



Adroit Edge Gateway

Quick Start Guide



Adroit
Edge Gateway

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1. Introduction

The Adroit Edge Gateway is designed to provide universal secure connectivity between OT systems and the Cloud. It can run as a Stand-Alone system or be used to provide the same functionality by connecting to existing Adroit SCADA systems.

In this guide we will be focusing on setting up and running the Adroit Edge Gateway and will touch on some of the other functions that can be run from the Application Launcher.

We will also be focused on configuring and connecting to an Adroit Agent Server as a Datasource. The output configuration of the software relates to individual Microservices and as such each have their own Quick Start Guides that can be found under the Documents menu of the Application Launcher.

We will not be dealing with the data once it gets into each Cloud endpoint or OPCUA interface as this is something that would be unique to the end user requirements.

2. Getting Started

2.1. System Requirements

The software can be downloaded from the Adroit Website. The installation is simple and requires little input other than providing a valid local or domain user account under which the application services will run and be able to access network resources.

The machine can be installed inside a network or in the DMZ of a company IT infrastructure, adding to the security. Either way, if the Adroit Edge Gateway is to be used to publish data to an external Cloud Service Provider or use the OPCUA/MQTT functionality somewhere on the Internet, it requires an Internet connection.

Note: The Adroit Edge Gateway software CANNOT be installed and added to an existing Agent Server machine and must run on a separate PC.

This User Account is important in that it will facilitate the correct level of access to local machine resources (typically this account is a local Admin on the Adroit Edge Gateway machine).

In the case where remote access to existing Agent Servers is required, this account must have user security rights to access the network and be able to authenticate on the SCADA network machines where the Adroit Agent Servers need to be accessed as Datasources.

2.2. Prerequisites for installing and configuring the Product

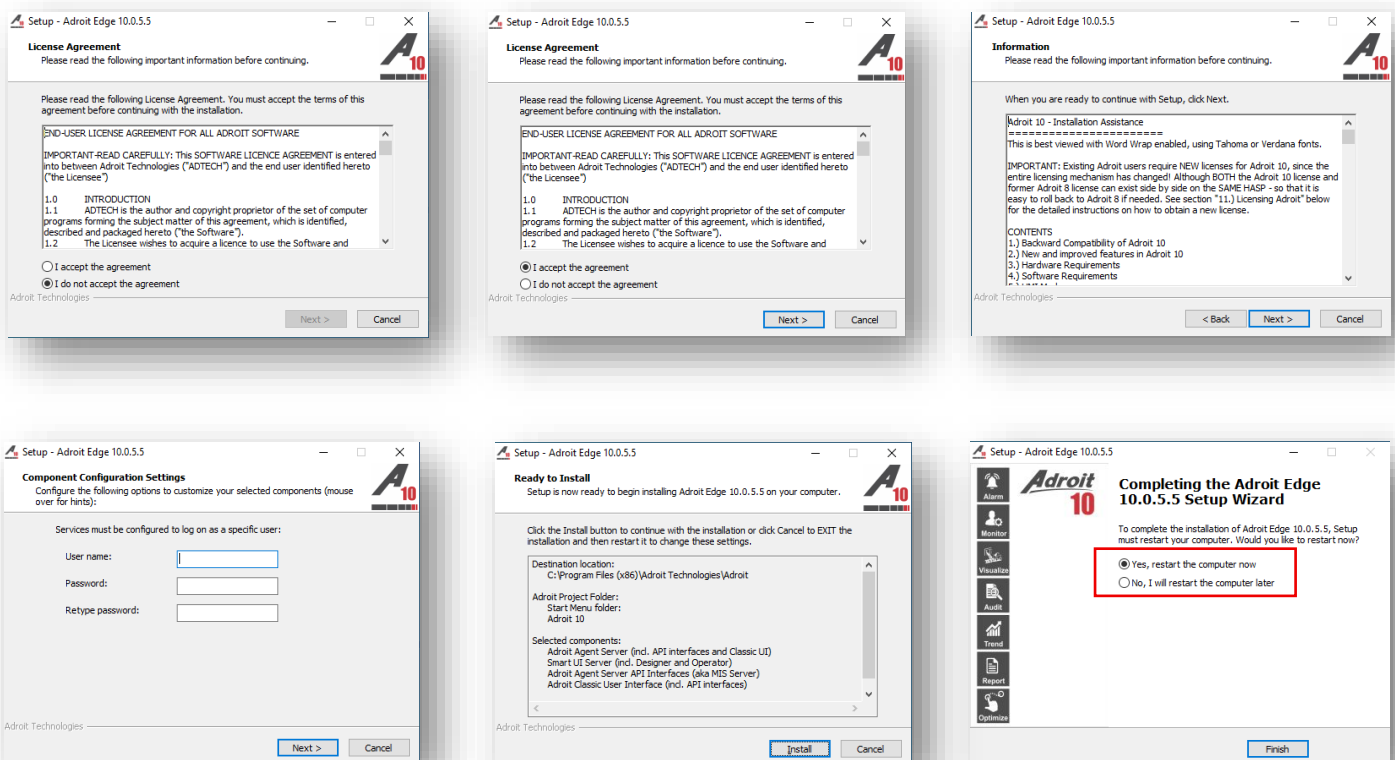
To run in a **"Stand-Alone Mode"** you can simply install the product after downloading the media from the Adroit Website.

If you wish to use the Adroit Edge Gateway in **"Gateway Mode"** connecting to an existing Adroit SCADA network and if you are already running an older version of Adroit then you will need to have upgraded to Adroit version 10 or higher.

Remember to install/upgrade all the components of Adroit, i.e. the Agent Server, SmartUI Server, SmartUI Designer and SmartUI Operator prior to configuring the Adroit Edge Gateway.

2.2.1. Installing the Product

After downloading the software, the install is an executable and can simply be run by double-clicking on the ".exe" file. Follow the steps and complete the installation. This will include a single icon on the desktop that will allow the user to run the Application Launcher.



Note: It is recommended to restart the PC after installing the software.



Figure 1 Installation Dialogs and Desktop Icon

3. Application Launcher

There are various menu items available within the application interface:

- Configuration
- Agent (I/O) Server
- Licensing
- Utilities
- Documents

3.1. Configuration

From the Configuration menu option, the user will be able to launch the Configuration Editor application (commonly known as the Config Editor). From here the user will have access to all settings and configuration of each component that makes up the Edge Gateway.

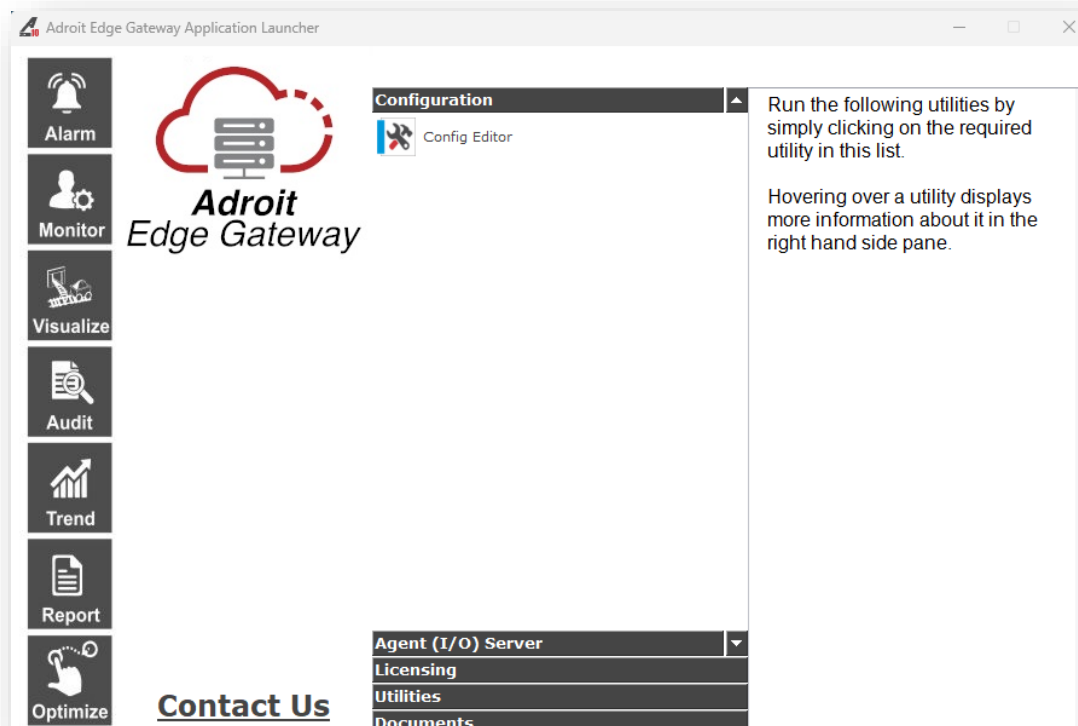


Figure 2 The Configuration Menu

Application	Description
Config Editor	The Adroit Edge Gateway Configuration Editor allows for setting up Edge Items and configuring settings for all Adroit Edge Gateway applications and Servers as well as other core functions such as backup and restore.

This is where the majority of the Adroit Edge Gateway configuration happens i.e., adding and connecting to Adroit Datasources and configuring the chosen Microservice(s).

The adding and setting up of Microservices and the detailed configuration and troubleshooting of each of these can be done using the particular Microservice Quick Start Guide.

The landing page will present a summary of the status of the system and will point out any missing components or services that have not yet been started. Resolving these “issues” is done in the same place:

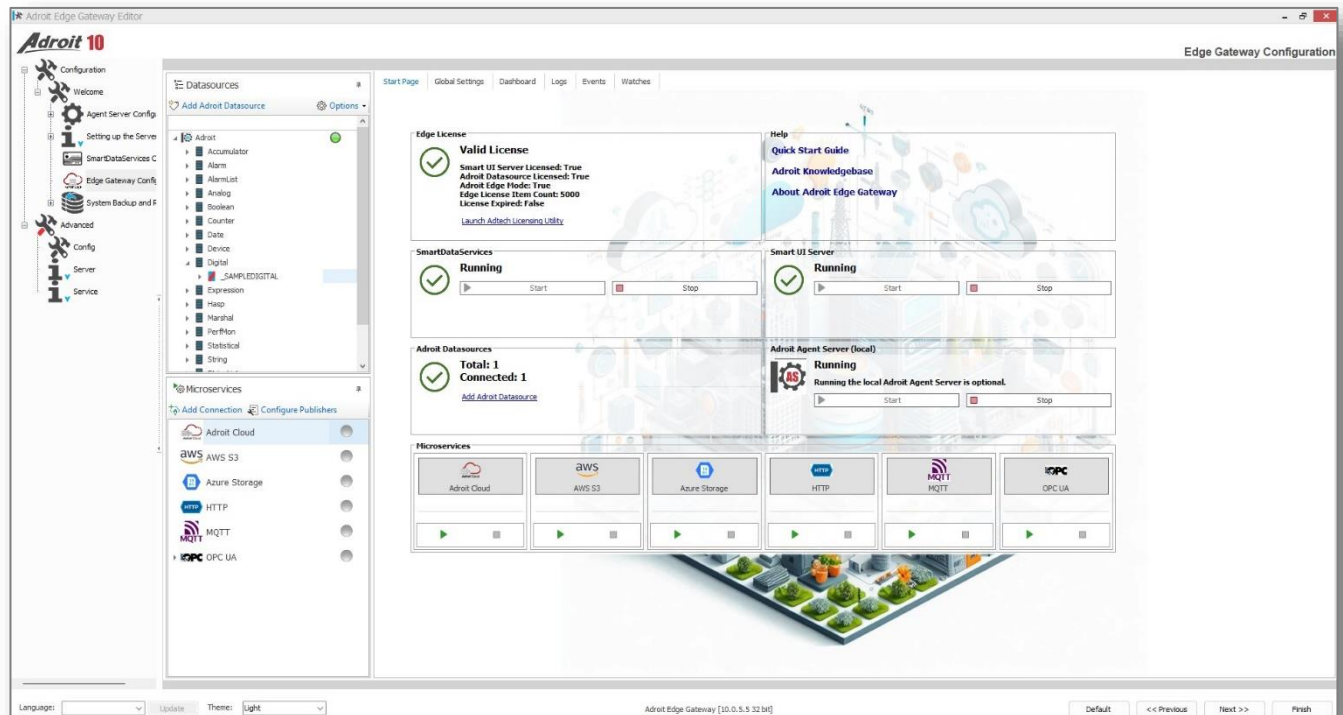


Figure 3 Edge Gateway Configurator Window

3.2. Agent (I/O) Server

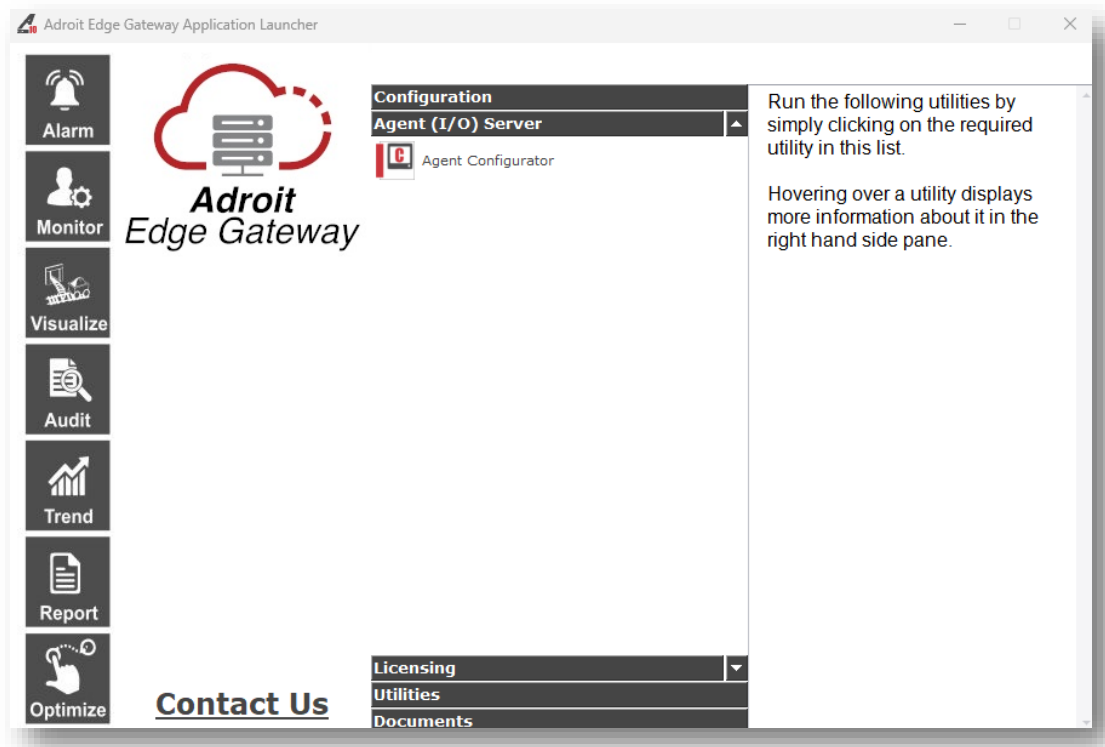


Figure 4 Agent (I/O) Server Menu

Application	Description
Agent Configurator	The Agent Configurator allows the creation and configuration of Agents in the Agent Server.

Clicking on this item opens the Agent Server (I/O Server) Configuration application. This is where users can add, delete and configure Agents, add and manage connections (PLC Drivers and Devices), Setup Scanning to PLC's etc. This is dealt with in more detail later in the guide.

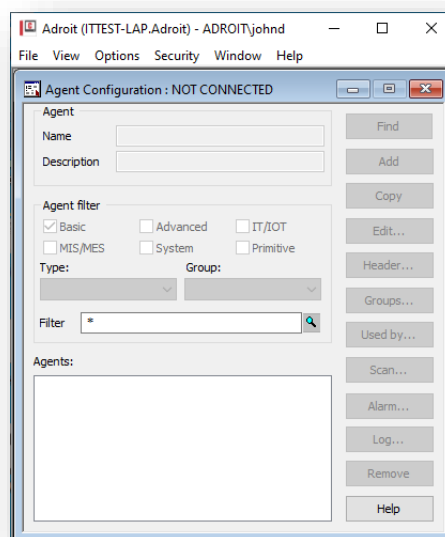


Figure 5 Agent Configurator

3.3. Licensing

Opening the Licensing Utility opens the application known as the Adroit Licensing Utility (ALU). It shows what Adroit Edge Gateway is licensed for. A new user will also use the application to request a soft license, and to install the license once received using the sub-menu items within the ALU itself.

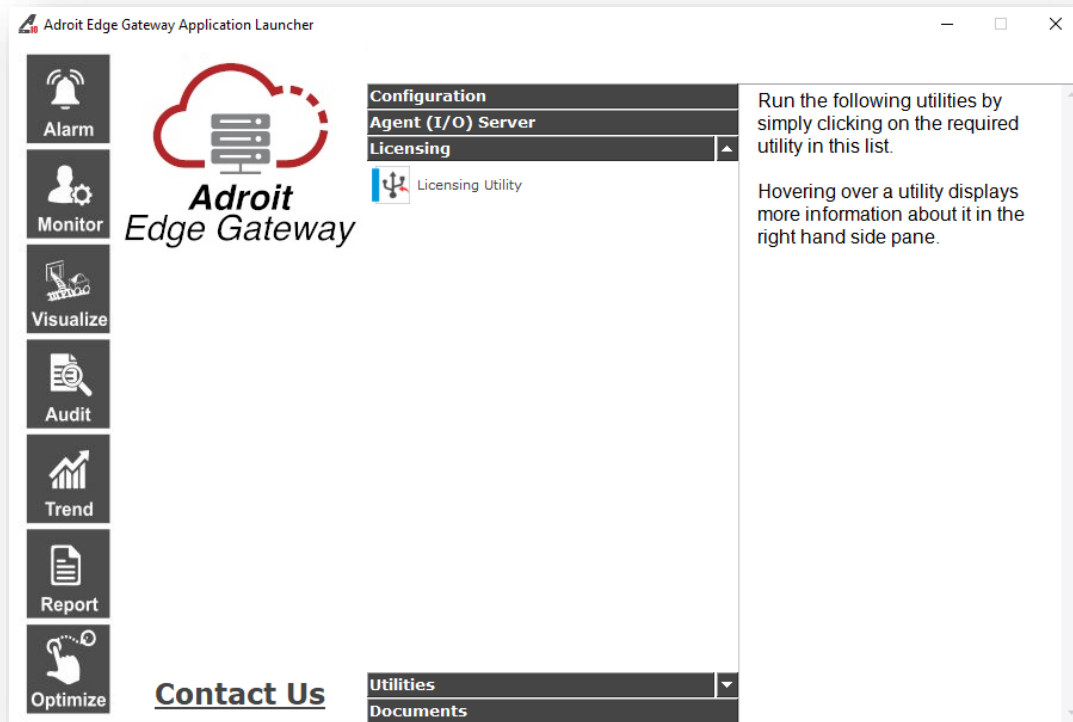


Figure 6 Licensing Menu

Application	Description
Licensing Utility	The Adroit Licensing Utility allows you to get, view and/or update your Adroit Edge Gateway product license, which you can either license via a HASP hardware key or a software license.

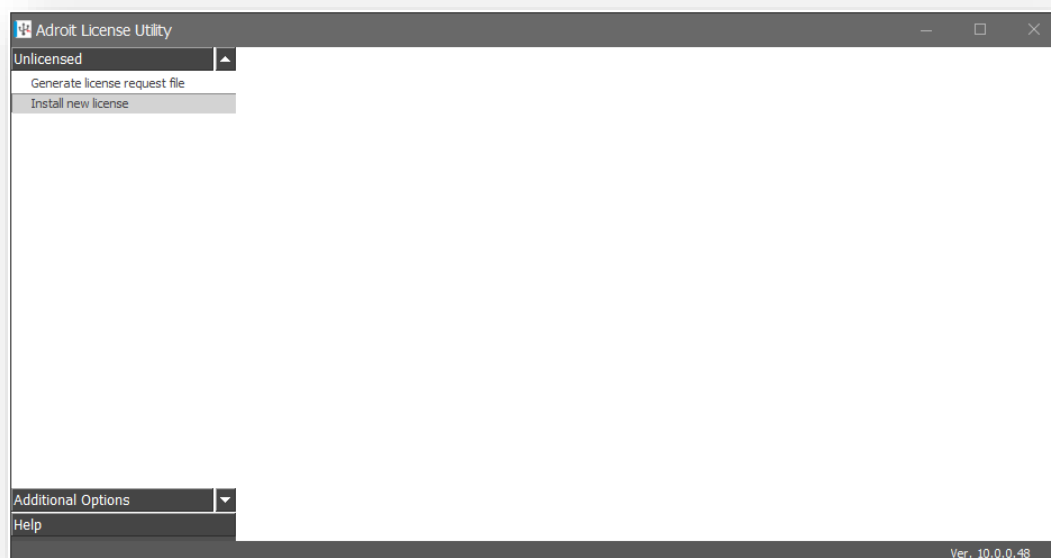


Figure 7 Adroit Licensing Utility (ALU)

3.4. Utilities

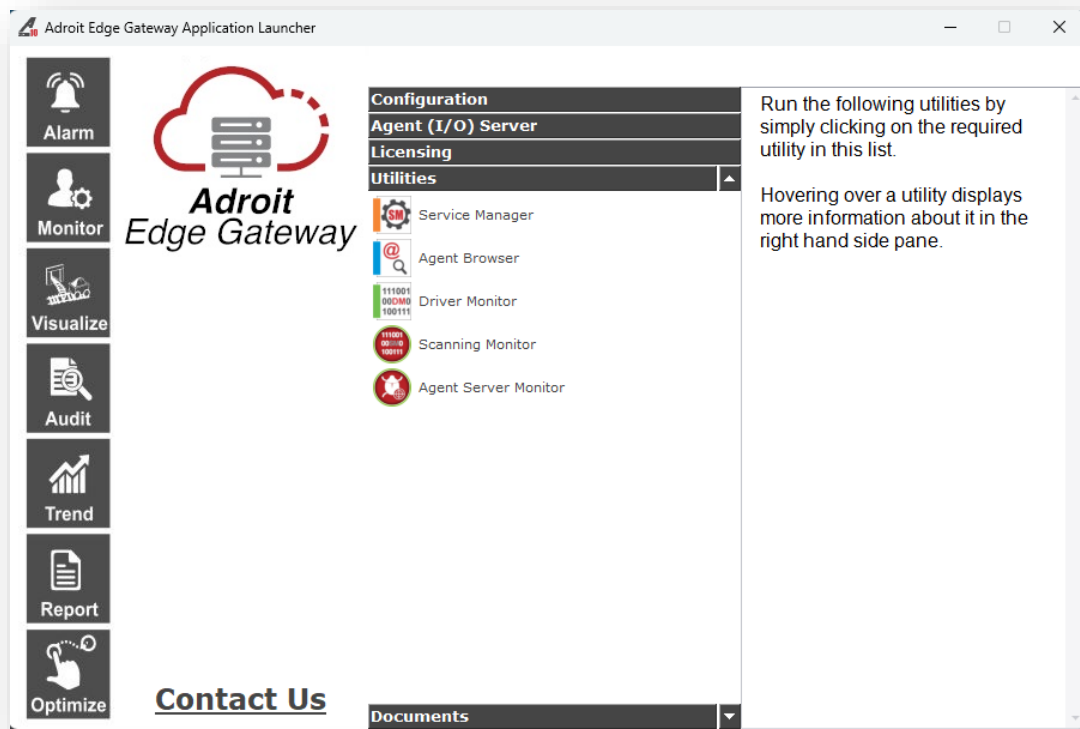


Figure 8 Utilities Menu

The utilities contained and launched from here assist with configuration debugging and include:

Application	Description
Service Manager	The Service Manager application monitors and controls the key Edge Services.
Agent Browser	The Agent Browser utility allows you to browse the Agents and slots of an Agent Server.
Driver Monitor	Allows advanced users to diagnose or troubleshoot device drivers.
Scanning Monitor	The Scanning Monitor utility is designed to assist experienced users in fine-tuning the Adroit scanning subsystem to achieve optimal performance, by providing an intuitive report-like view of advanced diagnostic information.
Agent Server Monitor	Allows advanced users to diagnose or troubleshoot the Agent Server and its client connections.

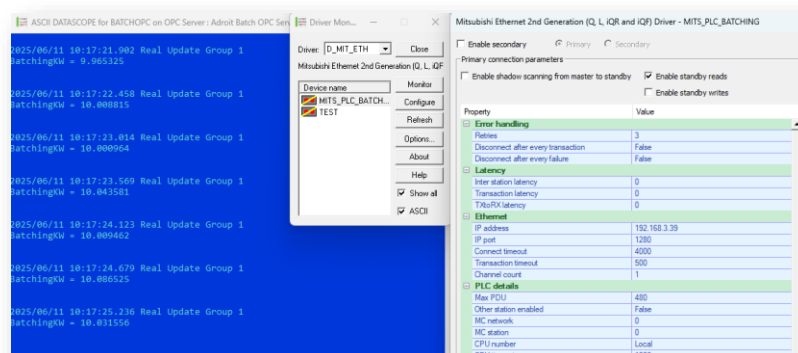


Figure 9 Typical Monitoring of Device using Scanning Monitor Utility

3.5. Documents

This Menu folder contains documents including all the Quick Start Guides for the Adroit Edge Gateway and each of the Microservices available to the user. These documents are also available on our website.

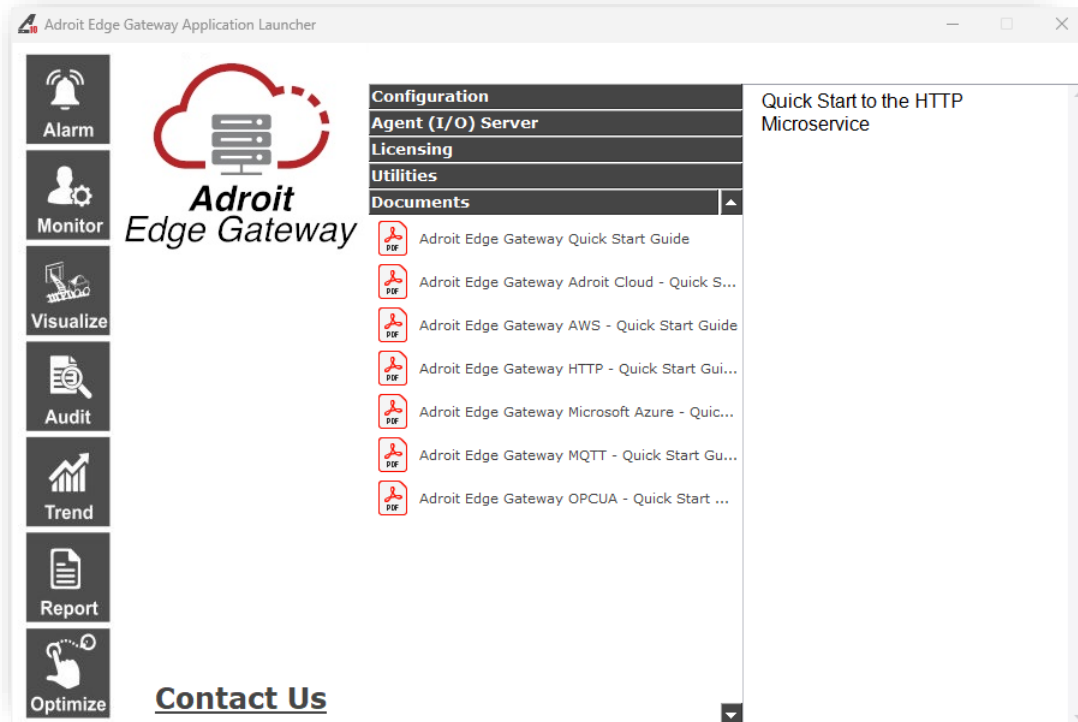


Figure 10 Documentation Menu

Application	Description
Quick Start Guide	A Guide to help getting started with Adroit Edge Gateway.
Adroit Cloud Microservice	An installation guide for Adroit Cloud Microservice.
AWS Microservice	An installation guide for Amazon Web Services Microservice.
HTTP Microservice	An installation guide for HTTP Microservice.
Microsoft Azure Microservice	An installation guide for Microsoft Azure Microservice.
MQTT Microservice	An installation guide for MQTT Microservice.
OPC UA Microservice	An installation guide for OPC UA Microservice.



Figure 11 Microservices Documents

4. Licensing

The process is simple, and the general approach is as follows:

4.1. Request a new license (c2v file).

Once you have installed the product, run the Application Launcher.

Open the Licensing tab, run the Licensing Utility, navigate to the Licensing menu and select "Licensing Utility".

From here the user can generate a License request file (.c2v)

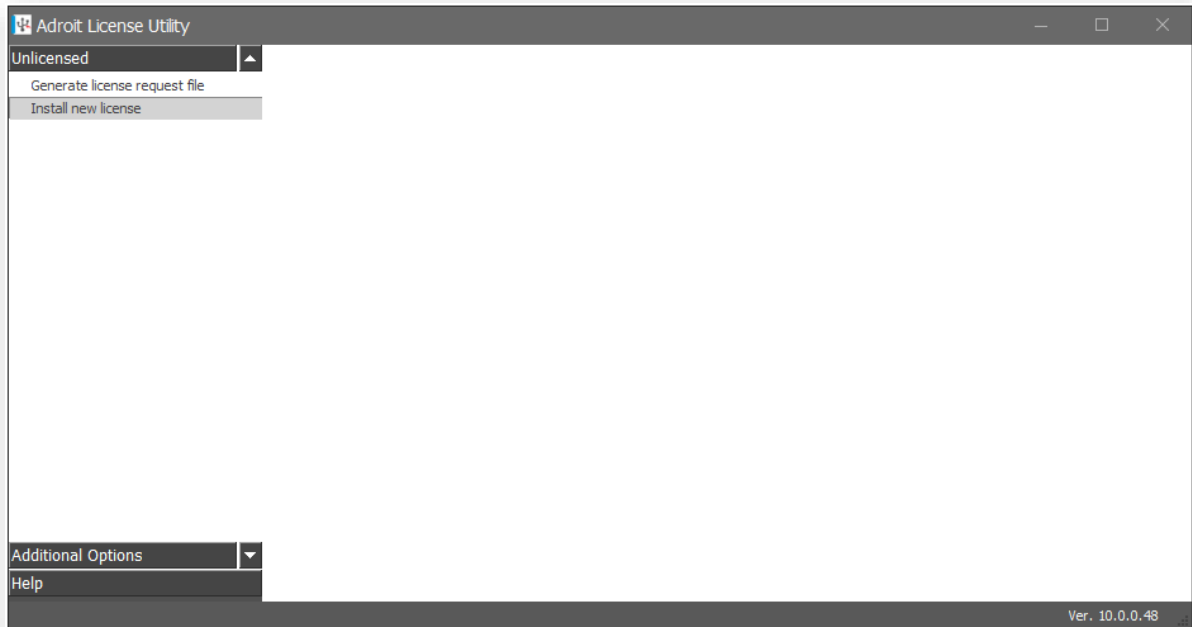


Figure 12 Adroit Licensing Utility

Open the Adtech Licensing Utility and select "Generate license request file" in the top right hand corner.

The c2v file will be generated as follows "[New-SL-computername.c2v](#)".

Send an email to **licensing@adroit.co.za** with this c2v file attached.

Adroit Technologies will then generate the required v2c file accordingly.

You will receive an email with the attached v2c file with instructions on how to apply the license.

4.2. Install the new license (v2c file).

Copy the attached v2c file to a folder on your PC.

Open the Adtech Licensing Utility, click on "Install new license"

Browse to where you saved your v2c file, select the license file and click Open.

Close the Adtech Licensing Utility.



Figure 13 Adroit Licensing Utility showing install License

Having installed the license, restart the PC to initiate.

5. Configuring the Adroit Edge Gateway

Open the Application Launcher, navigate to the "Configuration" menu and run the **Config Editor**.

In the Start Page Window you should have all the green ticks indicating that the following **Services** are started when launching the product:

- Local Agent Server
- SmartUI Server
- Smart Data Services

Note: These services are started in the "Automatic (Delayed Start)" start-up type, thus allowing priority to important critical services. Delays may occur before all services are started.

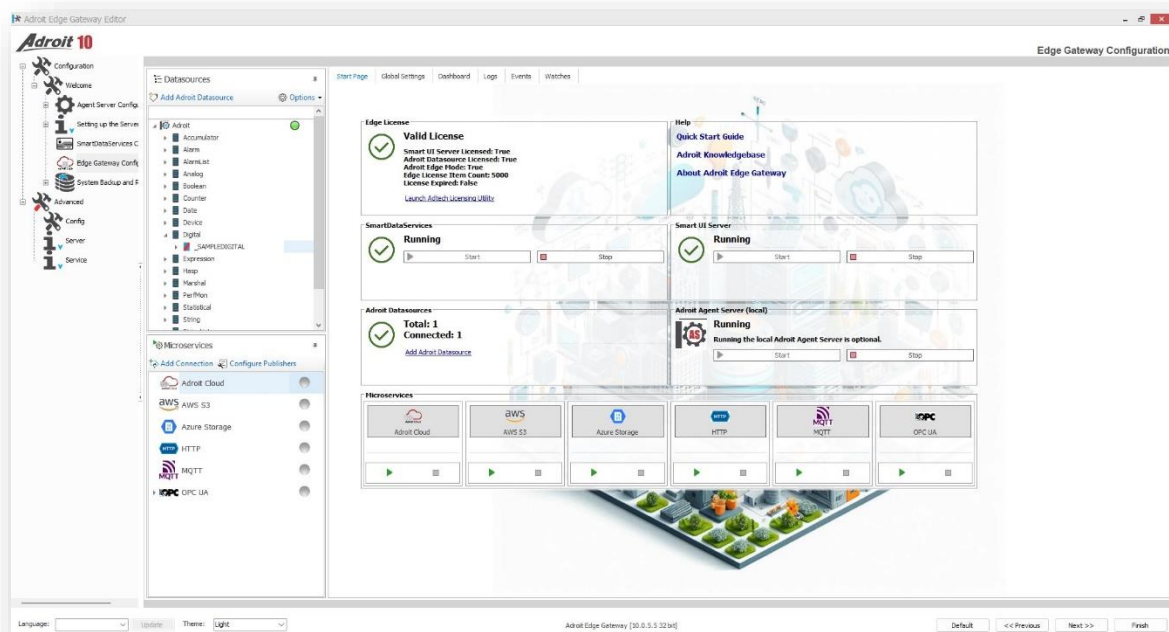


Figure 14 Config Editor showing installed License and Services running.

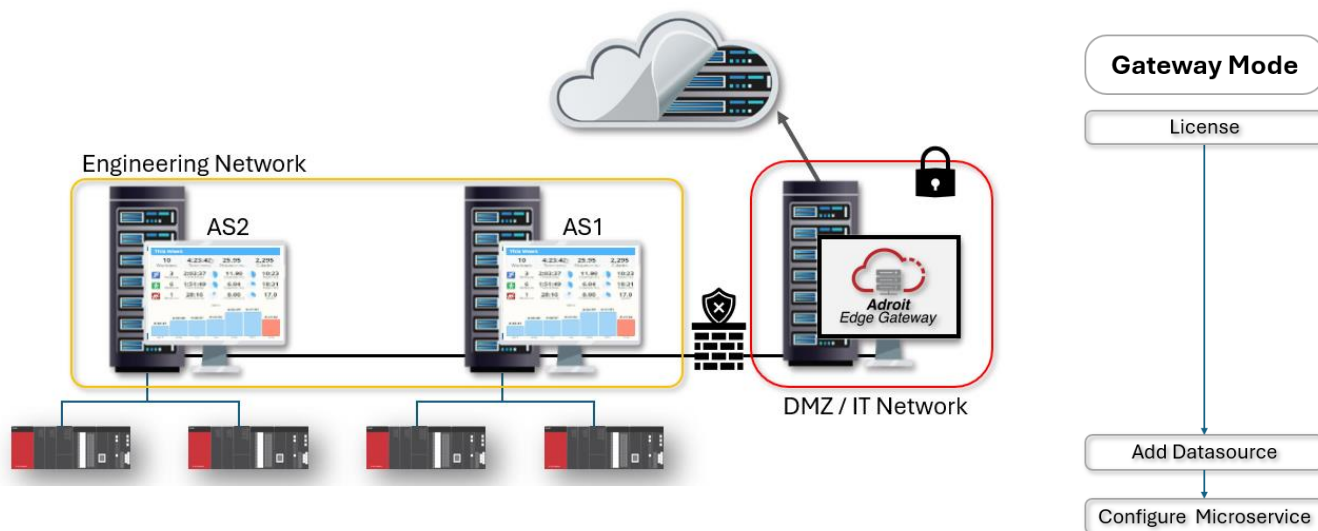
There are two ways the Adroit Edge Gateway can be used.

- Gateway Mode (refer to section 5.1)
- Stand-Alone Mode (refer to section 5.2)

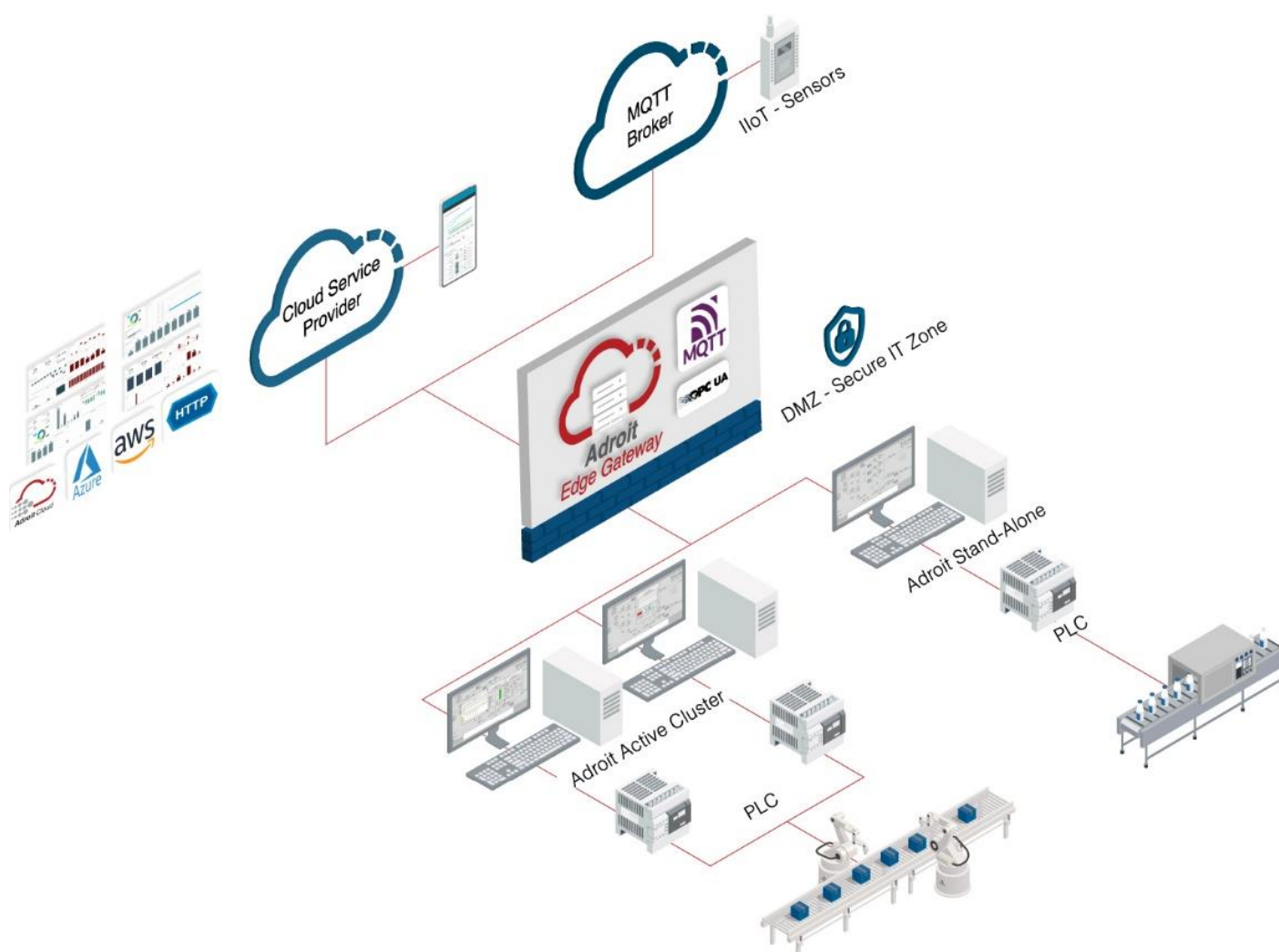
Details on how to configured each mode are described in the relevant sections.

5.1. Gateway Mode - Connecting to existing Adroit Agent Servers

If you are installing the Adroit Edge Gateway on an existing network or in the DMZ of a company IT infrastructure, follow this simple procedure.



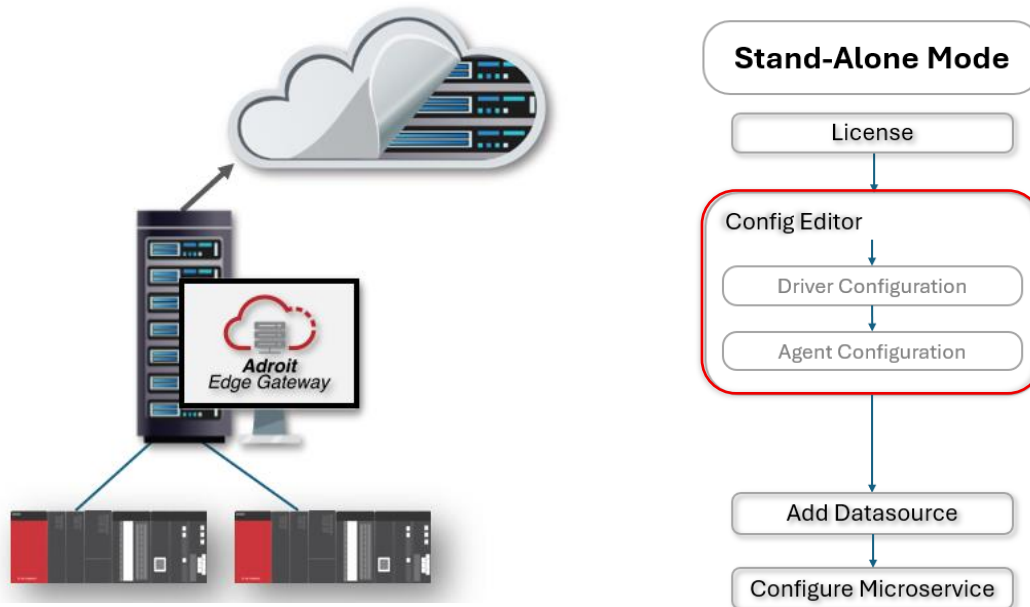
If you are using the Adroit Edge Gateway on an existing Adroit SCADA/HMI solution you can move to the [Chapter 6](#) that deals with **"Adding an Adroit Datasource"** connection to each of the Agent Servers from which you wish to extract and publish data.



5.2. Stand-Alone Mode - Configuring a Local Agent Server

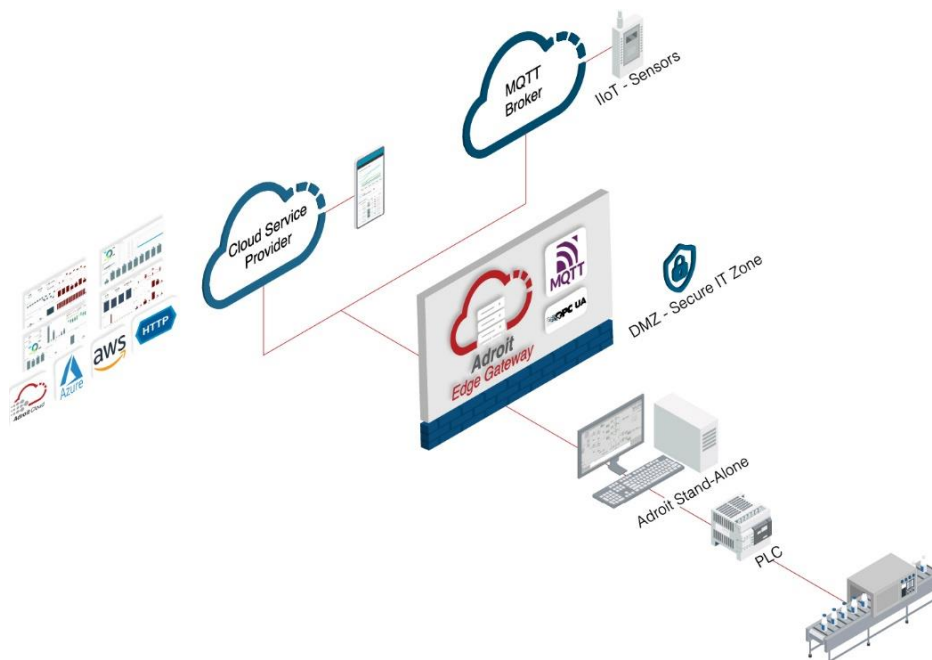
Where a user is installing it as a stand-alone concentrator from a stand-alone PLC or a network of PLCs. In this instance the user needs to run and configure the local Agent Server, configure PLC drivers along with creating and scanning the Agents to the PLC's prior to being able to access the Tags required for the Adroit Edge Gateway solution.

To users that do not know anything about how Adroit Agent Servers work there is a lot more detailed information on the Adroit SCADA on the website. Remembering that the Adroit Edge Gateway is built on the tried and tested Adroit SCADA but does not have the HMI interface.



Once your Agent (I/O) Server has started as a Service, you can now start configuring your local Agent Server as follows:

- Driver Configuration (refer to section 5.2.1)
 - Add and configure a Device Driver
- Agent Configuration (refer to section 5.2.2)
 - Create the Agents/Tags required.
 - Scan these tags to the front-end device (PLC)



5.2.1. Driver Configuration

- From the Agent Server Configuration menu on the left select "Driver Configuration". If the driver you wish to use is NOT in the list then just click on "Install New Driver" item and select the driver from the list presented and follow the installation process.
- Once the Driver is installed you need to create a Device instance that uses the selected driver. This is done by highlighting the Driver in the list and clicking on "Add" button. This will allow you to name the Device and to configure the Device communications parameters.

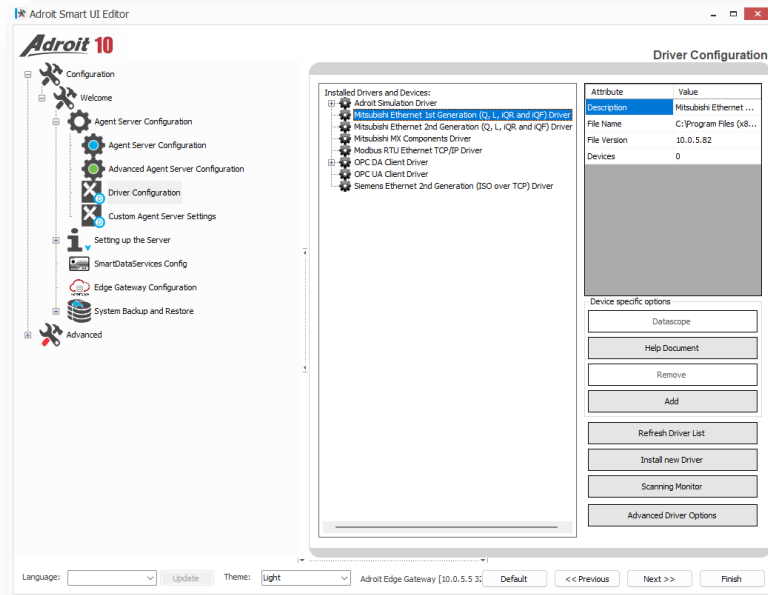


Figure 15 Adding a Device/PLC Driver

The image below shows a Device named MITS_PLC_BATCHING that is using the Mitsubishi Ethernet Driver along with its specific configuration. You will see the relevant IP settings, Timeouts etc. set for the Device. With most drivers you can test the communications to ensure that the Device has been set up correctly.

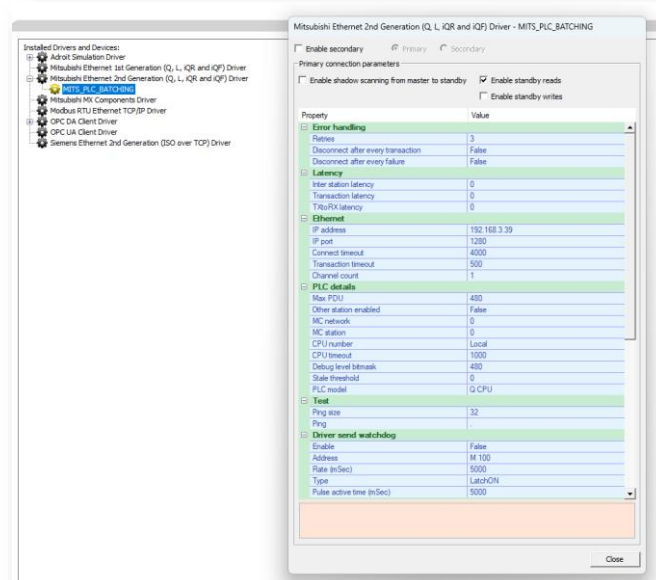


Figure 16 Configuring a Device

5.2.2. Agent Configuration

From the Application Launcher, open the Agent (I/O) Server tab and launch the Agent Configurator.

The Agent Server Configurator is the application that is used to configure Agents which are then the Dataelements you will want to publish via the Adroit Edge Gateway to the Cloud (or expose using OPCUA).

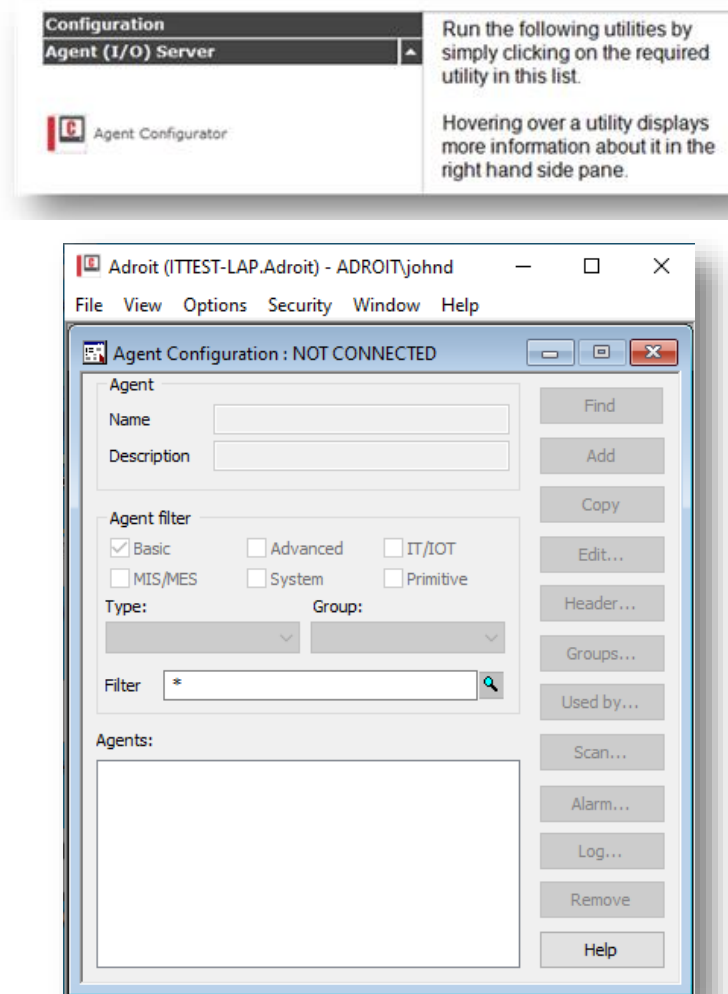


Figure 17 Agent Server Configuration Window

Data from the field is represented in Agents (add an Agent that suits the data or functionality required) – the standard Basic Agents are as follows:

Agent	Description
Analog	stores a floating-point engineering value, and associated scaling parameters.
Counter	Driven by a Digital Agent and delivers value-add data on a Digital Agent (i.e., on count, off count etc.). This is an Internal Agent.
Digital	stores a digital (ON/OFF) value and their text representations
Expression	Expression – allows for the configuration and execution of user-defined mathematical and logical expressions.
Marshal	"marshals" an integer input value into 16 discrete digital values
String	stores an 80-character ASCII string (79 chars max. with zero terminator)
StringList	stores any number of variable ASCII strings.
Timer	performs several commonly used timing operations.

There are many Agents available to the user to do pre-processing in the Agent Server and just use the data necessary in the Cloud.

NOTE: Refer to the Adroit Technical Description Document available on the website for a better description and understanding of the Adroit Agent concept and functionality. For many users it requires an understanding of the Adroit Agent terminology. A TAG in the Adroit world is the Agent.Slot and every Tag can be used in the Adroit Edge Gateway solution.

The images below shows an Analog Agent named MIXING_MOTOR_CURRENT and by double-clicking on the Agent you have added, it is possible to configure the particulars of the Agent such as Scaling, Units, Alarm Levels and Deadbands etc.

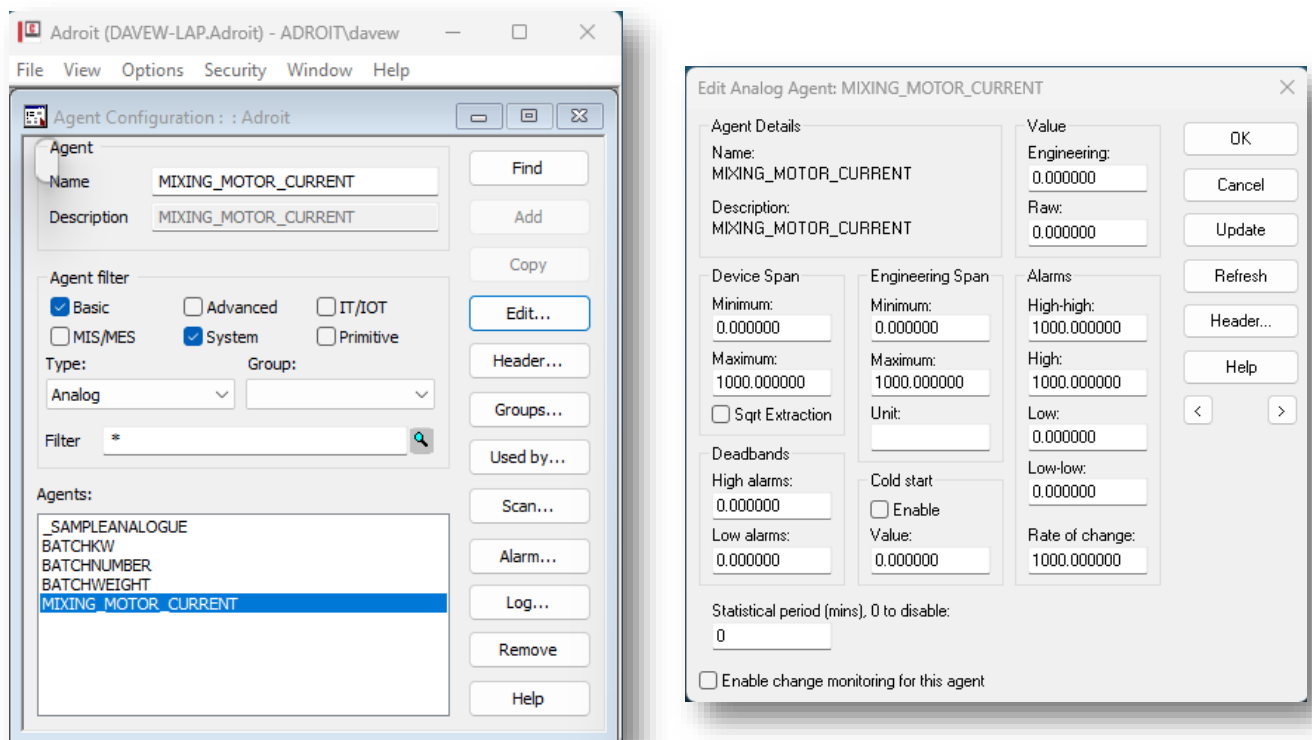


Figure 18 Adding and Setting up an Analogue Agent

The next step would be to Scan the Slot (typically the Agent.RawValue) to the PLC address in the selected PLC. This is done by selecting the Agent in the list, clicking on the "Scan" button and following the next few steps.

- Select the PLC Device from the Device listbox.
- Click on "Started" Radio Button (this allows you to stop and start a driver, however this only needs to be done once and applies to all Agents scanned to that Device.)
- Select the Agent Slot you wish to scan to.
- Add the PLC address.
- Select the Scan Rate you wish to use.
- Click on the Scan button, this will add to the scan list below and will automatically begin communications to the PLC.

There are various tools to check that the values are correct and are available in the Utilities Menu of the Adroit Edge Gateway Application Launcher. The easiest way is to simply open the Agent and click on "Refresh" to monitor or set the values of the Slots and see that they are changing and showing the correct values as contained in the PLC register.

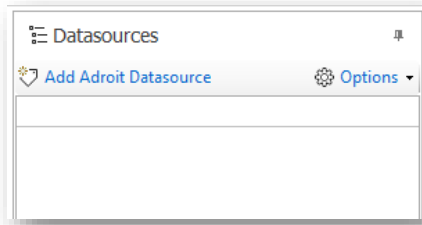
Note: *As previously pointed out there are many Agent Types, and each adds value to the project. Details of each Agent can be found in the help file in the Agent Configurator, else in the Adroit Technical Description Document available on our website.*

Once you have configured your device driver and required Agents you can move to the Chapter that deals with "**Adding an Adroit Datasource**" connection to each of the Agent Servers from which you wish to extract and publish data.

6. Adding an Adroit Datasource

When "Edge Gateway Configuration" is selected in the Config Editor, the view will show available Datasources in the top left tree (this is used to select tags from one or more Agent Servers).

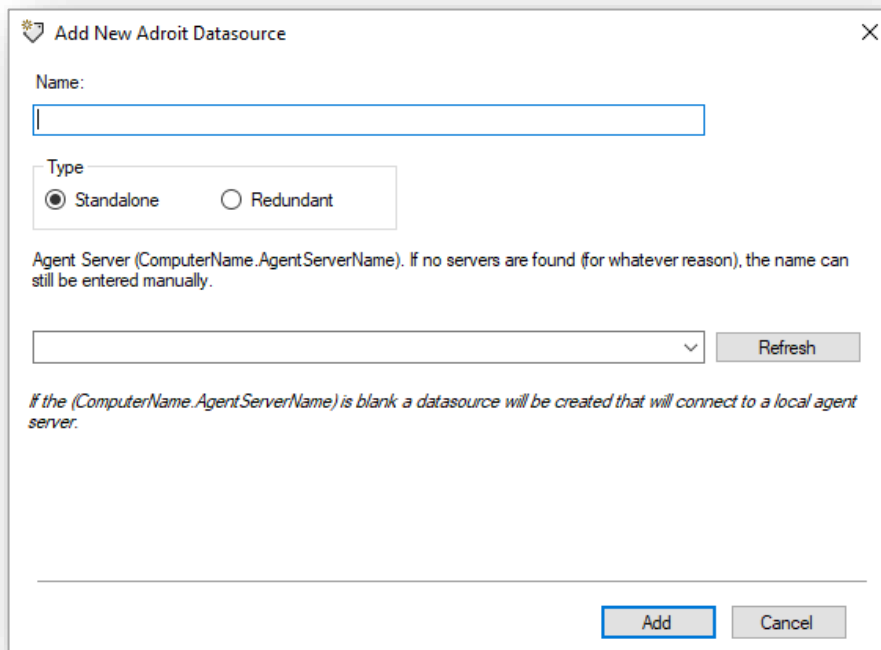
In order to add an Adroit Datasource, click on "Add Adroit Datasource" in the "Datasources" window.



Name the Datasource and browse your network and select the Agent Server you wish to access and publish data from. Once added the tree can be expanded and you can browse down the list of Agents and Slots available.

The Adroit Edge Gateway makes data available from one or more Agent Servers. These are made available by adding Datasources for each Agent Server (or Cluster).

The option to add Adroit Datasources is clearly visible at the top of the Datasource tree. This will then prompt us to name and configure a new Datasource by typing in the applicable connection string for the relevant Agent Server (typically of the form: *ComputerName.AgentServerName*).



The dialog box titled "Add New Adroit Datasource" contains the following fields and controls:

- Name:** A text input field for naming the datasource.
- Type:** Radio buttons for "Standalone" (selected) and "Redundant".
- Agent Server:** A text input field with a dropdown arrow. Below it, a note states: "Agent Server (ComputerName.AgentServerName). If no servers are found (for whatever reason), the name can still be entered manually."
- Refresh:** A button next to the Agent Server input field.
- Footer:** A note stating: "If the (ComputerName.AgentServerName) is blank a datasource will be created that will connect to a local agent server." Below this are "Add" and "Cancel" buttons.

Figure 19 Add new Datasource

Once a Datasource is added the Agents will become available in the Datasource tree and can then be linked to Microservices for publishing.

Note: it is possible to expose Agents and Slots (properties) of any Agents existing within your Agent Server, by changing the selection under the Options icon on the right-hand side of this window.

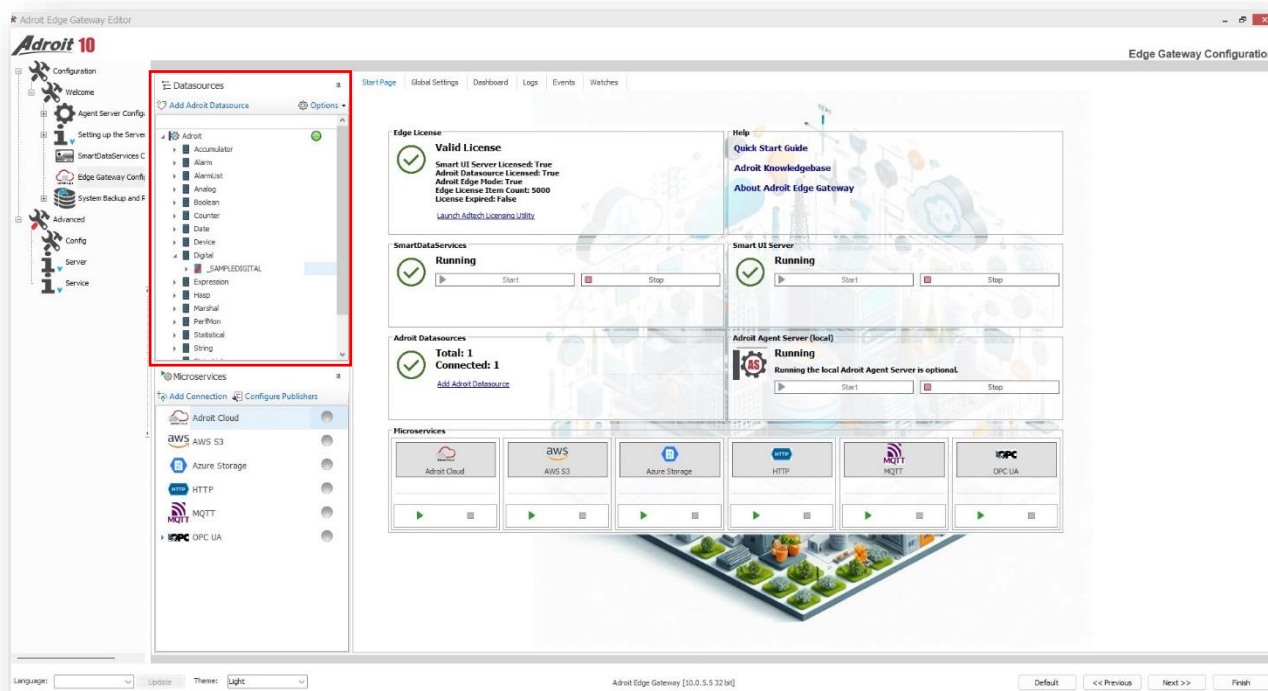


Figure 20 Config Editor showing Datasource

7. Configuring a Microservice

The next step is to set up the Microservice you wish to use to Publish your Dataelements to. This is done in the Microservices window. There is a separate "Quick Start Guide" for each of the possible Microservices available within the Adroit Edge Gateway. These can be accessed from the Document Menu in the Application Launcher.

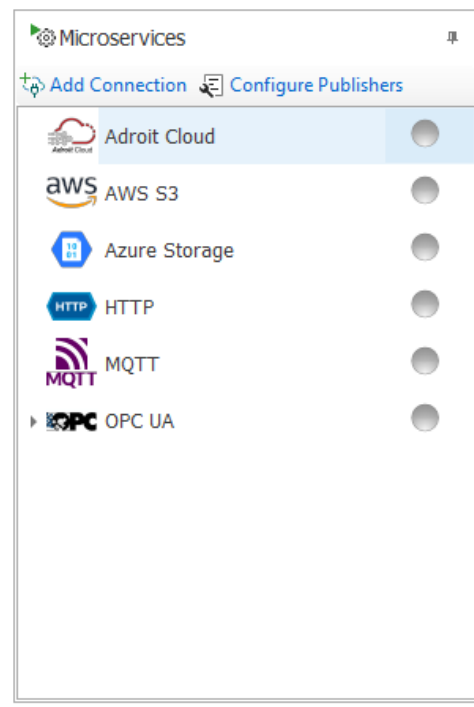


Figure 21 Microservices Configuration Window

It is important to understand the architecture of the Microservices, and the terminology used in the Adroit Edge Gateway.

A Microservice is similar to an Adroit Driver, a Connection is similar to a Device and a Publisher is an instance of a "Job", so a controlled push of data governed by your application requirements.

- Microservice
 - Connection 1
 - Publisher 1
 - Connection 2
 - Publisher 1
 - Publisher 2

An example might be as follows:

- Adroit Cloud
 - Plant 1
 - Blending Batch Details (published at end of Batch Cycle)
 - Plant 2
 - Energy Values (published every minute)
 - Production Values (published at end of shift)

Examples of this can be found below:

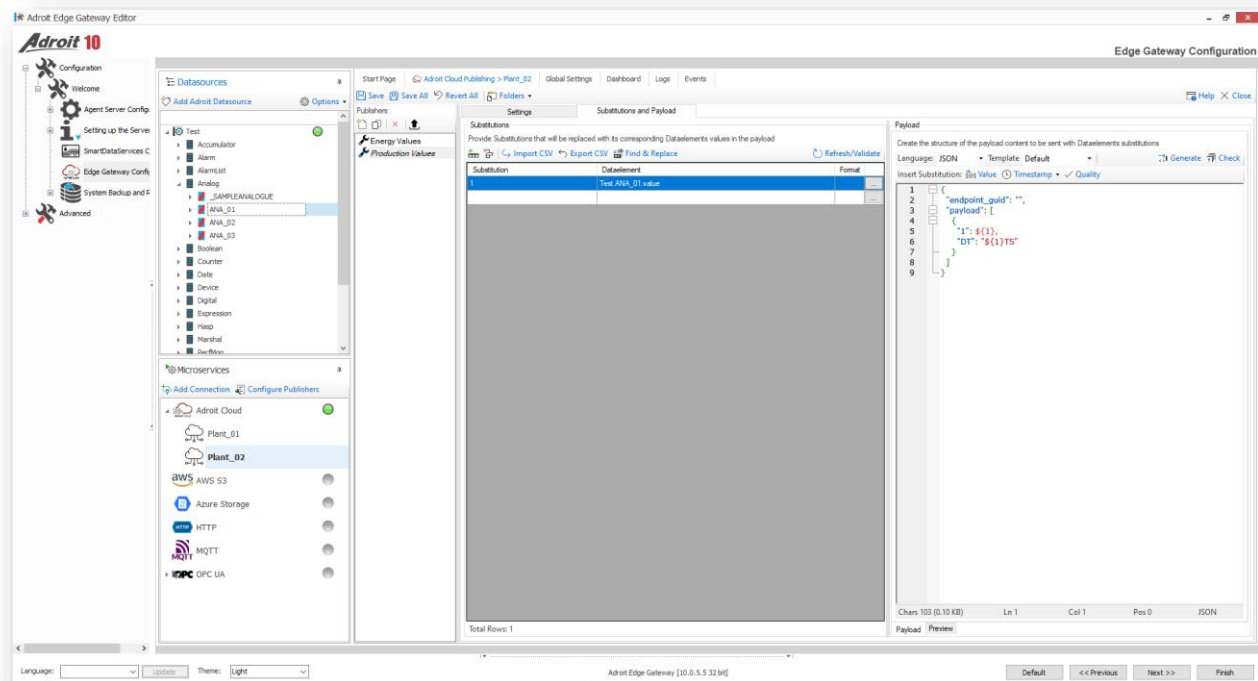
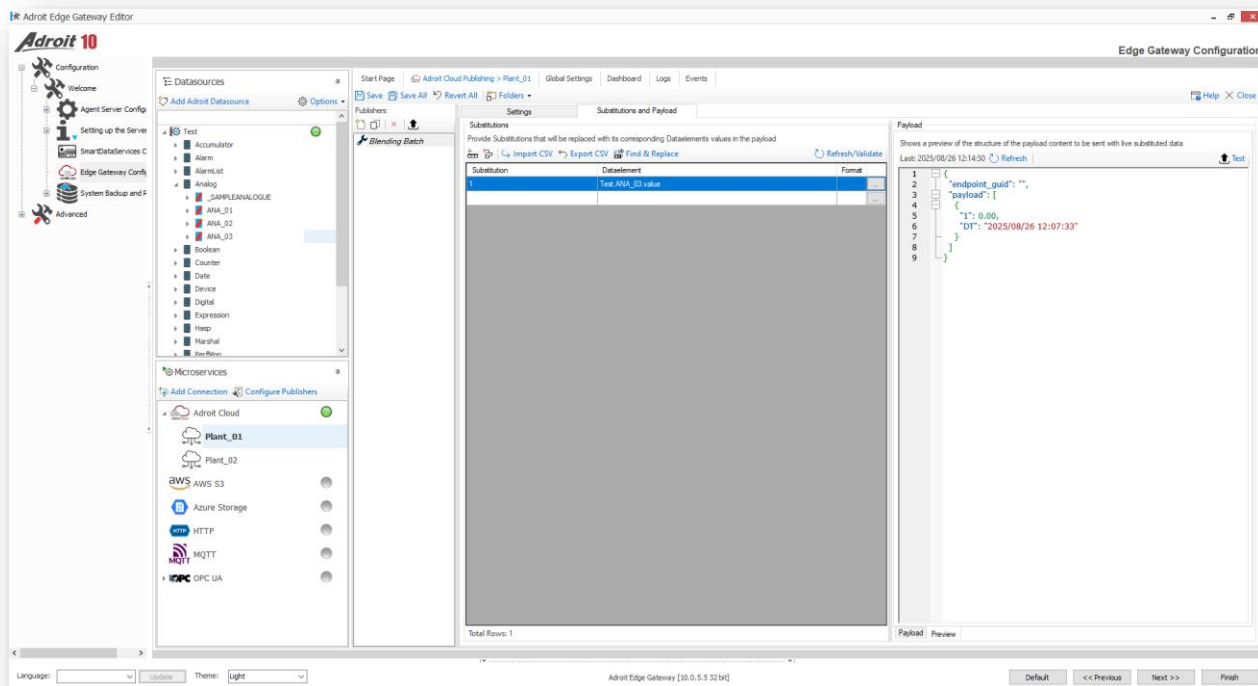


Figure 22 Examples of configured Microservices

8. Other Settings, Debugging and Management

There are a number of other tabs in the Configuration Interface namely:

- Start Page
- Global Settings
- Dashboard
- Logs
- Events

8.1. Start Page

The Start Page shows the status and gives the user control over stopping and starting the various applications and services used in the Publisher.

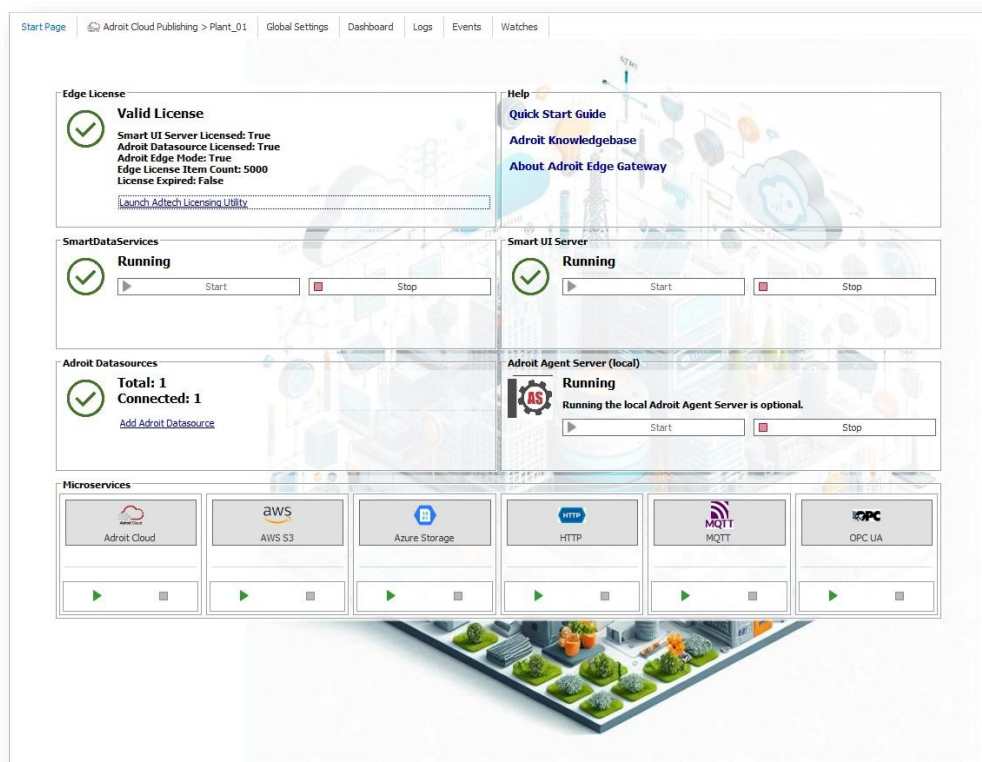


Figure 23 Start Page

8.2. Global Settings Page

In the Global Settings Page, the User can set the display format of the Analogue Values and set the Date/Time format to be used in the JSON message.

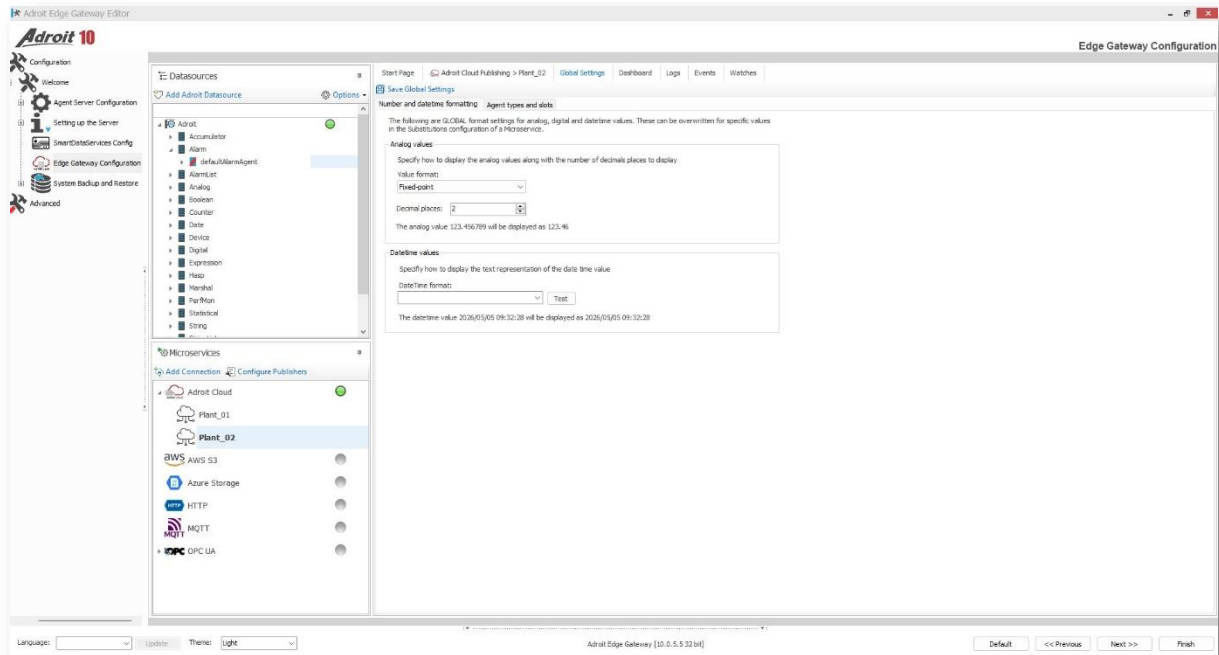


Figure 24 Global Settings Page

8.3. Dashboard Page

In the Dashboard Page shows the status of the License and each Microservice configured.

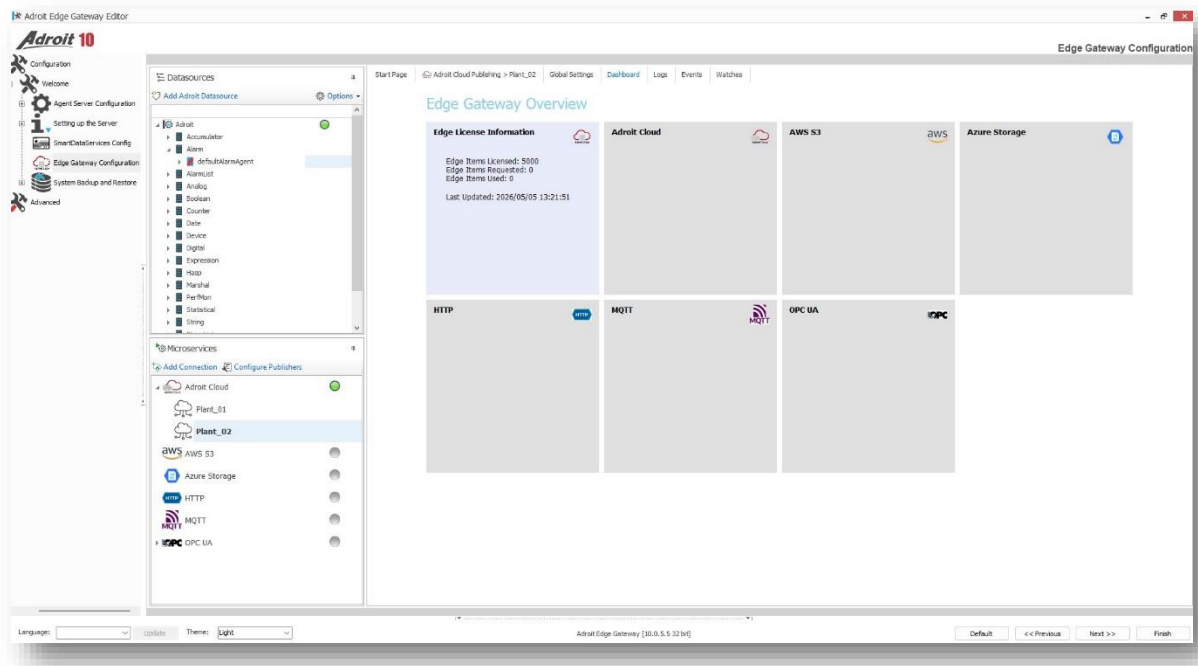


Figure 25 Dashboard Page

This page will also give an indication if there is a problem on any of the Microservices. i.e., licensed items exceeded, Publishers not started etc.

8.4. Logs Page

The Logs Page shows a log of what has happened in the product. This is very useful when understanding how the system is functioning.

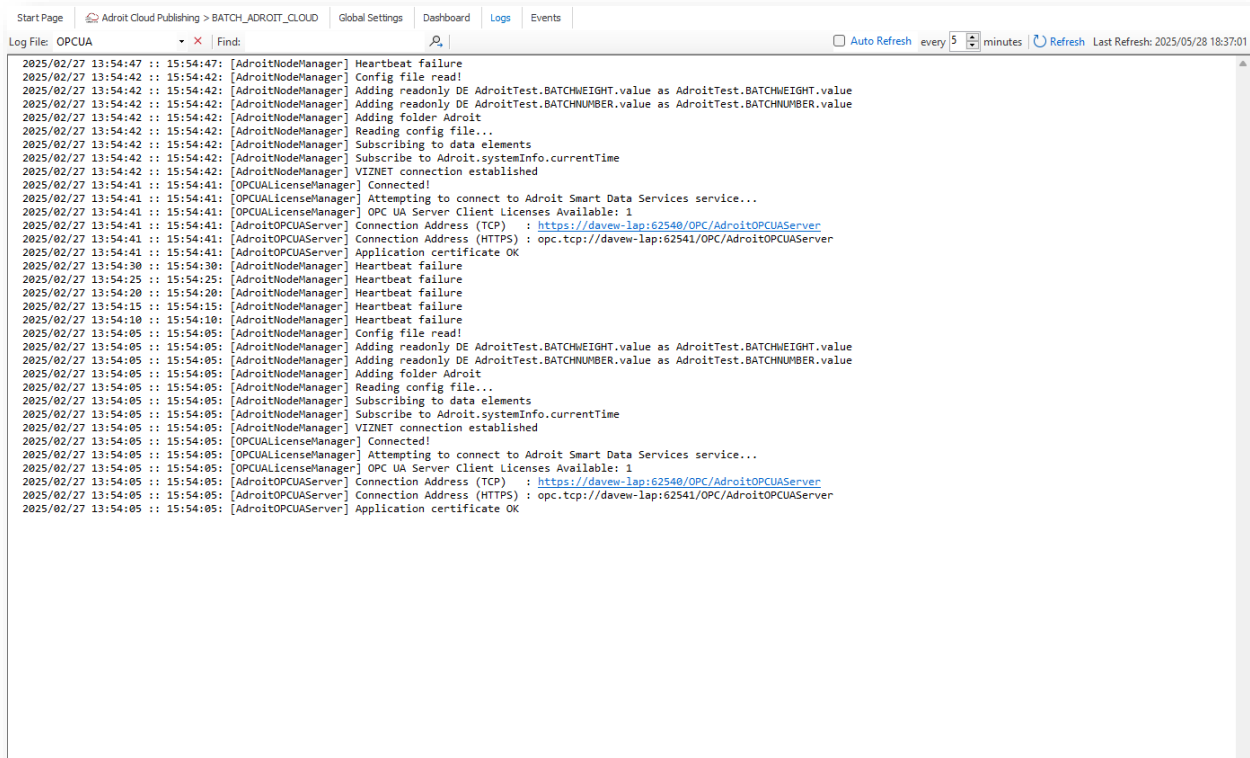


Figure 26 Logs Page

8.5. Events Page

The Events Page shows a log of the Windows Event System pertaining to the Publisher you have configured. This page is useful for debugging a system.

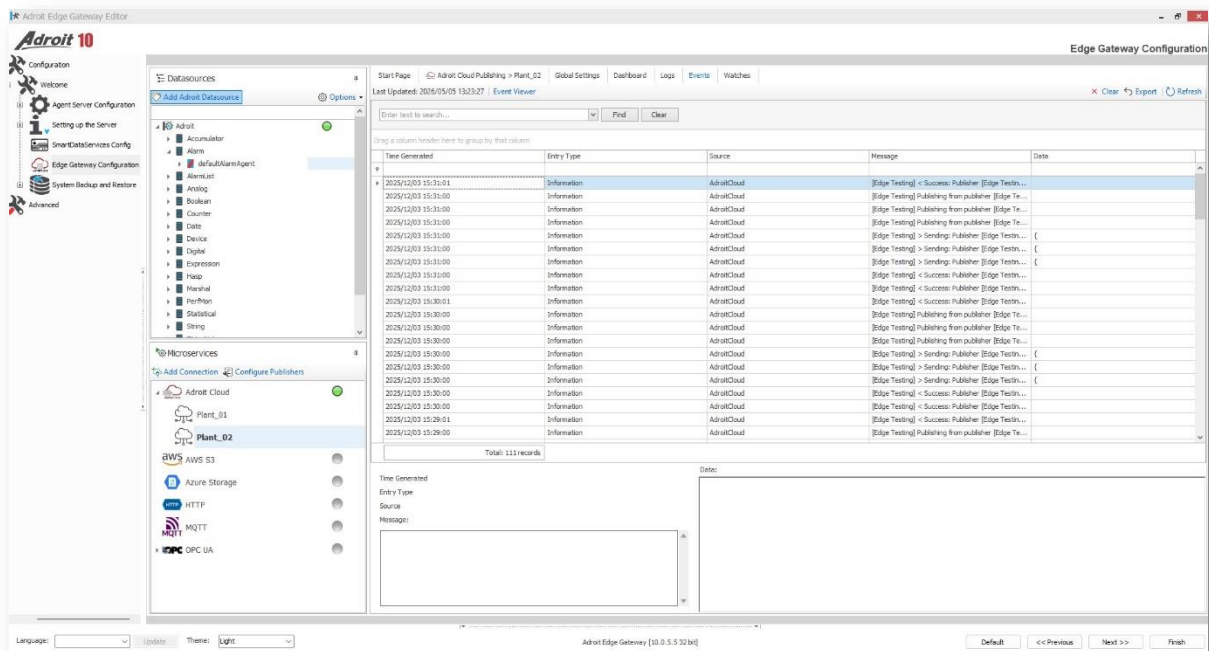


Figure 27 Events Page

8.6. Watches Page

The Watches Page is very useful if you want to monitor the real-time values of the data you are monitoring in the Agent Server. Simply drag and drop the Agent Slot you would like to monitor, and the Watches window will subscribe to that data. This page is useful for debugging a system.

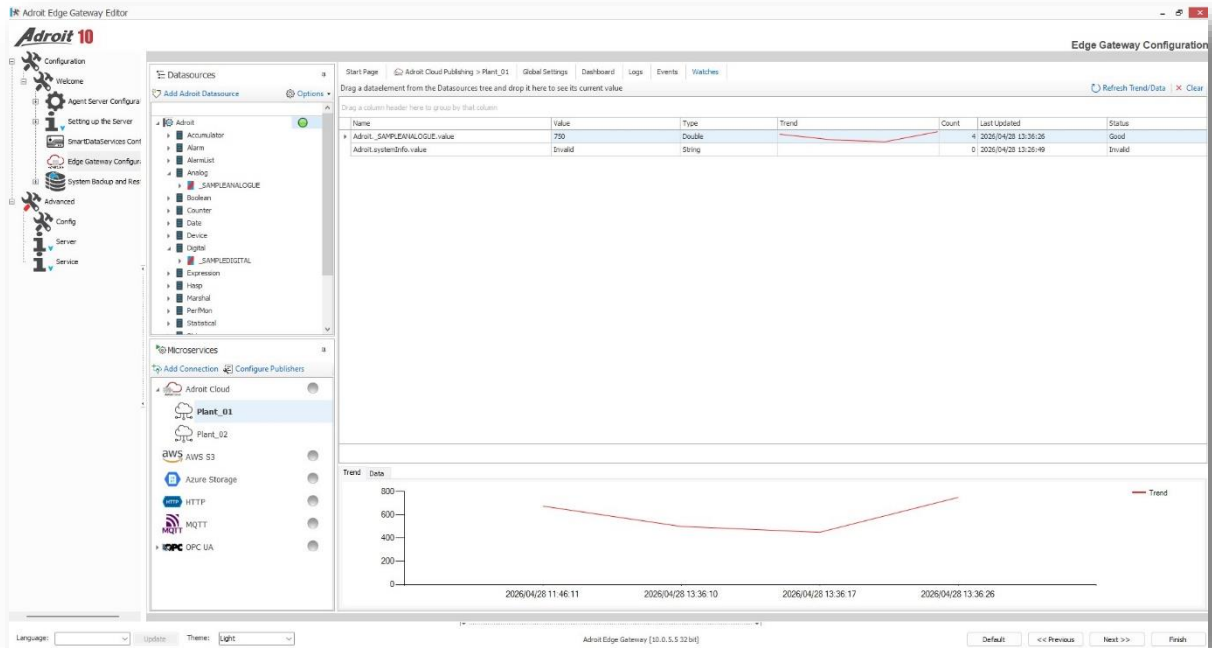


Figure 28 Events Page

9. Starting and Running the System

By default, the Adroit Edge Server and other Services are installed as Services. This means it can run securely within an IT environment as a Service.

Note: You need to start the individual Microservice for it to publish and in addition ensure the connection made is not in Maintenance Mode but in Publish Mode.

The following picture shows that the Microservice is running and the Connection is in “Publish” mode not “Maintenance” mode. These are dealt with in more detail in each of the Microservice Quick Start Guides.

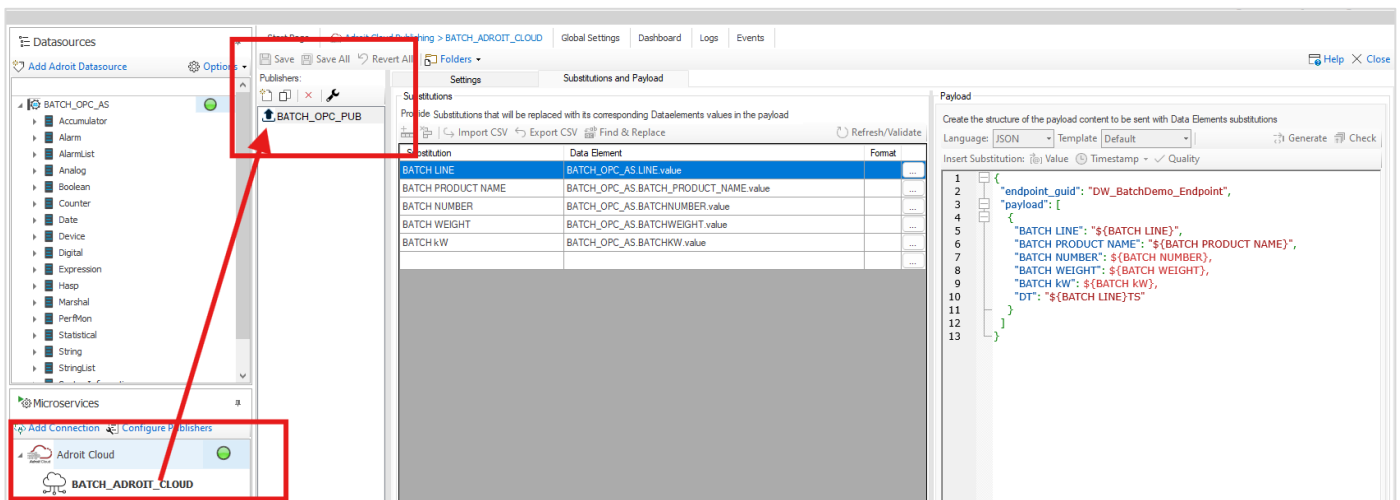


Figure 29 Microservice running and the connection in Publish Mode.

10. Backup and Restore

The backup process generates a single compressed file in the specified location, which contains the date and time of its creation, as well as containing all the relevant registry settings and all the files and folders containing the user-configuration of the currently specified Configuration.

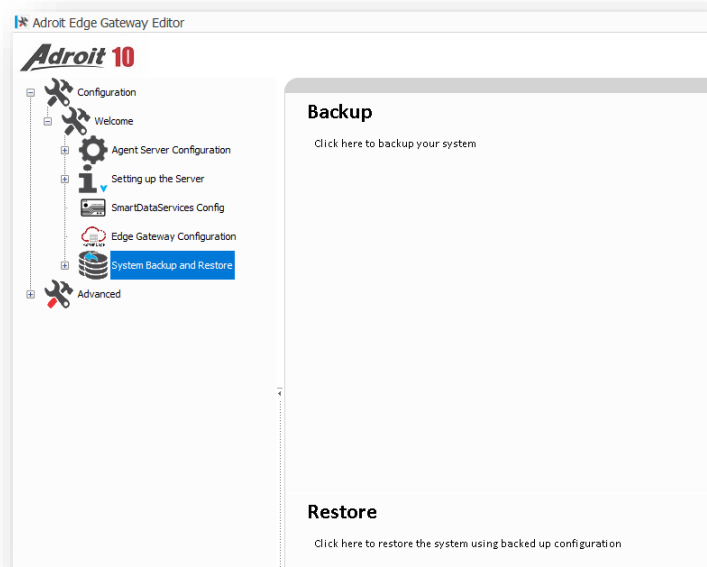
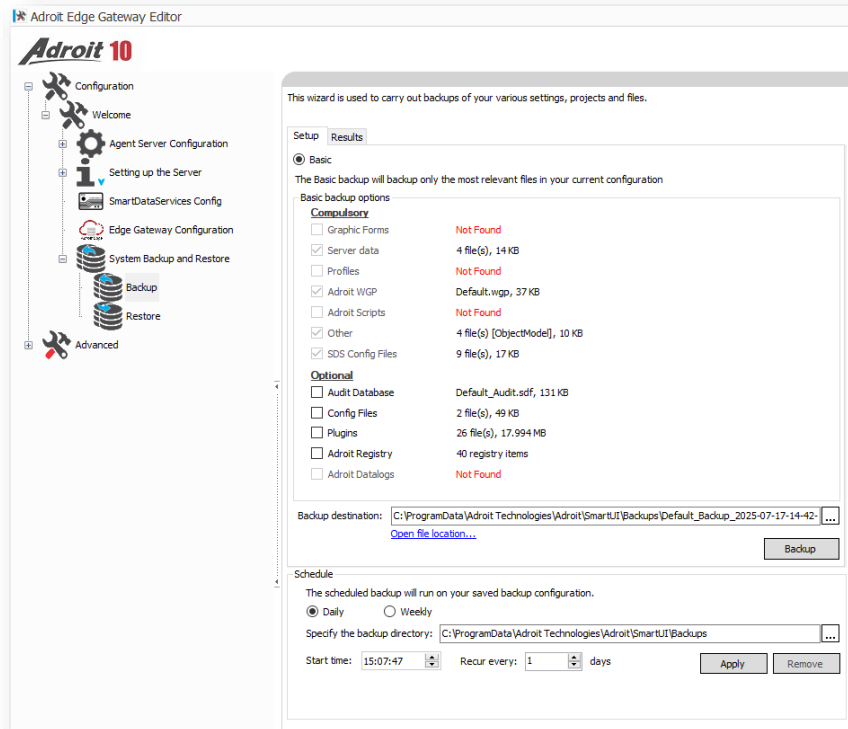


Figure 30 System Backup and Restore

10.1. Backup

Backup files are generated and stored at the following standard location:

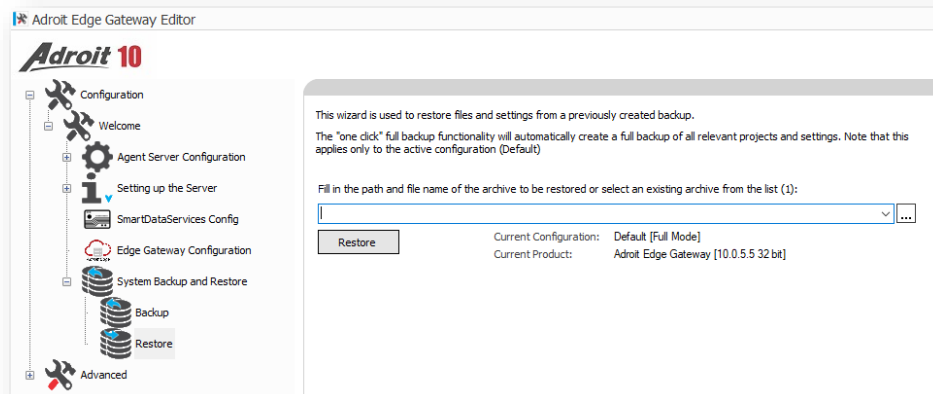
`C:\ProgramData\Adroit Technologies\Adroit\SmartUI\Backups\Default_Backup`



10.2. Restore

Before restoring the backup file, all service must be stopped.

Select the backup file you wish to restore, then click Restore.



Note: It is recommended to restart the PC after a Restore, this will ensure all required services are started.

11. Appendix A – Glossary of Terms

OT	"Operational Technology". Referring to the hardware and software used to monitor and control physical devices. This often refers to the hardware on which SCADA and associated software operates.
DMZ	"Demilitarized Zone". A sub-network or network zone separated by firewalls and/or switches in order to create a form of buffer zone between OT machines and outside networks or the internet.
Microservice	Refers to services responsible for specific functional roles within the Edge Gateway. These services typically represent specific types of Publishers (Adroit Cloud or OPC UA for example)
Endpoint	An Endpoint is essentially an address representing a specific service or API for ingesting and processing data. A single cloud service may expose multiple Endpoints representing logical grouping of incoming data and different potential processing streams within the cloud service.
Datasource	This represents a source of data. Most commonly in the Edge Gateway this will represent a connection to a specific Adroit Agent Server. The Datasource then exposes individual Dataelements that can then be consumed by Microservices and their Publishers.
Dataelement	A single point of data, typically representing a specific Slot within an Agent (when referring to data from an Adroit Datasource) but can also represent complex data types such as lists and tables from various Datasources
Agent	An Agent is the fundamental object type defined within the Agent Server. It represents a logical container that exposes one or more slots. In most cases the Agent is responsible for ingestion of raw data from devices and then applying intermediate manipulation thereof in order to make said data available to other consumers in different forms (scaling of raw data in an Analog for example).
Slot	A Slot typically represents a single value as exposed by a given Agent (the value Slot of an Analog agent which represents the scaled raw value as read from a physical device)
Tag	This refers to the minimum uniquely addressable form when consuming data from an Agent Server, i.e. "Agent.Slot". This term is commonly used simply to refer to a specific value from an Agent Server.
Stand-Alone Mode	A self-contained, independent installation of the Edge Gateway that includes a local Agent Server thus providing a complete solution from physical device to endpoint (whether cloud based or OPC UA).
Gateway Mode	Similar to Stand-Alone with the primary difference being the absence of a local Agent Server. This variant connects to external Agent Servers and augments their existing functionality by publishing data through various Microservices.

12. Appendix B – Simulator for Testing Purposes

For initial testing purposes, the user can make use of the built-in **SIMPLC** Simulator to simulate their Front-End Device.

For **Analog Tags**, use any of the range of addresses between DB 0:DW0 to DB 255:DW255
To simulate a dynamic situation, the values in memory are automatically incremented by the DB number on every scan. The formula is: new value = old value + DBnumber

For example:

- scanning to DB2:DW0 will increment the analog by 2 every cycle
- scanning to DB10:DW0 will increment the analog by 10 every cycle

For **Digital Tags**, use any of the range of addresses between DB 0:DW0.0 to DB 255:DW0.15

Any address in the range will result in the value of the Tag cyclically switching between 0 and 1.

For example:

- scanning to DB0:DW0.0 will toggle the value every cycle.

Follow this simple procedure:

- Open the Agent Configurator.
- Select the Tag you wish to scan, Click "Scan".
- Select the SIMPLC from the Device listbox.
- Select the Agent Slot you wish to scan to.(i.e., value or rawValue)
- Add the Address.(see above examples)
- Select the Scan Rate you wish to use.
- Click on the Scan button, this will add to the scan list.(Currently scanned tags)
- Click on "Started" Radio Button (this allows you to stop and start a driver, however this only needs to be done once and applies to all Agents scanned to that Device.)
- Click on File, Save in order to save the changes.

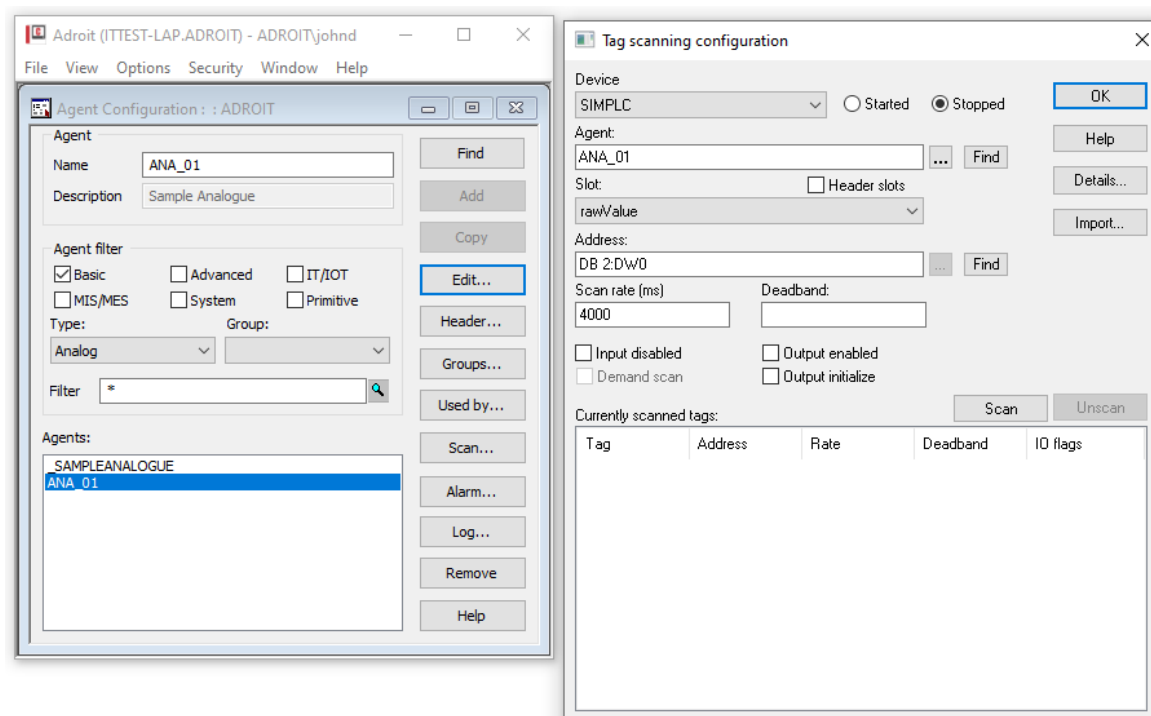


Figure 31 Scanning the Agent Slot to the PLC