

OPC UA User Guide

OPC UA Server

This guide walks through the OPC UA usage in EasyBuilder Pro / Weintek HMI.

UM016009E_20221101

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1. Overview

OPC UA (Unified Architecture) is a communication technology often used in industrial automation fields. OPC UA features cross-platform interoperability, unified access, standardized communication, and security. In this architecture, cMT Series HMI models with built-in OPC UA server play a key role as Communication Gateway, and allow OPC UA clients to access HMI or PLC data by subscribing to tags to receive real-time updates. This new architecture can help you achieve vertical integration.

Hardware & Software requirements:

- HMI Model: cMT Gateway Series, cMT Series, cMT X Series Advanced For cMT-SVR, cMT-HDM, cMT-FHD and cMT-FHDX, license is required and needs to be purchased separately.
- Software: EasyBuilder Pro V5.06.01 or later
- Recommended OPC UA Client: Unified Automation UaExpert

Weintek HMI and OPC UA

The following is an example of OPC Unified Architecture. In this architecture, the user can run SCADA on cMT-iPC15 as an OPC UA client, and use it to access data in OPC UA Server (implemented on cMT Series models), to receive data updates of the PLCs connected to HMI, regardless of which PLC brand is implemented.





2. EasyBuilder Pro Settings

In EasyBuilder Pro, click [IIOT] » [OPC UA Server] to setup OPC UA Server in the project.

OPC UA Server Settings

General tab

Firstly and most importantly, OPC UA Server information must be entered. Select [Enable] check box to open OPC UA Server settings dialog box, and enter in Comment and Server Name fields. For the rest, the default settings usually work. Security policy can be configured for the clients to use. EasyBuilder Pro provides system tags related to OPC UA Server, enabling users to monitor the server and give commands.

	OPC UA Server	
	General User Authentication	
OPC UA Server	Comment :	
	OPC TCP	
Enable	opc.tcp:// <hmi ip="">:4840/</hmi>	
	Port : 4840	
	Server name :	
	Security policy : 📝 None	
	✓ Basic128Rsa15 Sign; Sign & Encrypt ▼	
	✓ Bessic256 Sign; Sign & Encrypt	
	✓ Basic256Sha256 Sign; Sign & Encrypt	
	You can use the following OPC UA system tags :	
	L W-11435 (16bit) : OPC UA status (0: Stopped, 1: Started)	
	LW-11436 (16bit) : OPC UA error code (0: Success, 1 or more: Error)	
	LW-11437 (16bit) : OPC UA control command (0: None, 1: Start, 2: Stop)	
	* If timestamp in OPC UA is incorrect, please check your time zone setting in [System Parameter Settings].	
	Exit	
	OK Cancel Help	

User Authentication tab

This tab is for selecting the authentication method used when the client logs in. Browse, Read, and Write permissions can be granted to anonymous login. The username and password are the same ones as specified in System Parameter Settings » Security tab. When the client logs in using the username and password, the permissions are granted to the security classes specified in System Parameter Settings.



	OPC UA Server	
	General User Authentication Discovery	
OPC UA Server	Methods	
🔽 Enable	Anonymous	
Server	Browse	
Setting	Read	
Tag	Write	
E- Local I	🕼 User name & password	oup
t Ta	Browse class : Class : A	ag
	Read class : Class : A 🗸	ete
	Write class : Class : A	as
	* Edit user accounts in [Security] page of [System Parameter Settings] dialog.	brt
	Certificate	hrt
		····· •
		Exit
		Exit
	OK Cancel Help	

The Certificate option is available only for cMT Gateway series. OPC UA client may use certificates as authentication method instead of username-and-password method to login. Use web interface to configure trusted/untrusted user certificates, as shown below.

OPC UA							
OPC UAS	Server 🛛 S	tatus : Runnir	ng				
opc.tcp://192.	168.137.201:	:4840/G01					
Server Settings	Edit node	Certificates	Discovery	Advanced			
Trusted Users	•	- C					
	Name		Va	lid From	Valid to	Organization	OrganizationUnit
× Untrusted	UaExpert	@MAO-LAPTOP	20	19/12/10	2024/12/08	org	
Trust				Remove	Certificate	Import Certificate	Export Certificate

Discovery tab

When configured, OPC UA server will register to the Local Discovery Server (LDS). OPC UA Discovery service is used to simplify server location maintenance when there are many OPC UA servers in the network. An OPC UA client can access one LDS



Server and obtain all registered OPC UA server.

neral User Auth	entication	Discovery					
	URL				Com	ment	
1 opc.tcp://192	168.1.141	:4840/LDS-t					
Add	Remove						
	Remove						
IP:	19.	2.	168	25	1	8	141
Port :	4840						
Server Name :	LDS-test						
Comment :							
Server shutdov	vn may be that time	slightly del	ayed if the	register	red disco	very ser	ver is
unavailable at							

Tag

After setting OPC UA Server, go to Tag settings. The client program can use the tags to monitor and control OPC UA Server. As shown in the following screenshot, LB-0 is a readable and writable bit address while LB-1 is a readable bit address. Similarly, LW-0 is a readable and writable word address while LW-1 is a readable word address. The addresses that can be monitored and controlled are not limited to Local HMI addresses; PLC addresses can be added as well.



I Enable	Information modeling mode
erver	
Settings	
ag	
e	New Group
Tags	New Tag
	New Object
LW-1 read	Apply Structure
E MODBUS RTU	Settings
MODBUS 0x-1	Delete
	Namespace
	Import
	Export
lodes : 1 / 15000, HDA Address : 0 / 50	
	Exit

New Group

Old r	name :	
New r	name :	

Add a new group for managing tags.

New Tag

Name	: tag 1		
Type	🔘 String	🔘 Number	Boolean
Address			
Device :	Local HMI		+
Address :	LB	• 0	
Туре			
🔽 Readable		🕅 Writab	le
History (HDA)	l.		
🔽 Enable		Sampling i	interval : 0.5 💌 s
			OK Cancel

Add a new tag for the client to monitor or control.



The name must be specified, and the address can be Readable or Writeable.

History(HDA)

Enable OPC UA HDA.

Apply Structure

Device :	Siemens S7-1200/S7-1500		•
tructure :	PLC.Blocks.HMI_Alarm		+
	64 - C.	OK	Cancel

Structured node set under a device can be added, only if the device is a symbolic PLC and has structured data type defined.

After clicking OK in the Apply Structure window, a prompt window shows asking whether to create nodes that do not exist in the OPC UA node tree.



Settings	Set an existing group or tag.
Delete	Delete an existing group or tag.
Import	Import a tag file. Applicable import formats include:
	*.xlsx, *. xls, *.csv, *. xml
Export	Export current tags. Applicable export formats
	include: Excel format or XML format.

Tag – Information Modeling Mode

This Mode allows users to create objects by using the defined object types of an imported information model (e.g. EUROMAP 77/83).

	-
/er	
Settings	
Objects	New Group
	New Tag
LB-0 write	New Object
LW-0 write	Apply Structure
MODBUS RTU	Settings
	Delete
MODBUS 3x-1	Namespace Import

Setting

Description

New Group

ew Group	p			<u> </u>
Name :	group 1			
lode ID :	String			
	Numeric	1		
			OK	Cancel

Add a new group for managing tags. A Node ID can be defined.

New Tag

New Tag					—
Name	: tag 1				
Type	String		Number	Boolean	
Address					
Device :	Local HMI				
Address :	LB		▼ 0		
Туре					
🛛 Readable			Writable		
History (HDA)					
Enable					
Node ID					
String					
Numeric		1			
				ОК	Cancel

Add a new tag for the client to monitor or control.



Two types of tags can be added: Data Variable and Property.

Data Variable: The data collected by the device. New tags, either data variable or property, can be added under a data variable.

Property: The parameters of the device. No new tags can be added under a property.

The name must be specified, the address can be Readable or Writeable, and a Node ID can be defined.

History(HDA)

Enable OPC UA HDA.

New Object



Add an object in the Object Types list. The name must be specified.

A	p	p	ly	St	ru	ct	ur	е
---	---	---	----	----	----	----	----	---

Device :	Siemens S7-1200/S7-1500	•					
Structure :	PLC.Blocks.HMI_Alarm						
	ОК	Cancel					

Structured node set under a device can be added, only if the device is a symbolic PLC and has structured data type defined.

After clicking OK in the Apply Structure window, a



prompt window shows asking whether to create nodes that do not exist in the OPC UA node tree.



Settings	Set an existing group or tag.					
Delete	Delete an existing group or tag.					
Namespace	Namespace Image: Compare the provided attention or g/UA/ urm:Janecheng-PC:Weintek:UaServer Image: Compare the provided attention of					
Import	Import a tag file. Applicable import formats include: *.xlsx, *. xls, *.csv, *. xml					
Export	Export current tags. Applicable export formats include: Excel format or XML format.					

Note

- When downloading the project file to HMI, please make sure that the HMI time and time-zone settings are correct. Otherwise, the client program may not be able to authenticate, and the communication may fail due to authentication error caused by incorrect certificate valid time.
- Changing from Information Modeling Mode back to general mode is possible but please note that the node definition will be lost by doing so.



×

OK

3. OPC UA Client

Unified Automation UaExpert

Download Link

At the first time using this client software, please follow these settings steps:

1. Click OK to create an application instance certificate to identify your installation.

Welcome to the UaExpert Initial Application Setup

 When starting UaExpert for the first time, you have to create an application instance certificate to identify your installation.
 This is needed to use OPC Unified Architecture security. UA security allows you to authenticate your application as well as to use encryption and digital signatures to protect your communication.

Press OK to generate your personal X.509 application instance certificate and the corresponding RSA keys.

2. Fill in Organization and Organization Unit.

The Mew Application Instance Certificate					
	Subject:				
	Common Name:	UaExpert@MAO-LAPTOP	1		
	Organization:	ORG	1		
	Organization Unit:	OU	1		
	Locality:				

And then, connect to OPC UA Server.

1. Click [Server] » [Add] to add the server.



2. Double click on [Double click to Add Server], and enter the OPC UA Server URL. The IP address is the HMI IP address.



🚟 Add Server	? ×	
Configuration Name Discovery Advanced		
Endpoint Filter: No Filter	•	
 Local Local Network Microsoft Terminal Services Microsoft Windows Network 		
 Web Client Network Custom Discovery 	Enter Url Enter the Url of a compute:	r with discovery service running:
Secently Used	opc.tcp://192.1682.50:48	0K Cancel

3. OPC UA Server information shows, in this tab, authentication methods can be specified.



Add Server R 22 Configuration Name JaServer@cMT-4B20 - None - None (uatcp-uasc-uabinary)
Discovery Advanced
Endpoint Filter: No Filter 🔹
Q Local ▲ Second Network
Web Client Network
Custom Discovery Source Custom Discovery Custom Discovery Source Custom Discovery
 UaServer@cMT-4B20 (opc.tcp) None - None (uatcp-uasc-uabinary) Basic128Rsa15 - Sign (uatcp-uasc-uabinar Basic128Rsa15 - Sign & Encrypt (uatcp-uasc-uabinary) Basic256 - Sign (uatcp-uasc-uabinary)
A Basic256 - Sign & Encrypt (uatcp-uasc-uat +
Authentication Settings Anonymous
Username Password Store
Certificate
Connect Automatically OK Cancel

4. When the following message window shows, click [Yes].



5. Click the right mouse button and then click [Connect] to connect with OPC UA Server.



🔛 Unified Automation UaExpert - The OPC Unified Architecture Client - NewProject*															
File	Viev	/ Sei	rver	Doci	ument	Sett	ings	Help	0						
	Ø	Ð	Ø	0	•		\$	×	2				R	۲	
Project													ð ×	Data A	ccess Viev
4 🚺	Proj	ect Server	s	~ •	IT (DO									#	Server
	_	🚴 Ua Docun	Serve	r@clv	11-482	0 - No	ne - r	Vone	(uatcp	o-uasc	-	F	Remo	ve	
-	-	1 Da	ta Aco	cess V	ïew						0	0	Conne	ct	
											8	([Discor	nnect	
											2	F	rope	rties	
											2	0	Chang	je User	

6. Select "Trust Server Certificate" and click [Continue], and finish the settings.

📕 Certificate Validation				×						
Validating the certificate	of server 'UaServer@cMT-6F62' returned an error:									
BadCertificateUntr	usted									
Certificate Chain	Certificate Chain									
Name	Name Trust Status									
A UaServer@cMT-6F	A UaServer@cMT-6F62 Untrusted									
Certificate Details										
Subject				^						
Common Name	UaServer@cMT-6F62									
Organization	Organization									
OrganizationUnit	Unit									
Locality	LocationName									
State										
Country	DE									
DomainComponent	cMT-6F62									
Issuer										
Common Name	UaServer@cMT-6F62									
Organization	Organization									
OrganizationUnit	Unit									
Locality	LocationName									
State										
Country	DE									
DomainComponent	cMT-6F62									
Validity										
Valid From	Fri Jun 3 17:39:09 2016									
Valid To	Wed Jun 2 17:39:09 2021									
Info										
Serial Number	5752151D									
Signature Algorithm	RSA-SHA256									
Cipher Strength	RSA (2048 bit)									
Thumbprint (SHA1)	417AFF6C0D1C82B2395593DD9BC08EC37D0CC673									
				Ť						
		Trust Server	Certifica	ite						
Accept the server certificate	e temporarily for this session	Continue	Cance	9						

4. Accessing OPC UA Server Data

When the connection settings are completed, address information can be found in Address Space field. HMI parameters are in HMI Info folder, and user-defined tags



are in Tags folder. By dragging a tag to the Data Access View filed, the details on the tag can be viewed, and its value can be changed, as long as it's a writeable address, such as LB-0 and LW-0 mentioned earlier. The value of addresses that are only readable, such as LB-1 and LW-1, cannot be changed.

Unified Automation UaExpert - The OPC Unified Architecture Client - NewProject*									• 🔀
File View Server Document Setti	ings	Help							
🗋 🖉 🕞 🗭 🥥 🔶 🗕	0	🗙 🔌 🙎		2					
Project 🖉 🛪	D	ata Access View				8	Attributes		ē×
🔺 🇊 Project 🔺	#	Server	Node Id	Display Name	Value	Datatype	😏 🧹 💺		0
Servers	1	UaServer@cM	NS2 String Loc	LB-Owrite	false	Boolean	Attribute	Value	*
UaServer@cMT-4B20 - I	3	UaServer@cM	NS2 String Loc	LW-Owrite	0	UInt16	A Nodeld	NodeId	
Documents -	45	UaServer@cM UaServer@cM	NS2 String Loc NS2 String MO	LW-1read MODBUS 0x-1	false false	Boolean Boolean	NamespaceIndex	2	E
4	6	UaServer@cM	NS2 String MO	MODBUS 3x-1	0	UInt16	IdentifierType	String	
Address Space 🛛 🖉 🗙							Identifier	MODBUS RTU.Tags.MODBUS 3x-1	
😏 No Highlight 👻							NodeClass	Variable	
C Root	1						BrowseName	2, "MODBUS 3x-1"	
Objects							DisplayName	"", "MODBUS 3x-1"	
4 🛅 Local HMI							Description		
HMI Info							WriteMask	0	-
🔺 🚞 Tags							References		đ×
LB-Owrite							🕢 🚽 🎒 Forward 💌		0
LB-1read								1. N	
LW-Owrite							Reference larget Dis	playivame	
D LW-lread							Has lypeDefini BaseData	Variable lype	
A MODRUS 0v 1									
	1								
Views					_				
			m			•			

5. References

OPC UA Security-How It Works:

https://opcfoundation.org/wp-content/uploads/2014/08/11 OPC UA Security How

It Works.pdf

OPC Support General Information:

https://wikis.web.cern.ch/wikis/display/EN/General+Information