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cMT-G04 with OPC UA Server and MQTT Sparkplug B

Introduction: To implement IIoT connectivity without changing existing HMI and controller hardware, as well as HMI and controller programs, Weintek has released two Gateway protocol converters, which are cMT-G03 (Serial bridge) and cMT-G04 (Ethernet bridge), to retrofit customers' systems. This document discusses how to utilize cMT-G04 to build the OPC UA server and transfer data via MQTT Sparkplug B specification, which is well supported by **Inductive Automation Ignition SCADA**.

cMT-G04 has a built-in Ethernet switch to act as an Ethernet bridge. To bridge a cMT-G04 to the device, users need to connect the existing HMI to SW1 port of cMT-G04 and connect the existing controller to SW2 port of cMT-G04. This architecture can ensure the communication between the HMI and the controller is not affected. The LAN port of cMT-G04 is used to connect to a company or factory network.
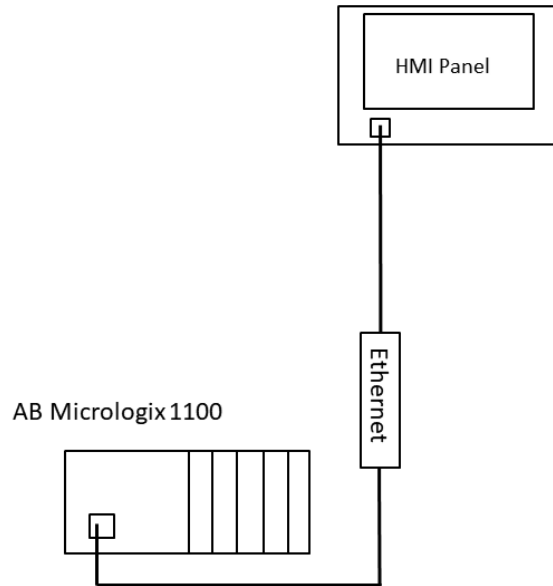
Equipment & software:

1. HMI
2. Allen Bradly MicroLogix 1100
3. cMT-G04

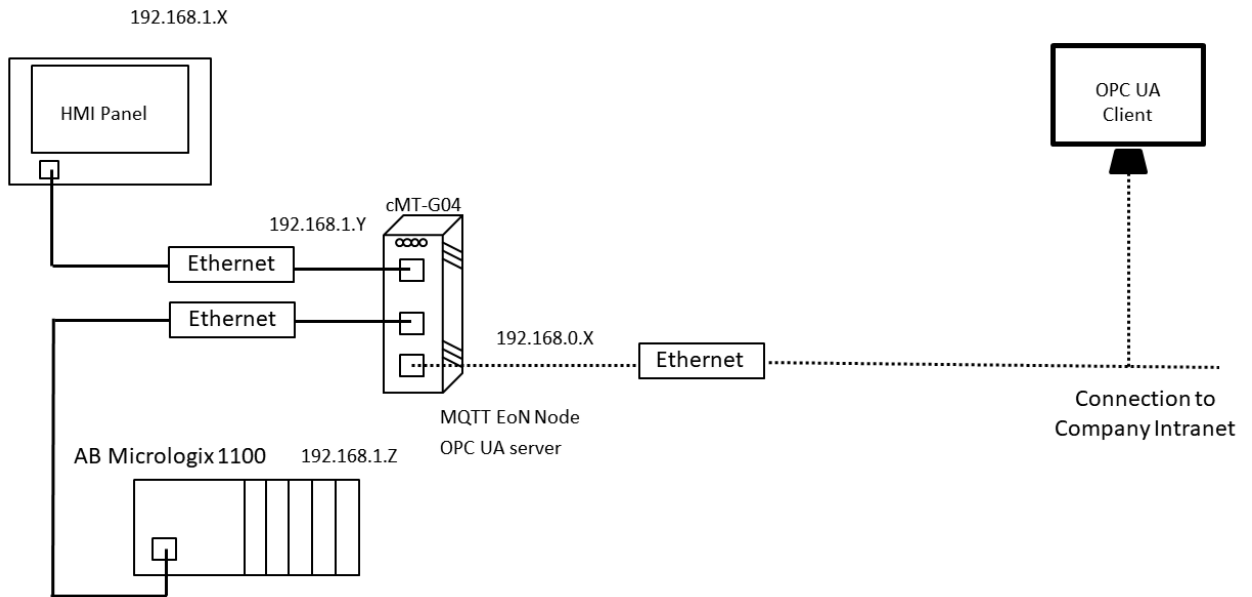Note: Easybuilder pro version 6.01.02 and greater supports cMT-G04.

Wiring diagram:

Before configuration -

After configuration -

Hardware Configuration:

Ethernet ports of cMT-G04 -

Port Name	Connecting to
SW1	HMI
SW2	Controller
LAN	Company or factory network

Software configuration:

Launch Easybuilder pro and select cMT-G04 Gateway(Ethernet Bridge).

The popup window will be displayed as shown. Click [New Device] to select a driver of the controller.
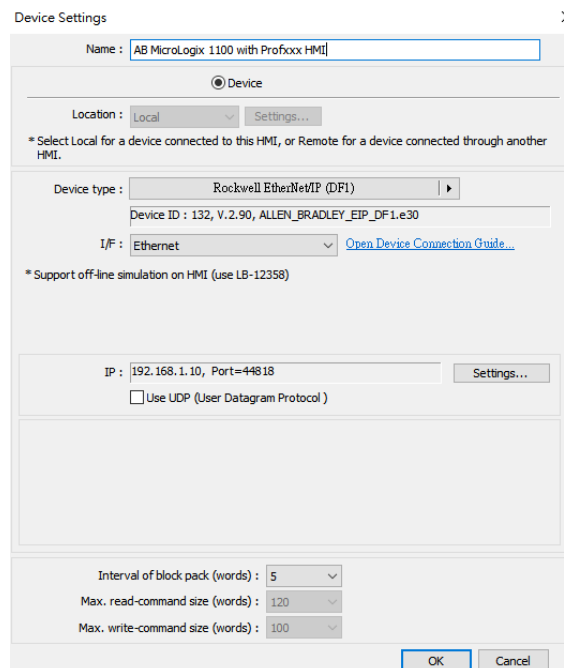

[Name]: Enter a name of the controller and HMI.

[Device type]: Select this driver "Rockwell EtherNet/IP(DF1)" for the communication of the AB Micrologix 1100.
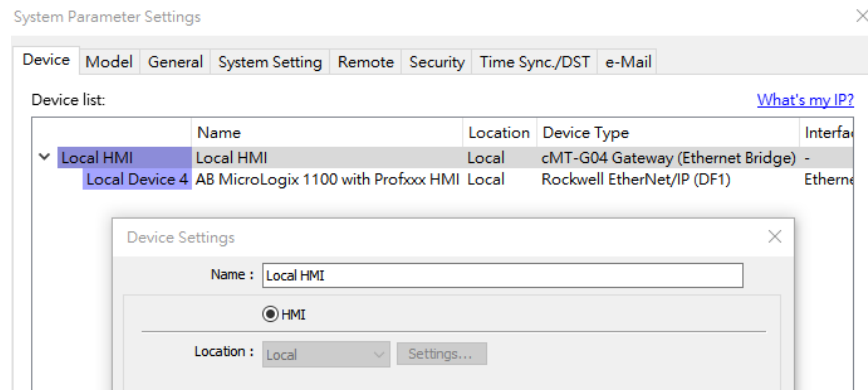
[I/F]: Ethernet

[IP]: The IP address is the same as the IP address that I set up on the PLC.

Click [OK] to exit.

Double click [Local HMI] to change the name of cMT-G04.

Click [OK] to close [System Parameter Settings].

You can see the three main steps on the main screen to complete this project.

Step 1.   Add a driver into Device List in the project. (**This step is completed**)

Step 2.   Enable OPC UA server and MQTT. Designate PLC addresses.

Step 3.   Download this project to cMT-G04.

Step2. -

MQTT Sparkplug B Setup -

Click [MQTT] button on the main screen or go to [IIoT/Energy] » [MQTT] on the toolbar, and check [Enable] checkbox to enable MQTT functionality.

There are three tabs to configure communication parameters of the MQTT server.
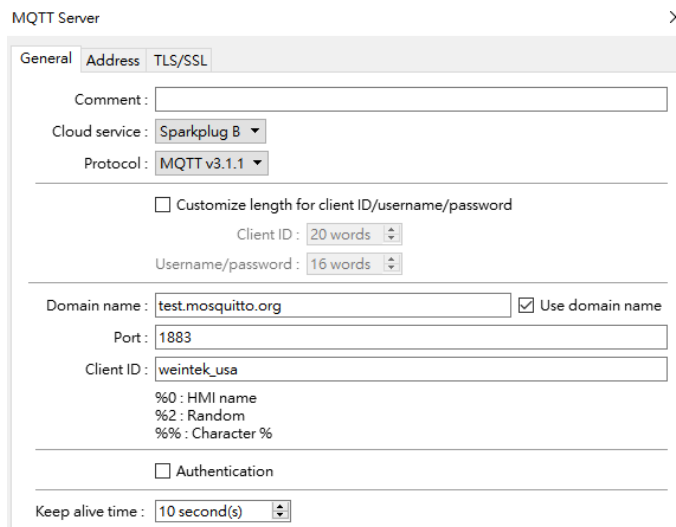
[General] tab -

Cloud service: Select **Sparkplug B**.

Protocol: Supports **MQTT v.3.1** or **MQTT v.3.1.1**.

Domain name: Use **test.mosquitto.org** as broker for testing purpose.

Port number: Enter MQTT port number **1883**.

Client ID: Enter the client/registeration ID.

Authentication: If enabled, subscribers will be required Username and Password when connecting MQTT Broker.
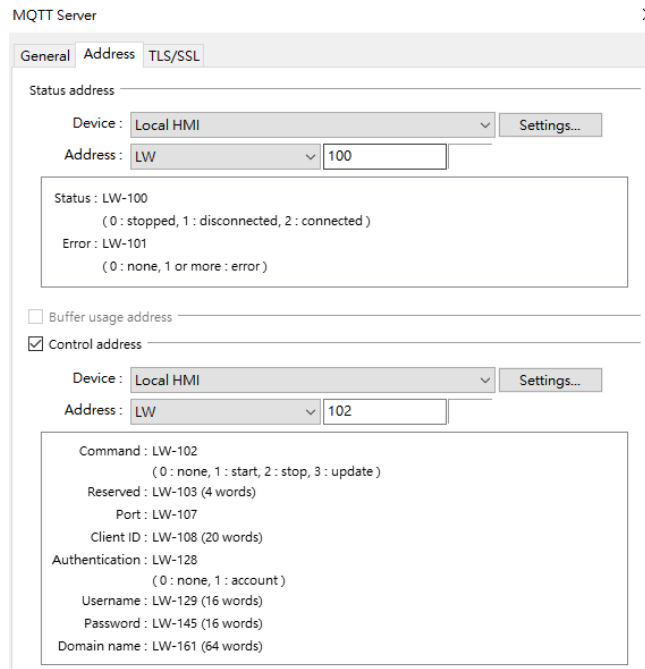

[Address] tab - Define registers of **Status address** and a register of **Control address** if enabled.

Note: Easybuilder pro version 6.02.01 supports Buffer functionality for Sparkplug B.
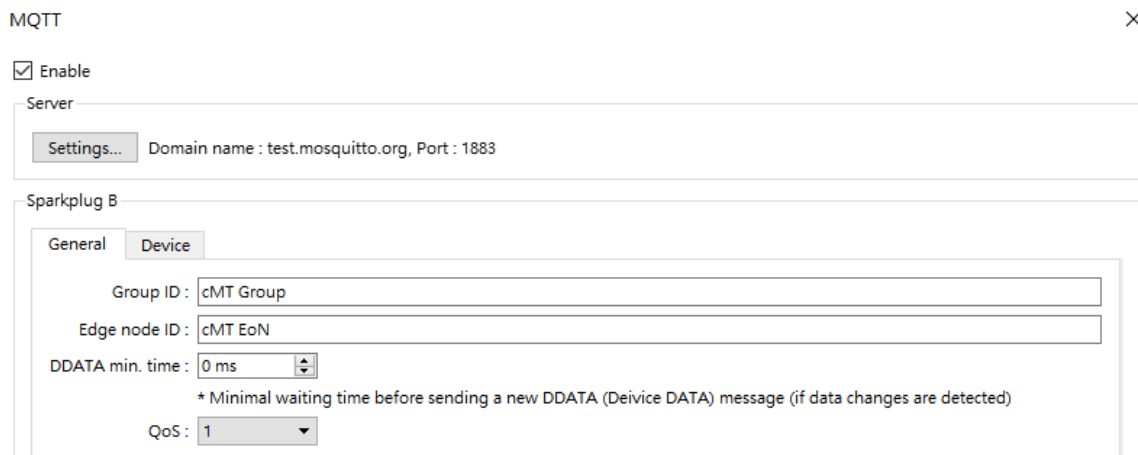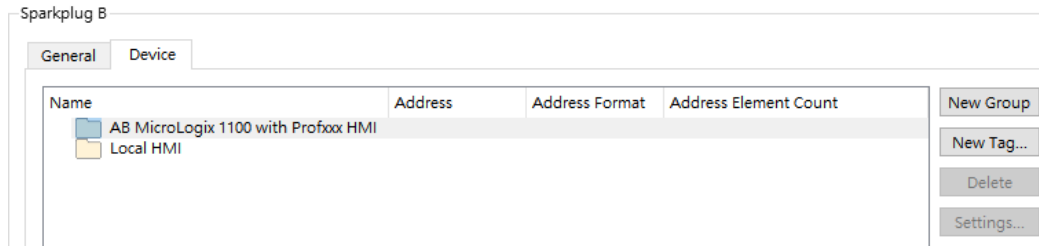
[TLS/SSL]tab - Disable TLS/SSL.

After completing Server setup, there are two tabs within Sparkplug B.

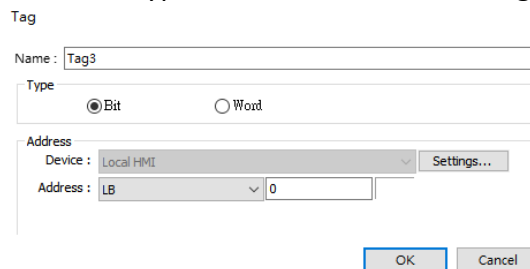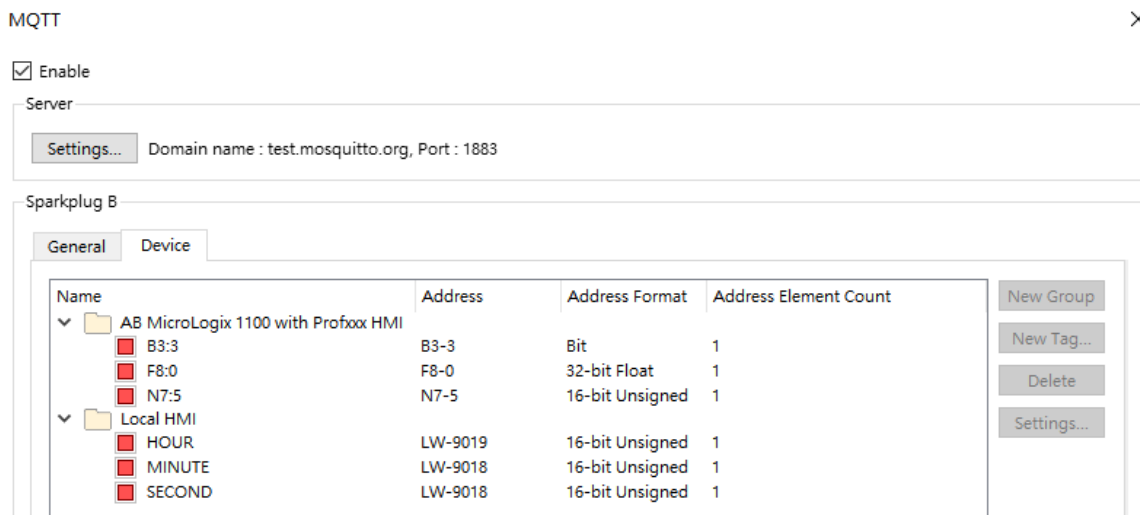[General]tab - Enter Group ID and Edge node ID.

[Device]tab - Click [New Tag] to add tags into the MQTT payload.

Enter a tag name and select data type as well as a controller register.

The window as shown includes all tags created in the MQTT EoN node.

MQTT Sparkplug B can transmit tags on the connection which can be clearly browsed on the **Tag Browser** of **Ignition**. Browse the tags data from the following path of **Tag Browser.**

[All Providers] » [MQTT Engine] » [cMT Group] (Group ID) » [cMT EoN] (Edge node ID) » [Local HMI] (Device name) » HOUR

[All Providers] » [MQTT Engine] » [cMT Group] (Group ID) » [cMT EoN] (Edge node ID) »
[AB MicroLogix 1100 with Profxxx HMI] (Device name) » F8:0

OPC UA Server Setup

Click [OPC UA] button on the main screen or go to [IIoT/Energy] » [OPC UA Server] on
the toolbar, and check [Enable] checkbox to enable OPC UA server functionality.
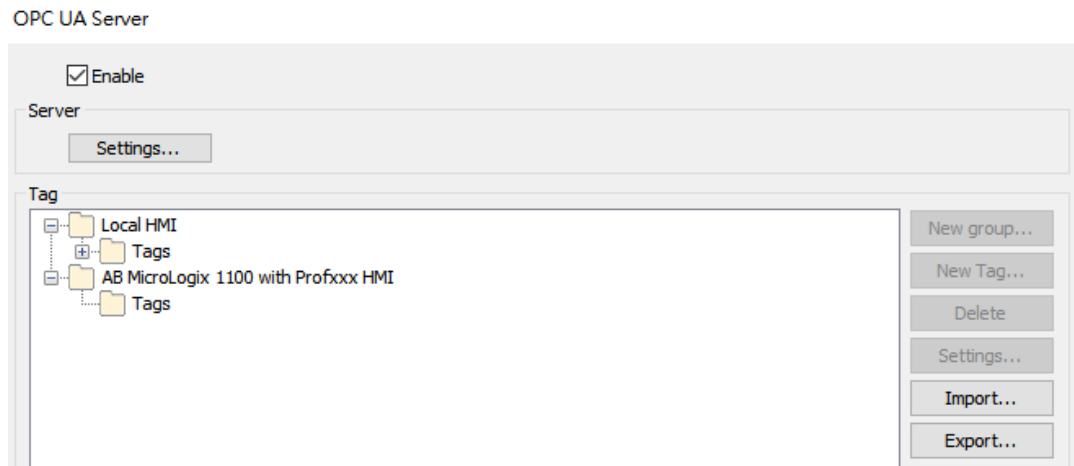
Click [Tags] within [AB MicroLogix..](Controller name) and then click [New Tag] to add
OPC UA tags.

> For example, add a tag for Internal bit memory of the PLC.
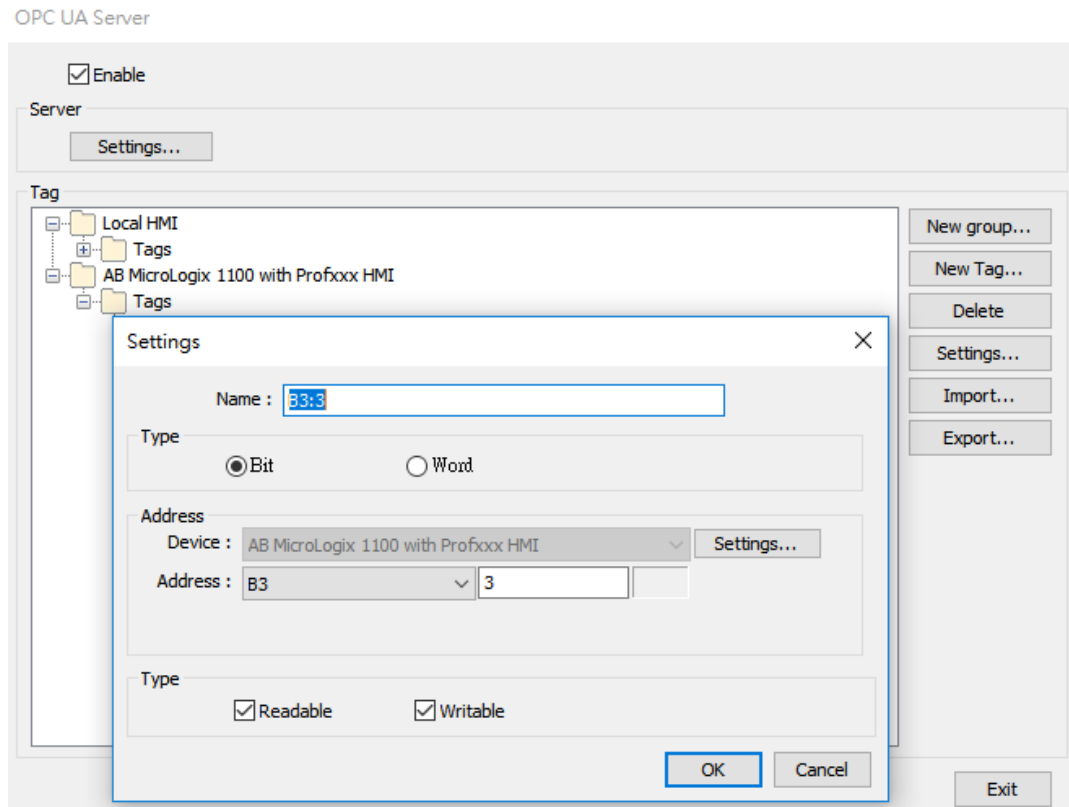
> [Name]: Enter a tag name.
> [Type]: Data type is **Bit**.
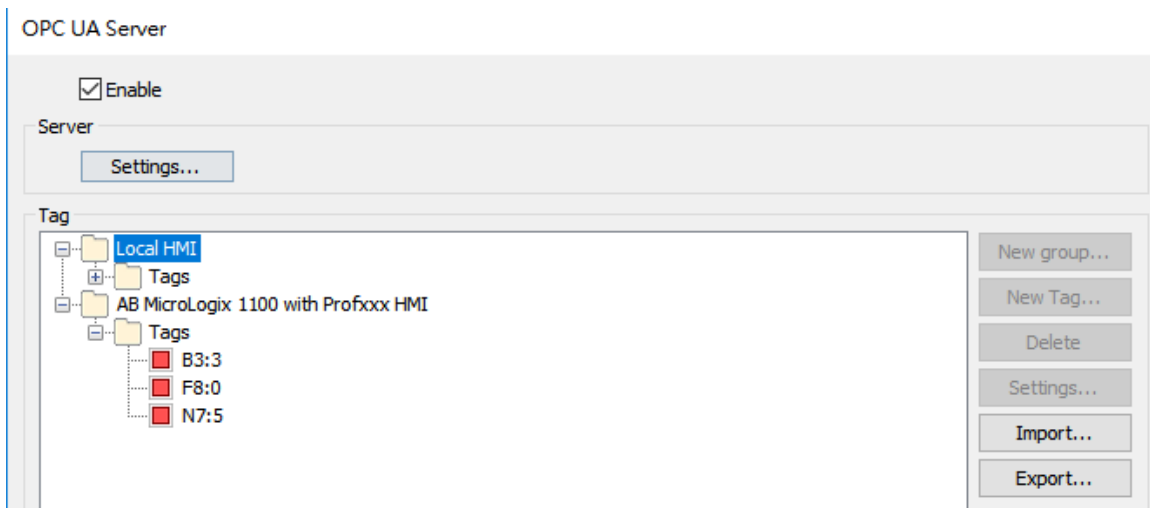> [Address]: Select **B3** and enter register number **3**.
> [Type]: data is readable and writable.

> When completing setup, click [OK] to exit.

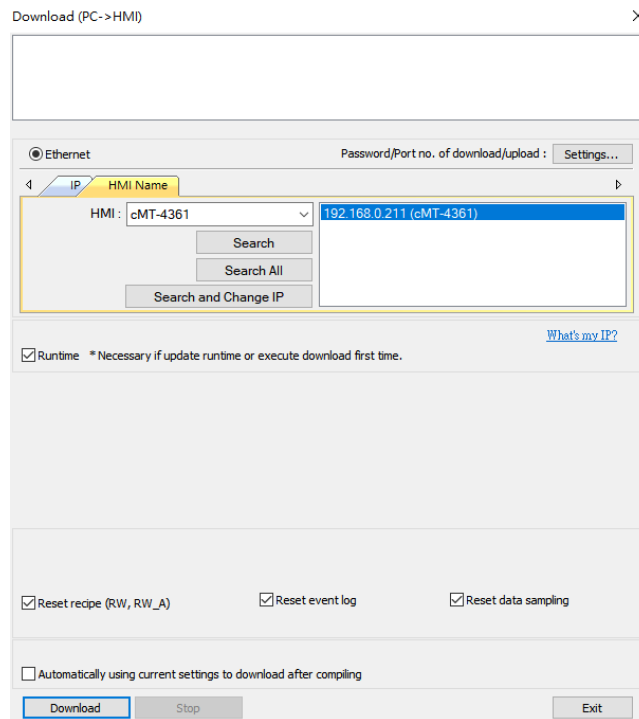The window as shown includes all tags created in the OPC UA server.
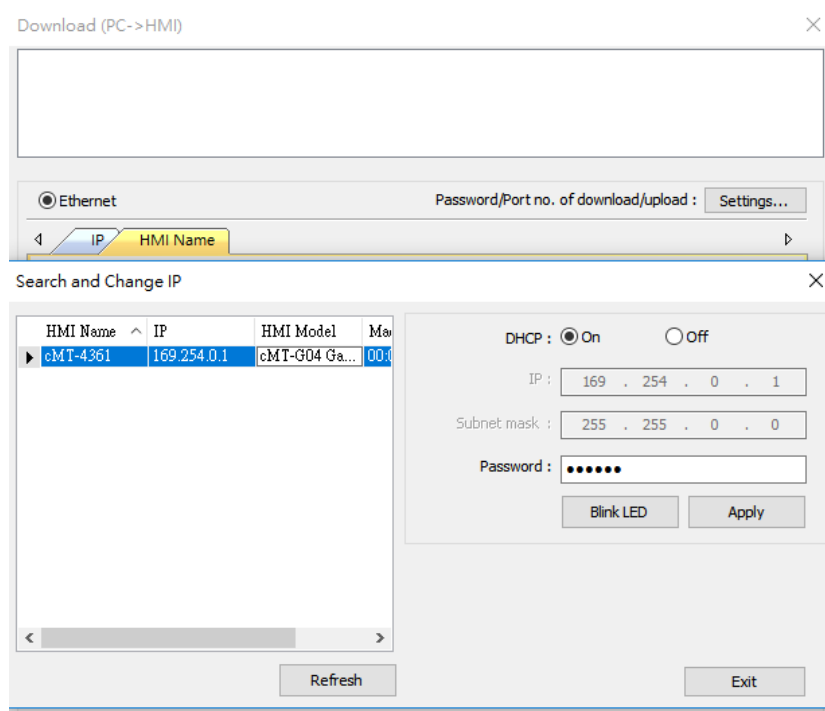

Step3. -

Connect the **LAN** port of cMT-G04 and the PC to a router with an Ethernet cable. Click [Download] button on the main screen or go to [Project] » [Download] on the toolbar.

Find the cMT-G04 and click [Download].

You can change the **LAN** IP address of the cMT-G04 by going to [Search and Change IP].

Disable DHCP and enter IP address as well as subnet mask according to the company/ factory network. Click on [Apply]. The popup window will show "Successfully updated Ethernet settings."
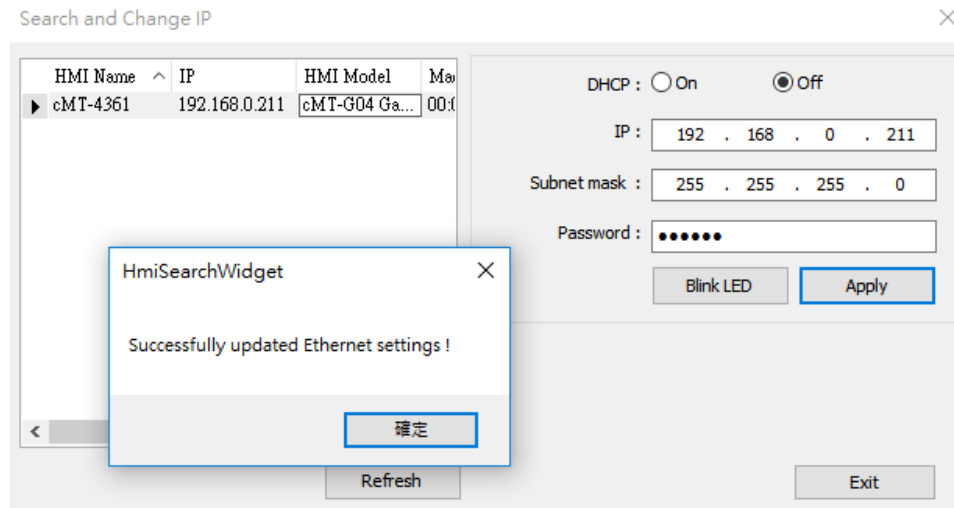
Changing the IP address of the SW1 &SW2

Connect the **LAN** port of the cMT-G04 and the PC to a router with an Ethernet cable. Open a web browser (IE, Chrome, or Firefox) on a PC, and make sure the IP address of the PC has a same subnet IP. Enter the IP address of cMT-G04. For example, 192.168.0.211.

Select an identity and enter its password. The default password is 111111.

Go to [Network] tab. The IP address of the Ethernet1 is the IP address of **LAN** port, and it is changed by the earlier step.

Click [Switch(LAN)] and enter IP address as well as mask for the communication of the machine network. SW1 and SW2 share the IP address of **Switch**.

Testing:

Launch the OPC UA client software UAExpert on a PC to monitor OPC UA tags data.
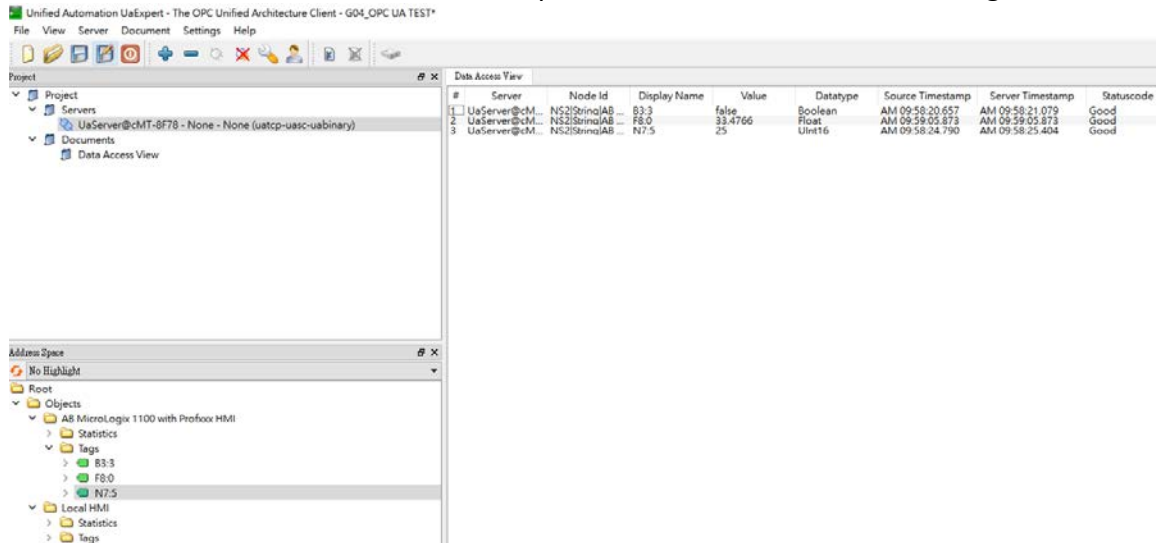
You can drag and drop tags configured in the OPC UA server to [Data Access View].
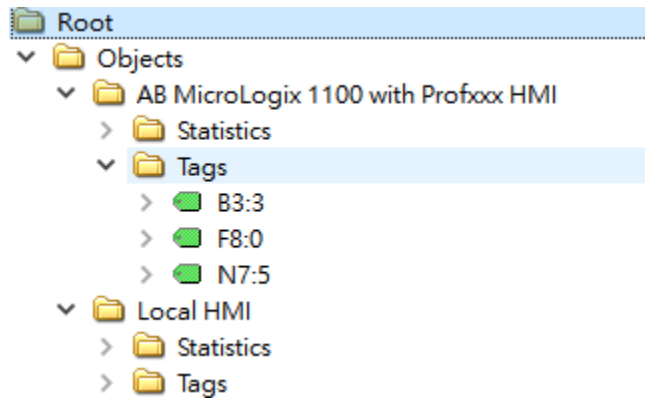
The data will be displayed as shown.

#	Server	Node Id	Display Name	Value	Datatype	Source Timestamp	Server Timestamp	Statuscode
1	UaServer@cM...	NS2|String|AB ...	B3:3	false	Boolean	AM 09:58:20.657	AM 09:58:21.079	Good
2	UaServer@cM...	NS2|String|AB ...	F8:0	33.4305	Float	AM 10:00:55.390	AM 10:00:55.390	Good
3	UaServer@cM...	NS2|String|AB ...	N7:5	25	UInt16	AM 09:58:24.790	AM 09:58:25.404	Good

Reference Link:

Weintek Labs website: http://www.weintek.com

Founded in 1996, WEINTEK LABS is a global-leading HMI manufacturer and is dedicated to the development, design, and manufacturing of practical HMI solutions. WEINTEK LAB's mission is to provide quality, customizable HMI-solutions that meet the needs of all industrial automation requirements while maintaining customer satisfaction by providing "on-demand" customer service. WEINTEK LABS brought their innovative technology to the United States in 2016, WEINTEK USA, INC., to provide quality and expedient solutions to the North American industrial market.

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