPath1,tagDataType1,tagValue1;tagPath2,tagDataType2,tagValue2). Review [MQTT Engine Primary Host Control](#) for additional information.
  - Supported tag DataTypes are: Byte, Short, Integer, Long, Float, Double, Boolean and String

## Servers

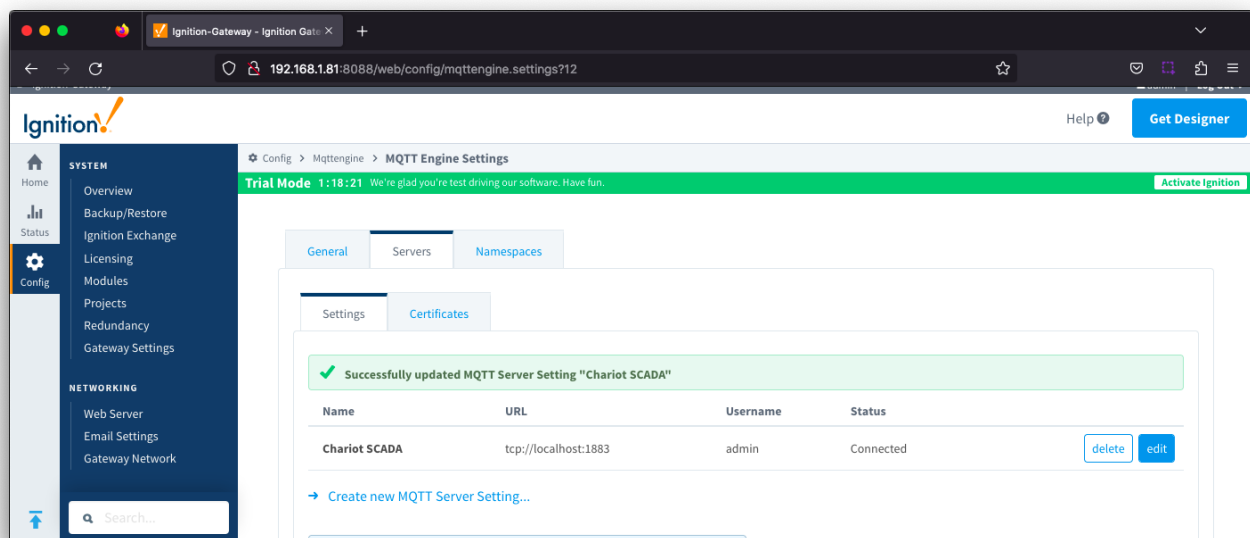
The Servers tab has two parts - [Settings](#) and [Certificates](#)

## Servers - Settings

This tab provides a list of the MQTT Servers that MQTT Engine should connect to. By default, MQTT Engine is configured to connect to the local MQTT Distributor based MQTT Server and is set up to connect to localhost, port 1883, using the default username/password.

Additional or alternative MQTT Servers can be configured in MQTT Engine - often times more than one will be configured to handle fail-over in redundant or geographically distributed systems. Clicking on the 'Create new MQTT Server' link will bring up a form for adding a new MQTT Server setting.

The connection status of each server can be seen in the 'Status' column.



The configuration sections available are [Main](#), [TLS](#), [Advanced](#) and [Advanced Legacy State](#)

## Server Settings - Main

The screenshot shows the Ignition-Gateway web interface. The browser address bar displays `192.168.1.81:8088/web/config/mqttengine.settings?16`. The page title is `MQTT Engine Settings`. A green banner at the top indicates `Trial Mode 1:14:37` with the text `We're glad you're test driving our software. Have fun.` and an `Activate Ignition` button.

The `MQTT Engine Settings` page is divided into a left sidebar and a main content area. The sidebar contains the following sections:

- Home**
- Projects**
- Redundancy**
- Gateway Settings**
- NETWORKING**
- Web Server**
- Email Settings**
- Gateway Network**
- SECURITY**
- General**
- Auditing**
- Users, Roles**
- Service Security**
- Identity Providers**
- OAuth2 Clients**
- Security Levels**
- Security Zones**
- DATABASES**
- Connections**
- Drivers**
- Store and Forward**

The main content area displays the `MQTT Engine Settings` form. The form is titled `Main` and contains the following fields:

| Main             |                                                                                                                                                                                                   |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name             | <input type="text" value="Chariot SCADA"/><br>The friendly name of this MQTT Server Setting                                                                                                       |
| Enabled          | <input checked="" type="checkbox"/> Enable this MQTT Server Setting                                                                                                                               |
| URL              | <input type="text" value="tcp://localhost:1883"/><br>The URL of the MQTT Server to connect to. Should be of the form <code>tcp://mydomain.com:1883</code> or <code>ssl://mydomain.com:8883</code> |
| Username         | <input type="text" value="admin"/><br>The username for connections if required by the MQTT Server (optional)                                                                                      |
| Change Password? | <input type="checkbox"/> Check this box to change the existing password.                                                                                                                          |
| Password         | <input type="password"/><br>The password for connections if required by the MQTT Server (optional)                                                                                                |
| Password         | <input type="password"/><br>Re-type password for verification.                                                                                                                                    |

- **Name**
  - This is the friendly name of the MQTT Server used to easily identify it.
- **Enabled**
  - Whether or not connections to this MQTT Server are enabled.
- **URL**
  - This is the URL of the MQTT server. Its format is as follows: `[protocol]://[location]:[port]`. Each of these are shown below.
    - protocol - Either `tcp` or `ssl`
    - location - The server location. e.g. `localhost`, `myserver.chariot.io`, `mydomain.com`, etc
    - port - The port the MQTT Server is listening on. Generally this is `1883` if using `TCP` or `8883` if using `SSL`
- **Username**
  - Optional MQTT username to use in the MQTT connect packet. This is required if the MQTT Server to connect to requires it.
- **Password**
  - Optional MQTT password to use in the MQTT connect packet. This is required if the MQTT Server to connect to requires it.

## Server Settings - TLS

The screenshot shows the Ignition-Gateway web interface. The browser address bar indicates the URL is `192.168.1.81:8088/web/config/mqttengine.settings?16`. The page title is "MQTT Engine Settings". A green banner at the top indicates "Trial Mode 1:13:22". The left sidebar contains navigation links: Home, Status, Config, and various system settings. The main content area displays the TLS configuration settings.

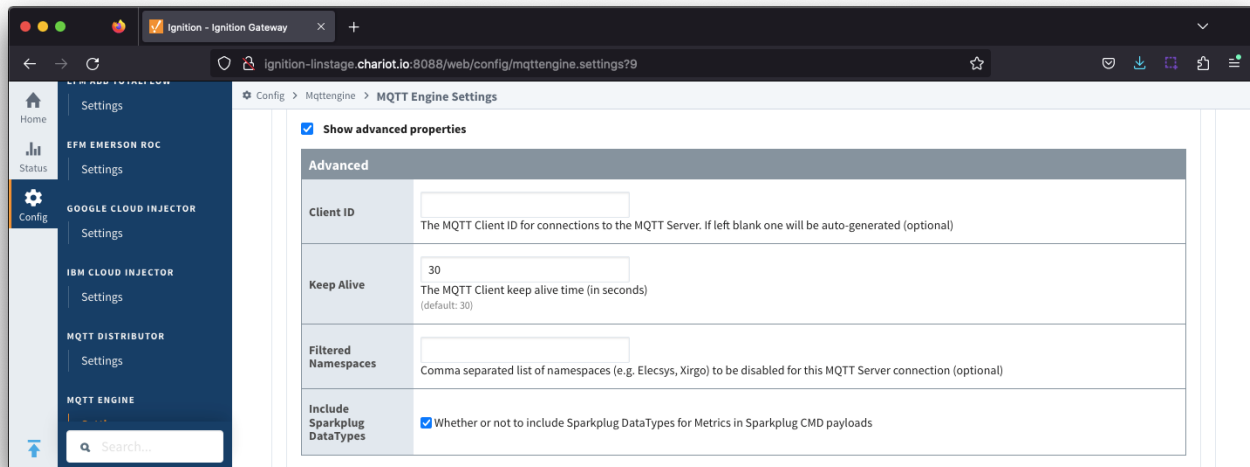
| TLS                     |                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------|
| CA Certificate File     | <div>- none -</div> <div>CA Certificate file currently in use</div>                          |
| Client Certificate File | <div>- none -</div> <div>Client certificate file currently in use</div>                      |
| Client Private Key File | <div>- none -</div> <div>Client private key file currently in use</div>                      |
| Change Password?        | <input type="checkbox"/> Check this box to change the existing password.                     |
| Password                | <div></div> <div>The password associated with the certificate's private key (optional)</div> |
| Password                | <div></div> <div>Re-type password for verification.</div>                                    |
| Hostname Verification   | <input checked="" type="checkbox"/> Enable TLS Hostname Verification                         |
| TLS ALPN Extensions     | <div></div> <div>The TLS ALPN Extensions to use with this connection (optional)</div>        |



See this document for TLS configuration: [Secure MQTT Communications using SSL or TLS](#)

- **CA Certification File**
  - CA Certification file currently in use.
- **Client Certification File**
  - Client Certification file currently in use.
- **Client Private Key File**
  - Client Private Key file currently in use
- **Password**
  - Optional password associated with the certificate's private key.
- **Hostname Verification**
  - Enable TLS Hostname Verification. This is true by default.
- **TLS ALPN Extensions**
  - Optional TLS ALPN Extensions, such as http/1.1, to use with this connection if supported by the MQTT Server.

## Server Settings - Advanced



- **Client ID**

- Optional MQTT client ID to use. If specified this will be used in the MQTT Engine connect packet when connecting to the server. If left blank, a random client ID will be created of the form 'ME-xxxxxxxx-xxxx-xxxx'.



**Caution:** MQTT Clients IDs **must** be unique and if two clients attempt to connect with the same client ID, one will be forcefully disconnected from the server to allow the other client to connect.

- **Keep Alive**

- The maximum interval in seconds (5-65,535) between any two MQTT protocol control packets sent by the client to the server.
- Minimum Keep Alive for MQTT Engine is 5.
- If the client is idle and has no control packets to send, it will send PINGREQ protocol packet and the server is required to respond with a PINGRESP packet. If no response is received from the server within 1.5 times the Keep Alive, the client will close the connection.
- If the server does not receive, at minimum, a PINGREQ message from a client within 1.5 times the Keep Alive, it will terminate the connection and send the client's LWT message if defined.
- For MQTT Engine with Primary Host enabled, this is a message of format spBv1.0/STATE/primary\_host\_id with a payload {"online" : false, "timestamp" : 1668114759262}
- For MQTT Engine with Legacy Primary Host enabled, this is a message of format STATE/primary\_host\_id with a payload of OFFLINE

- **Filtered Namespaces**

- A comma separated list of namespaces that will be filtered/disabled for connections to this MQTT Server.
- The default namespaces are Elecsys, Xirgo, Sparkplug A and Sparkplug B.

- **Include Sparkplug DataTypes**

- Whether or not to include Sparkplug DataTypes for Metrics in Sparkplug CMD payloads
- Enabled by default

## Server Settings - Advanced Legacy State

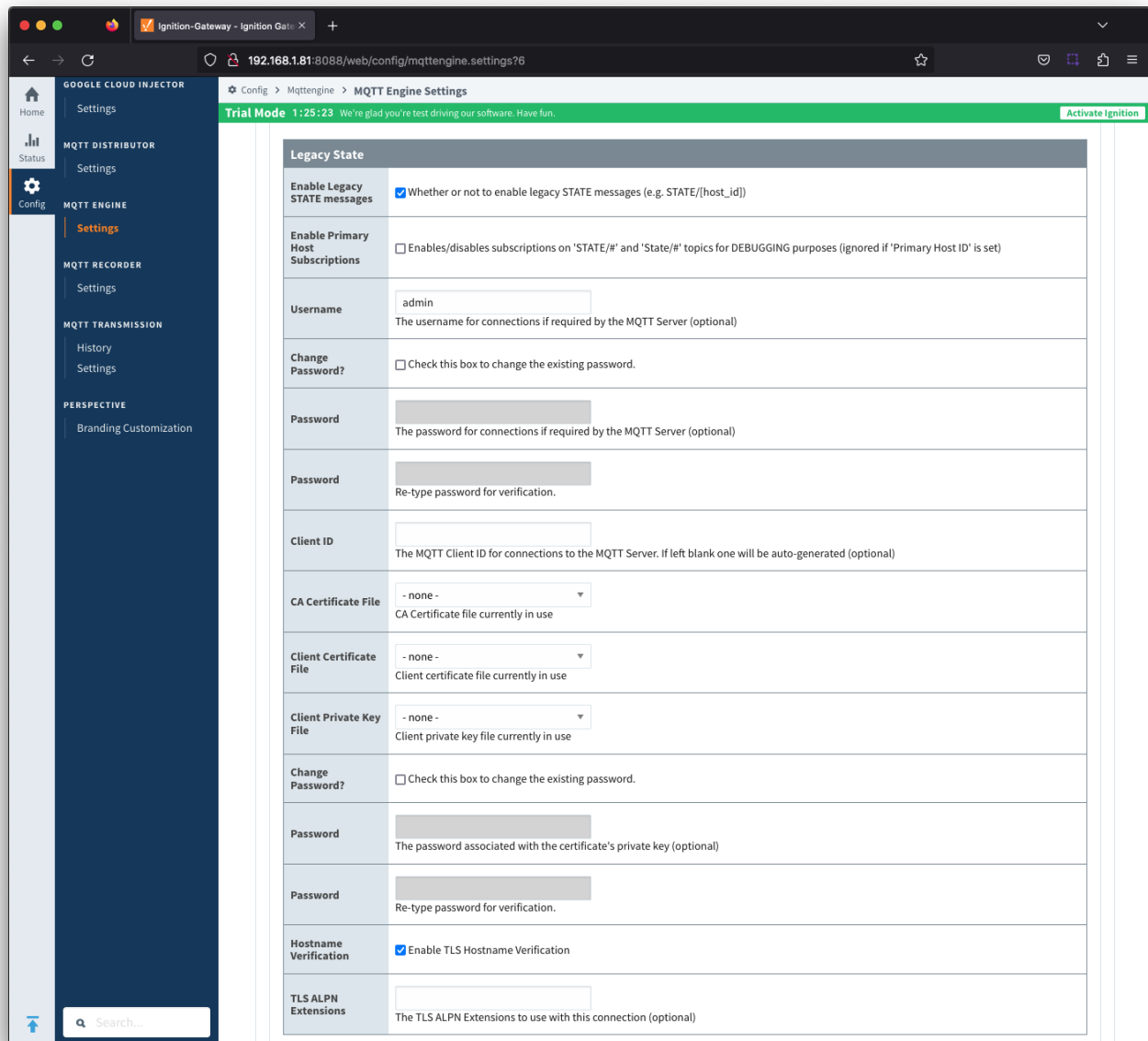
From release 4.0.14 MQTT Engine will support the [new STATE message format](#) and be in compliance with MQTT Sparkplug™ B specification v3.0.0.

However as there will still be many existing clients which are only compatible with the MQTT Sparkplug™ B specification v2.2, we have made changes to MQTT Engine to establish a MQTT client whose only function is to publish the STATE message in its legacy format.

If you are updating from a previous version of MQTT Engine to v4.0.14, the configuration of the Legacy State template will be completed as part of the upgrade process and the Legacy Client enabled.



**Note:** For some MQTT servers, the Username/Password for each client connection must be unique and so these parameters for the second legacy client will need to be edited



- **Enable Legacy STATE messages**
  - Whether or not connections to enable legacy STATE messages (e.g. STATE/[host\_id]). This is false by default unless upgrading from a previous module version.
- **Enable Primary Host Subscriptions**
  - Whether or not to enable MQTT Engine subscriptions on legacy STATE/# and State/# topics.
  - Requires that Enable Legacy STATE messages is TRUE and Primary Host Enabled is FALSE and/or Primary Host ID is null.
  - This setting is for debugging purposes only.
- **Username**
  - Optional MQTT username to use in the MQTT connect packet. This is required if the MQTT Server to connect to requires it.
- **Password**
  - Optional MQTT password to use in the MQTT connect packet. This is required if the MQTT Server to connect to requires it.
- **Client ID**
  - The MQTT Client ID for connections to the MQTT Server. If left blank one will be auto-generated of the form ME-LS-xxxxxxxx-xxxx-xxxx
- **CA Certification File**
  - CA Certification file currently in use.
- **Client Certification File**
  - Client Certification file currently in use.
- **Client Private Key File**
  - Client Private Key file currently in use
- **Password**
  - Optional password associated with the certificate's private key.
- **Hostname Verification**
  - Enable TLS Hostname Verification. This is true by default.
- **TLS ALPN Extensions**

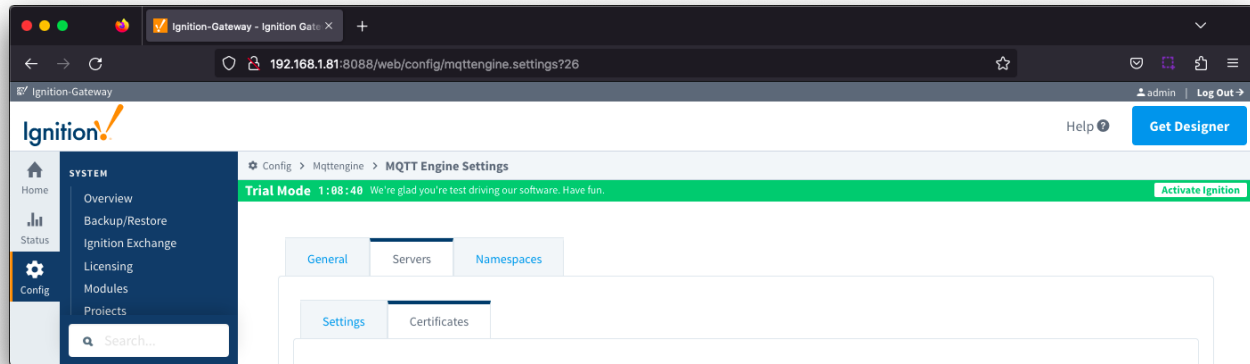
- Optional TLS ALPN Extensions to use with this connection

## Servers - Certificates

This tab provides a list of the certificate or private key files if loaded and available for TLS configuration.

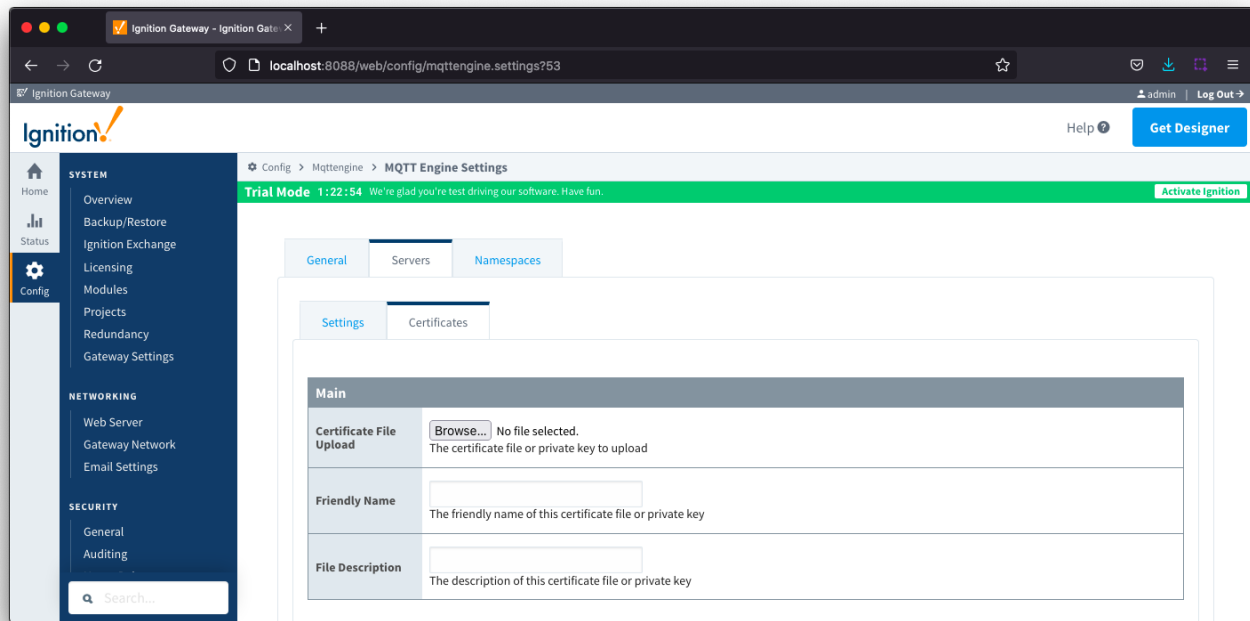


All certificate or private keys must be in PEM format. If using modules pre 4.0.9, any private key file must also be in RSA PKCS1 format. If using modules 4.0.9 or greater, any private key must also be in either RSA PKCS1 or PKCS8 format.



The Certificates tab contains a single [Main](#) section.

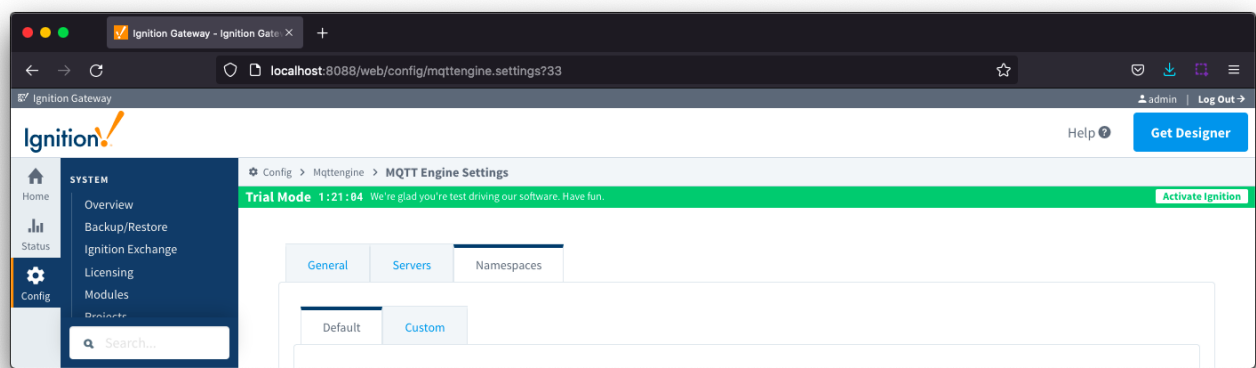
## Servers Certificates - Main



- **Certificate File Upload**
  - Browse to the certificate file or private key to upload.
- **Friendly Name**
  - The friendly name of the certificate file or private key.
- **File Description**
  - The description of the certificate file or private key.

## Namespaces

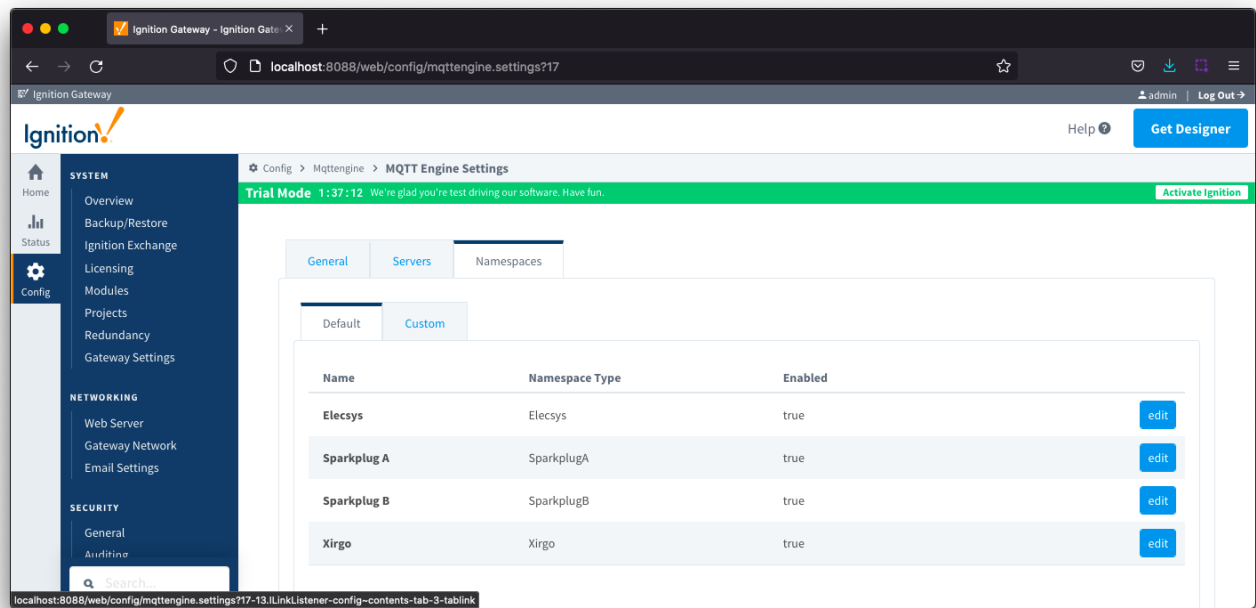
The third tab is used for configuring namespaces. Each namespace configuration represents a family of devices and/or data that MQTT Engine will support. A namespace defines the topics that each MQTT Engine client will subscribe on as well as indicates how the payload will be handled.



The Namespace tab has two parts - [Default](#) and [Custom](#).

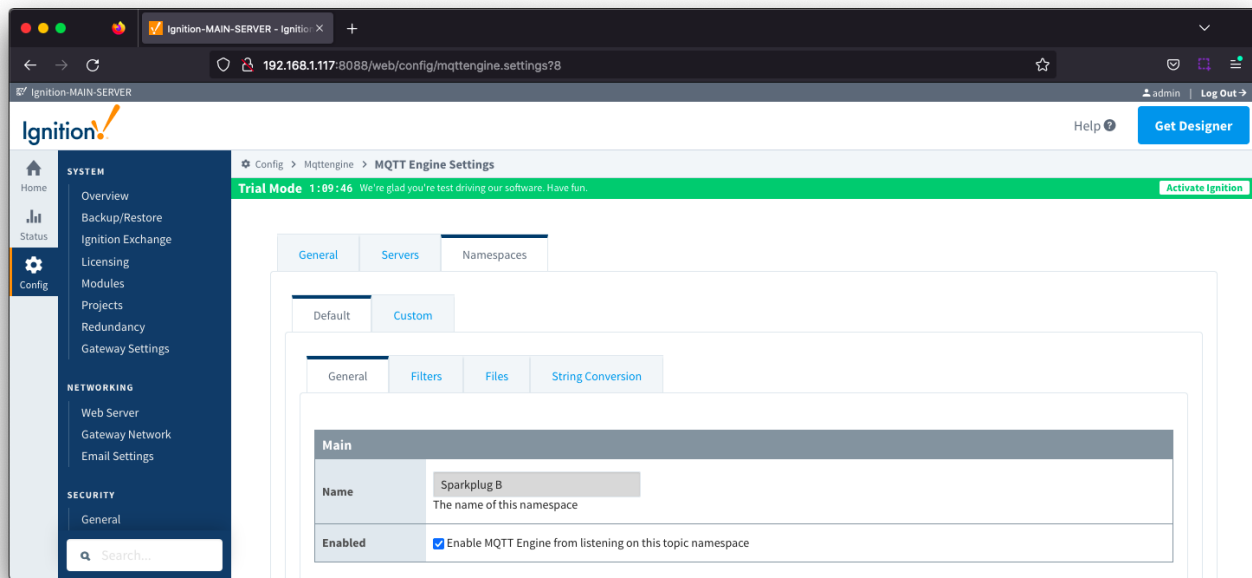
### Namespaces Default

Default namespaces are provided out of the box and can simply be enabled or disabled. When MQTT Engine is first installed, all non Sparkplug B default namespaces are disabled.



The Default tab has four parts - [General](#), [Filters](#), [Files](#) and [String Conversions](#)

### Namespaces Default - General

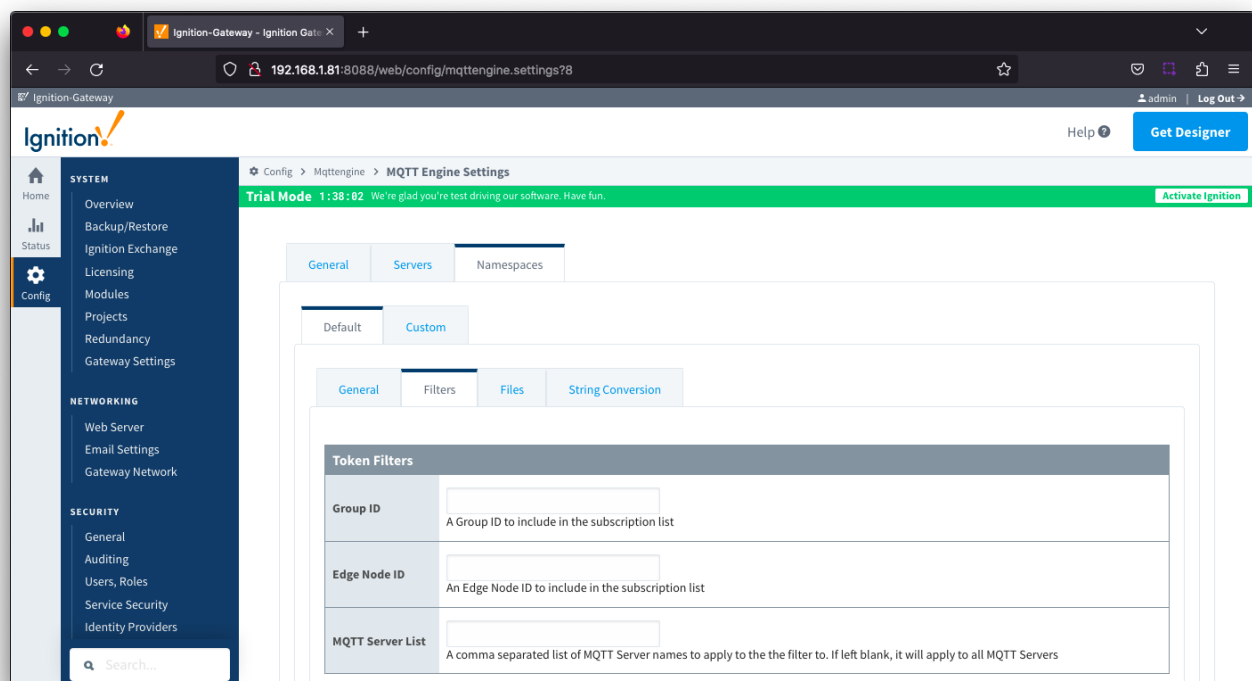


- **Name**
  - A friendly name of the namespace to easily identify it.
- **Enabled**
  - Whether or not the namespace is enabled.
  - If enabled, MQTT Engine will subscribe to the topics necessary to provide support for devices and data associated with that namespace. If disabled, MQTT Engine will unsubscribe from those topics and no longer support the devices and data associated with that namespace.

## Namespaces Default - Filters

Namespace filters allows you to specify Group or Group/EdgeNode combinations which will be included in the MQTT Engine subscriptions for this specific namespace.

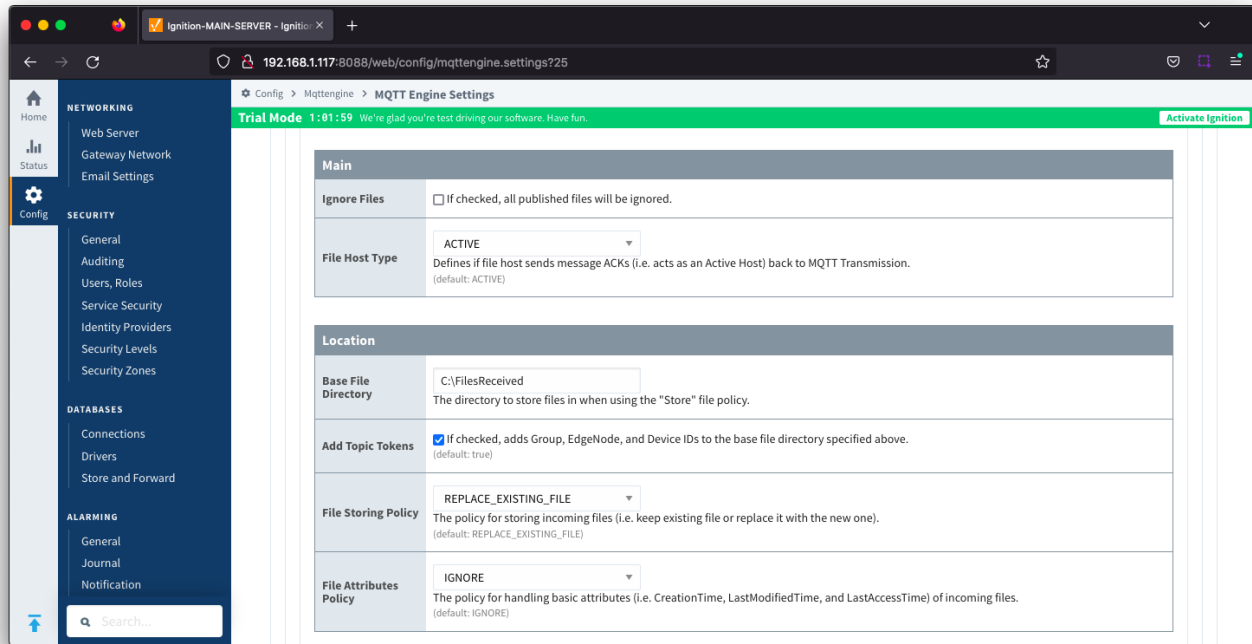
From MQTT Engine 4.0.16 and newer, it also allows for the filters to be applied to specific MQTT Servers.



- **Group ID**
  - The Group ID to be included in the MQTT Engine subscriptions for this specific namespace.
- **Edge Node ID**
  - Edge Node ID to be included in the MQTT Engine subscriptions for this specific namespace.
- **MQTT Server List**
  - A comma separated list of MQTT Server names to apply the filter to. If left blank, it will apply to all MQTT Servers

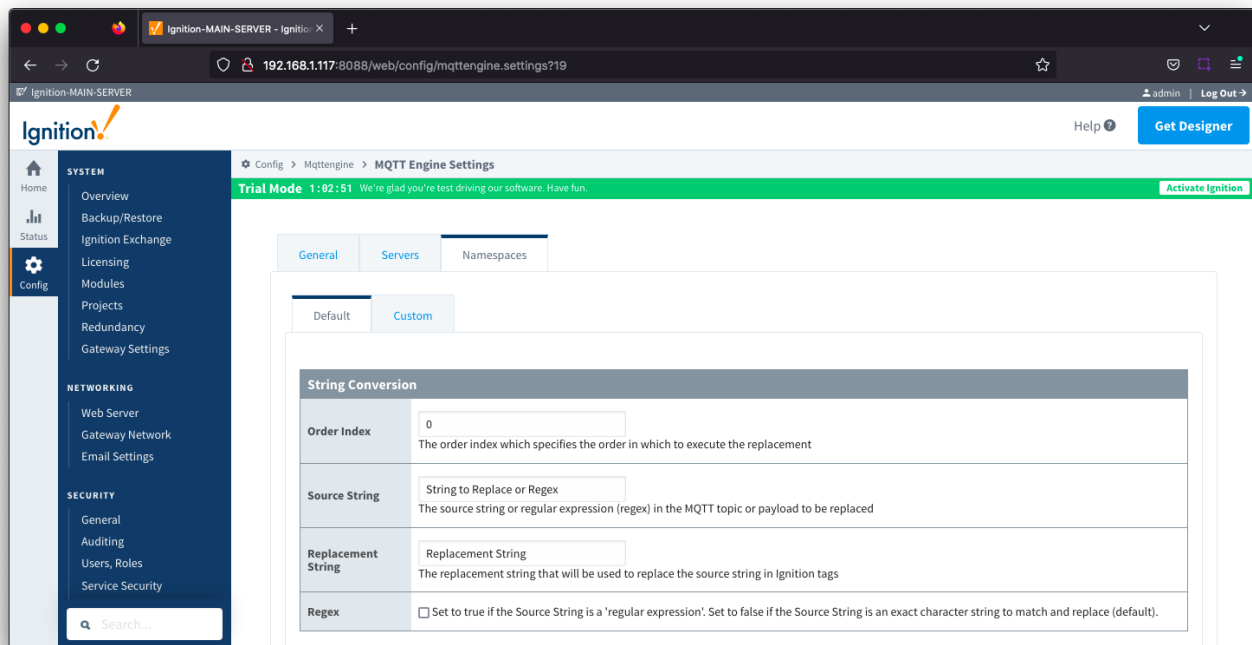
Additional detail on the default namespaces is available [here](#).

## Namespaces Default - Files



- **Main**
  - **Ignore Files**
    - Default: Unchecked.
    - If checked, all published files will be ignored
  - **File Host Type**
    - Default: ACTIVE. Host will send message ACKs back to MQTT Transmission acting as an Active Host
    - Options are ACTIVE and PASSIVE
- **Location**
  - **Base File Directory**
    - The directory to store files when 'Ignore Files' is unchecked
  - **Add Topic Tokens**
    - Default: Checked. If selected, appends the Group ID, Edge Node Id and device ID to the Base File Directory when storing files
  - **File Storing Policy**
    - The file policy for storing incoming files. Options are REPLACE\_EXISTING\_FILE and KEEP\_EXISTING\_FILE
    - Default: REPLACE\_EXISTING\_FILE
  - **File Attributes Policy**
    - The policy for handling basic file attributes such as CreationTime, LastModifiedTime and LastAccessTime of incoming files. Options are IGNORE, APPEND\_TO\_FILENAME, UPDATE\_FILE\_ATTRIBUTES and APPEND\_AND\_UPDATE
    - Default is IGNORE

## Namespaces Default - String Conversion



- **Order Index**
  - The order index which specifies the order in which to execute the replacement
- **Source String**
  - Free form field for the source string or regular expression (regex) in the MQTT Topic or payload to be replaced
- **Replacement String**
  - Free form field for the replacement string that will be used to replace the source string in Ignition tags
- **Regex**
  - If checked, the source string will be treated as a 'regular expression'
  - If unchecked, the source string is an exact character string to match and replace
  - Default: unchecked

Reference the [MQTT Engine String Replacement](#) HowTo tutorial for additional details

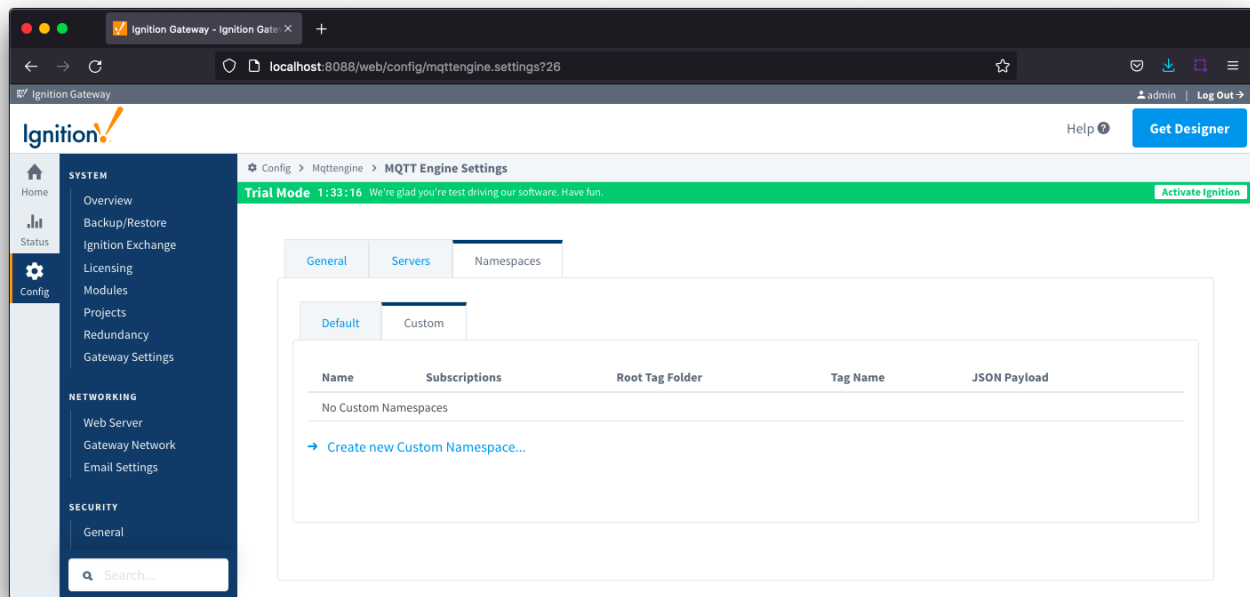
## Namespaces Custom

[Custom Namespaces](#) are used to provide support for generic, non Sparkplug compliant MQTT messages with string based payloads. If a custom namespace is configured MQTT Engine will convert all messages received to tags where the topic of each message will translate directly to the tag's path and the payload will be the tag's value.



We recommend disabling the Sparkplug B default namespace if defining a custom namespace.

MQTT Engine supports [MQTT Engine String Replacement](#) for both MQTT Topics and Payloads for character sequences that will become part of an Ignition tag path.

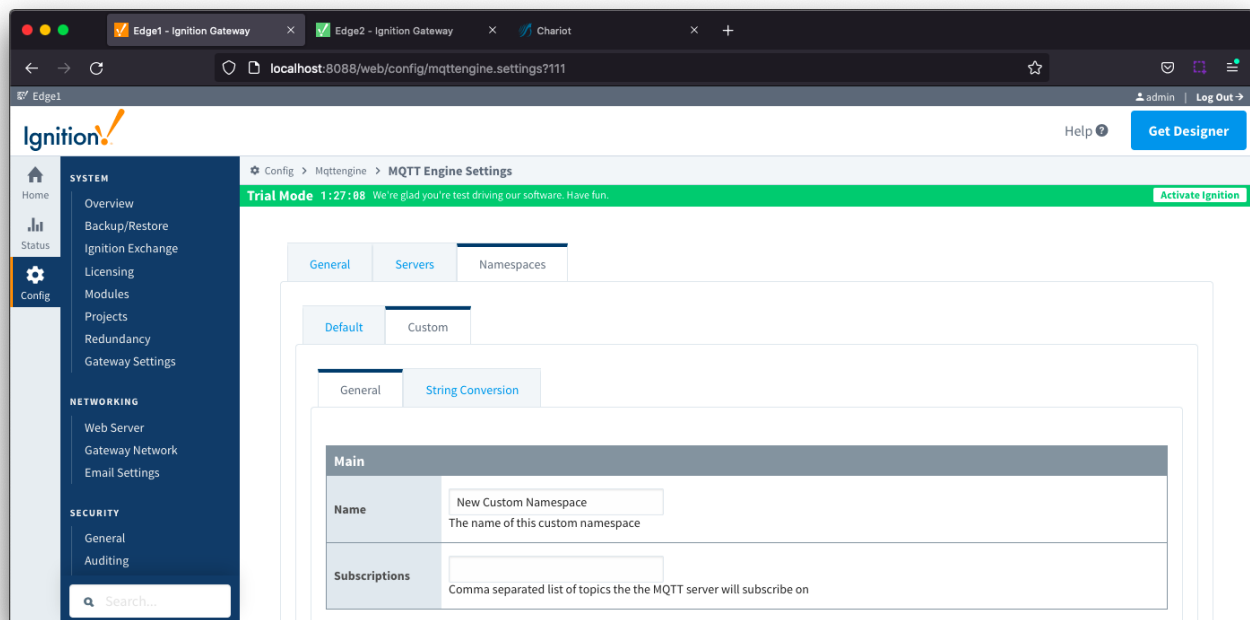


Each custom namespace configuration has two parts - [General](#) and [String Conversion](#).

## Namespaces Custom General

The configuration sections available are [Main](#), [Optional](#) and [Advanced](#).

## Namespaces Custom - General Main



- **Name**
  - A friendly name of the namespace to easily identify it.
- **Subscriptions**
  - A comma separated list of subscriptions and supports both the multi-level (#) and single level (+) wild card characters.

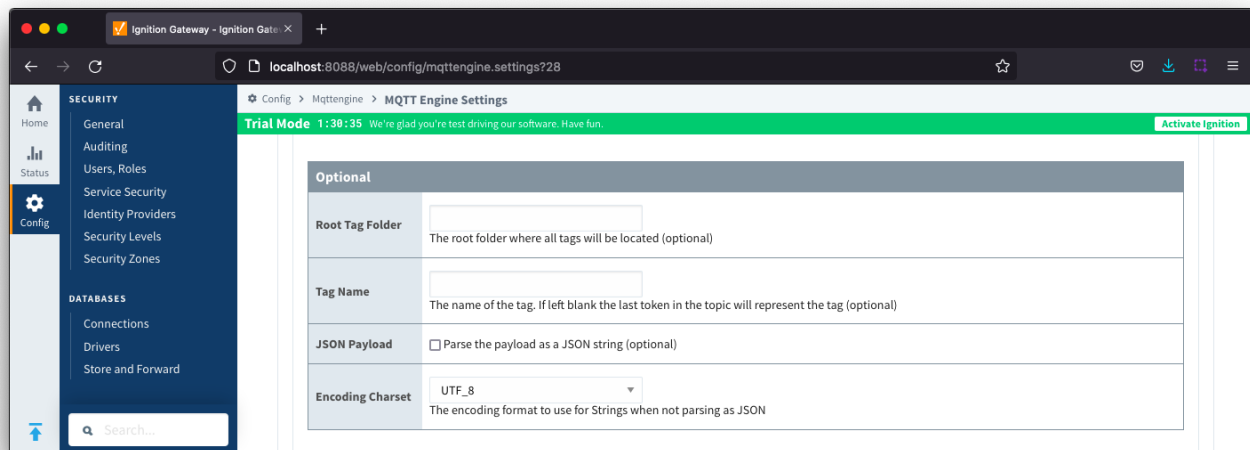
- (+) is a single level wildcard that matches any name for a specific topic level. This can be used instead of specifying a name for any topic level in the topic filter.
- (#) is a multi level wildcard that can only be used at the end of the topic filter as the last level and matches any topic whose first levels are the same as the topic levels specified at the left-hand side of the # symbol.



Check your MQTT Topic subscriptions to verify if they contain valid Ignition tag path or tag name characters. View the [Ignition Understand Tag Naming](#) document for details on the tag name rules.

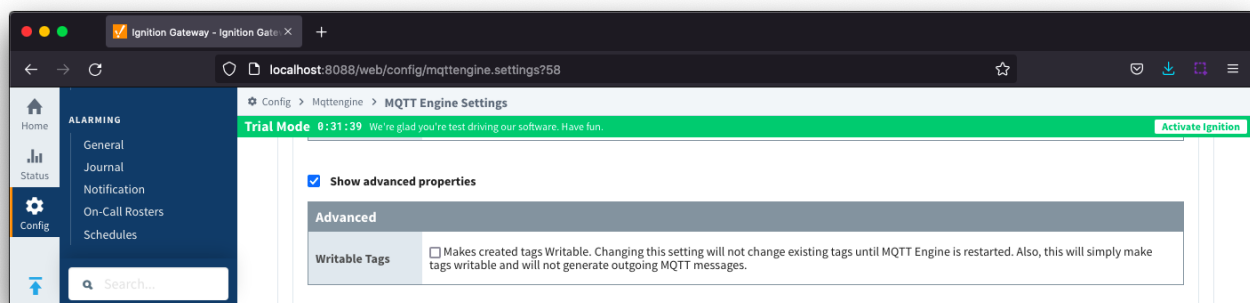
While MQTT and Sparkplug both support characters such as . & % =, Ignition does not support these as valid characters in a tag path or tag name and as a result, it may be necessary to tell MQTT Engine to replace certain characters or strings of characters with something else so the tag path and tag names can be properly created in Ignition. Reference the [MQTT Engine String Replacement HowTo](#) for additional details on how to use this configuration.

## Namespaces Custom - General Optional



- **Root Tag Folder**
  - A name of a folder where all tags will be stored. If configured, this folder will be the base folder where all tag paths will start.
- **Tag Name**
  - A tag name to be used for all tags. If not configured, the last token in the topic will represent the tag.
- **JSON Payload**
  - Optional flag to indicate that the content of the string based payload is a JSON object.
- **Encoding Charset**
  - The encoding format to use when not parsing as JSON.

## Namespaces Custom - General Advanced



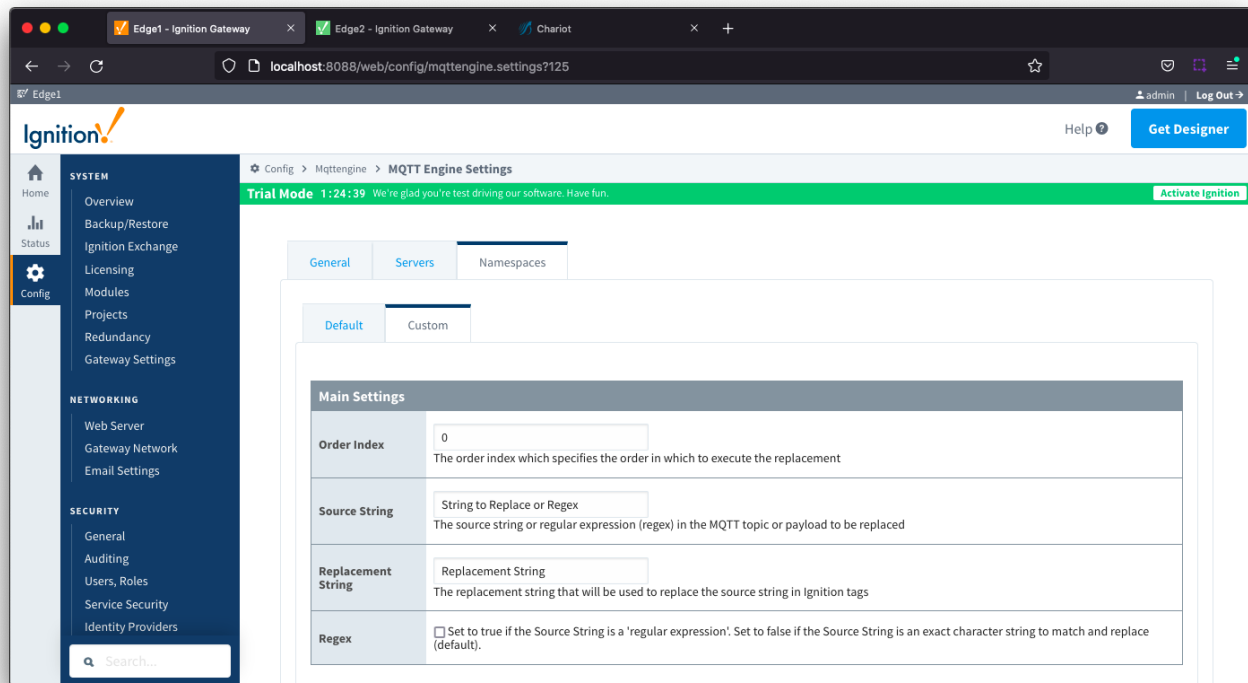
- **Writable Tags**
  - Enables writes on tags created by the Custom Namespace. **Note:** This will only make the tags writable; it will **not** result in outgoing MQTT messages.

## Namespaces Custom - String Conversion

There is one configuration section available [Main Settings](#)

Reference the [MQTT Engine String Replacement HowTo](#) for additional details on how to use this configuration.

## Namespaces Custom - String Conversion Main Settings



- **Order Index**
  - The order index which specifies the order in which to execute the replacement
- **Source String**
  - The source string or regular expression (regex) in the MQTT topic or payload to be replaced
- **Replacement String**
  - The replacement string that will be used to replace the source string in the Ignition tags
- **Regex**
  - Checkbox to determine the source string format. If selected, source string is a 'regular expression'. If deselected, source string is an exact character string to match and replace.