

# Application Note

How to configure OPC UA driver communication!

Rev 1.1

# Revision History

Rev1.0 : Initial Release

Rev1.1 : Add async trigger script

## Conformance Testing

The following hardware/software configuration was used to test communication.

1. Aveva Edge 2023 (Service Pack: 0, Path: 0, Build Number: 4801.2308.3105.0000)
2. Loytec LINX215 DDC Controller (Firmware: 8.2.4 2024-03-19 16:37:00)
3. KEPServerEX 6.15 (V6.15.132.0)

# OPC UA Introduction

OPC UA (Unified Architecture) is a new International Standard designed for communication between information systems.

OPC UA involves with new features such as : Security based on certificate exchange, heartbeat for connections in both directions and acknowledgement of transmitted data.

The OPC UA server is accessible via two URL

`opc.tcp://ip_address:4840`

`https://ip_address/UA`

It is required to setup OPC UA server before establishing a connection with any OPC UA client.

## OPC UA and Security Mode

### Security Policy

1. None
2. Basic128Rsa15 (Sign + Sign&Encrypt)
3. Basic256 (Sign + Sign&Encrypt)
4. Basic256Sha256 (Sign + Sign&Encrypt)
5. Aes128Sha256RsaOaep (Sign + Sign&Encrypt)
6. Aes256Sha256RsaPss (Sign + Sign&Encrypt)

### User Authentication Mode

1. Anonymous
2. Credentials
3. X509 Certificate

# Available Drivers Interface

## Aveva Edge 23

OPC UA Server  
OPC UA Client

OPC XML-DA Client

OPC DA 2.05 Server  
OPC DA 2.05 Client

OPC HDA Server

## LOYTEC

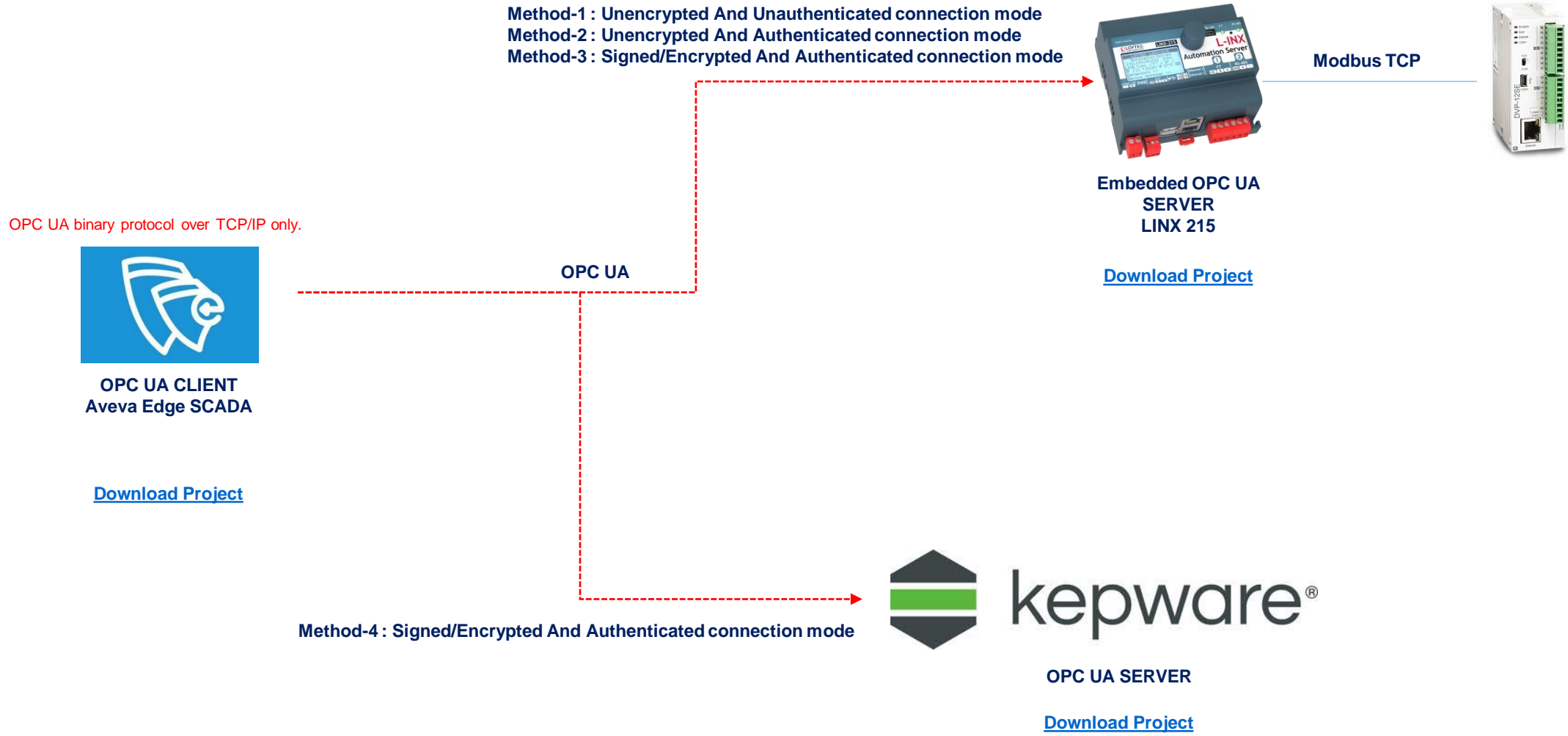
OPC UA Server

OPC XML-DA Server  
OPC XML-DA Client

## KEPServerEX

All others

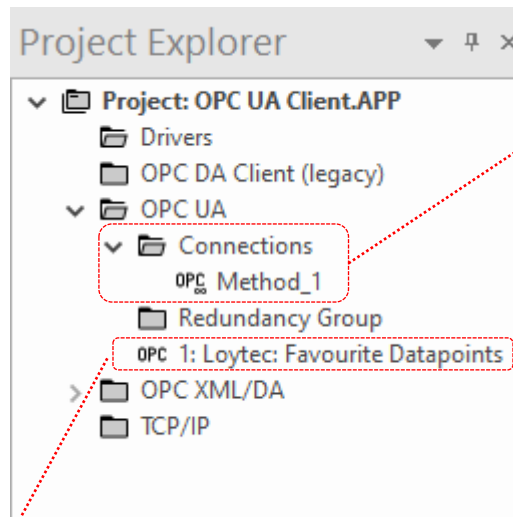
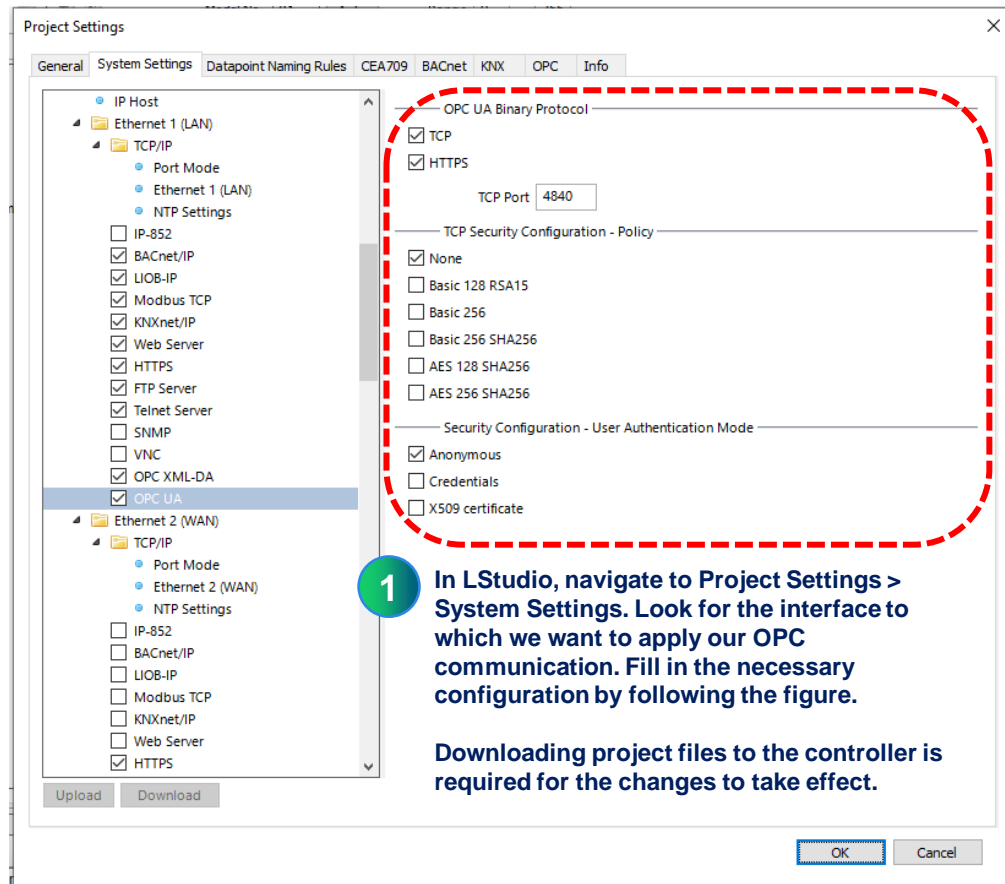
# OPC UA Connections



# Method 1 : Unencrypted And Unauthenticated connection mode

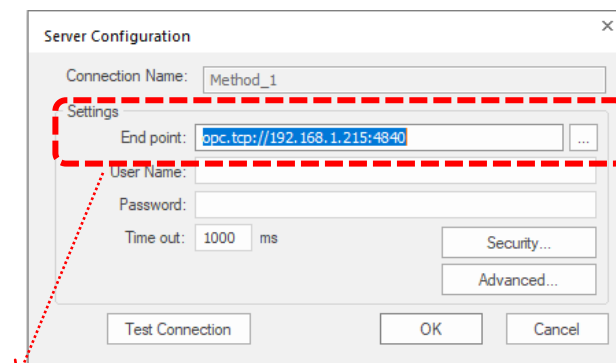
**Security Policy** : None

**Authentication Mode** : Anonymous



(Refer to next sheet for further details)

**2** Right click to create new **Connections** under OPC UA/Connections folder.



8 Finally click on Advanced Button and assign asynReadTrigger Boolean Tag.

Asynchronous read trigger:

asynReadTrigger

5

Connection: **Select connection method that we previously created.**

Method\_1

Advanced...

Status:

Status Message:

Publish rate (ms):

Disable:

1000

6

Root node or view:

/0:Objects/1:Loytec ROOT/1:Favorites

**Browsing root node will make it much easier when selecting hierarchical OPC data points.**

	Tag Name	Browse Path
	Filter text	Filter text
1	fav_bVar	/1:bFavVar
2	fav_iVar	/1:mFavVar
3	fav_rVar	/1:aFavVar
4	fav_sVar	
*		
*		
*		
*		
*		

7

**Right click to browse OPC datapoints.**

UA Browser

UA Server( /0:Objects/1:Loytec ROOT/1:Favorites )

- sFavVar
- mFavVar
- aFavVar
- bFavVar

**Available OPC datapoints will show in this area.**

Selected Item: /1:sFavVar

Element Type: Variable Data Type: String

Node Id: ns=1;j=93792

Value: Hello World

Array Element:

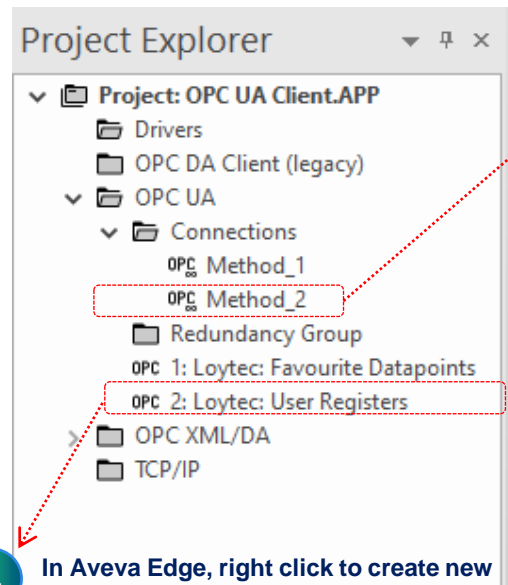
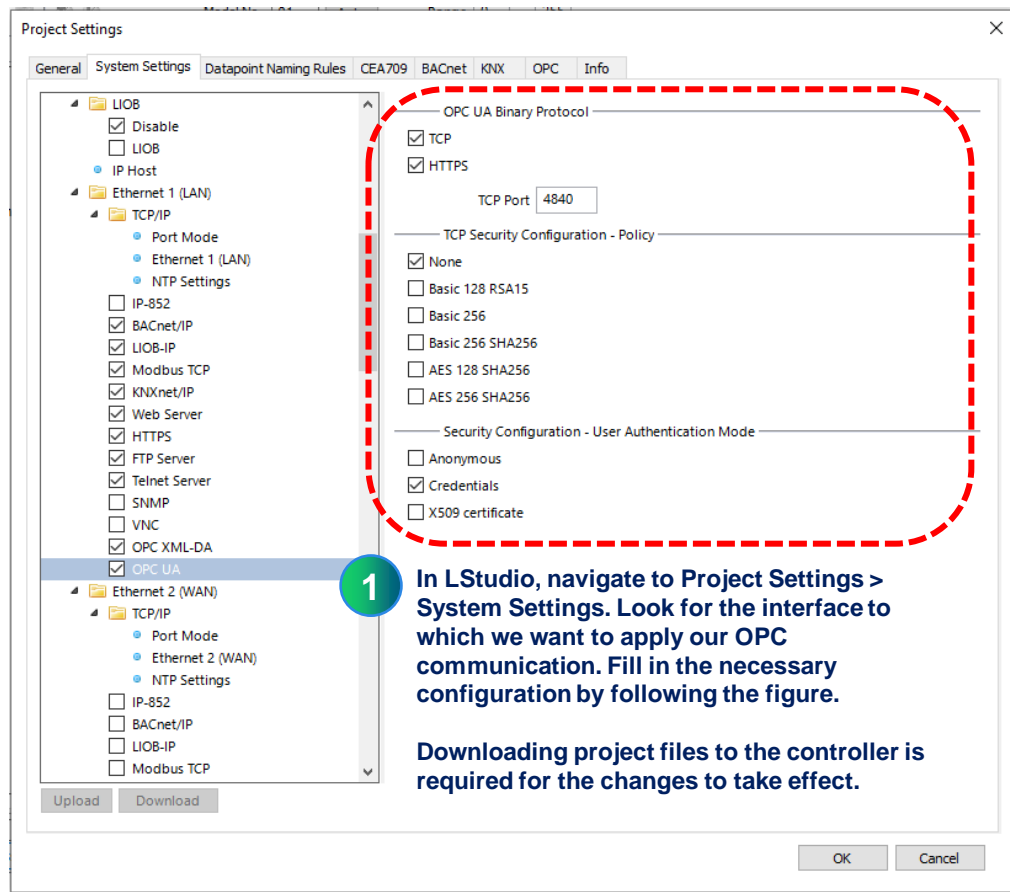
OK Cancel



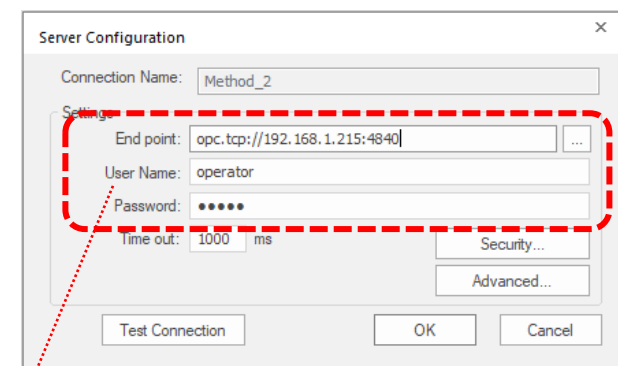
## Method 2: Unencrypted And Authenticated connection mode

**Security Policy** : None

**Authentication Mode**: Credential



2 Right click to create new **Connections** under OPC UA/Connections folder.



Username : operator  
Password : 12345

Please note that servers listening on the default port (4840) can only be found.

8 Finally click on Advanced Button and assign asynReadTrigger Boolean Tag.

Asynchronous read trigger:

asynReadTrigger

5

Connection: **Select connection method that we previously created.**

Status: Status Message:

Publish rate (ms): Disable:

1000

6

Root node or view: **Browsing root node will make it much easier when selecting hierarchical OPC data points.**

	Tag Name	Browse Path
	Filter text	Filter text
1	user_bVar	/1:bVar
2	user_iVar	/1:mVar
3	user_rVar	/1:aVar
4	user_sVar	
*		
*		
*		
*		
*		

7

**Right click to browse OPC datapoints.**

UA Browser

UA Server( /0:Objects/1:Loytec ROOT/1:User Register )

- sVar
- mVar
- aVar
- bVar

Available OPC datapoints will show in this area.

Selected Item: /1:aVar

Element Type: Variable

Data Type: Double

Node Id: ns=1,i=93328

Value: 18

Array Element:

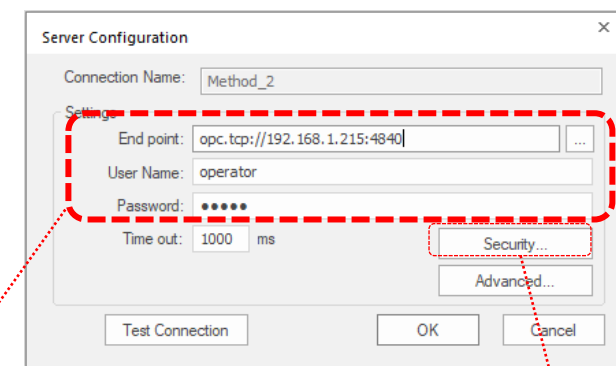
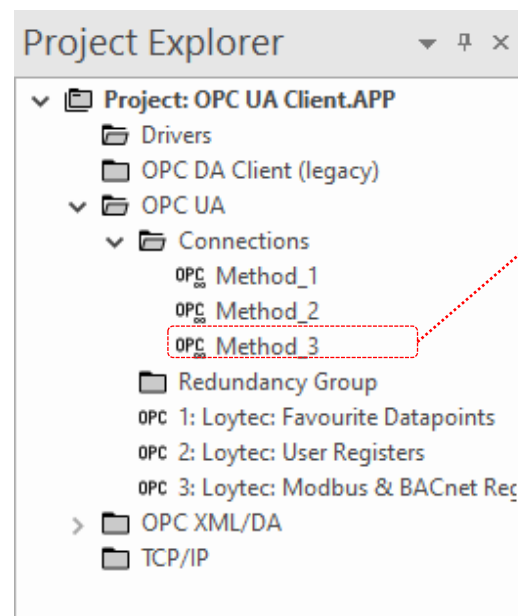
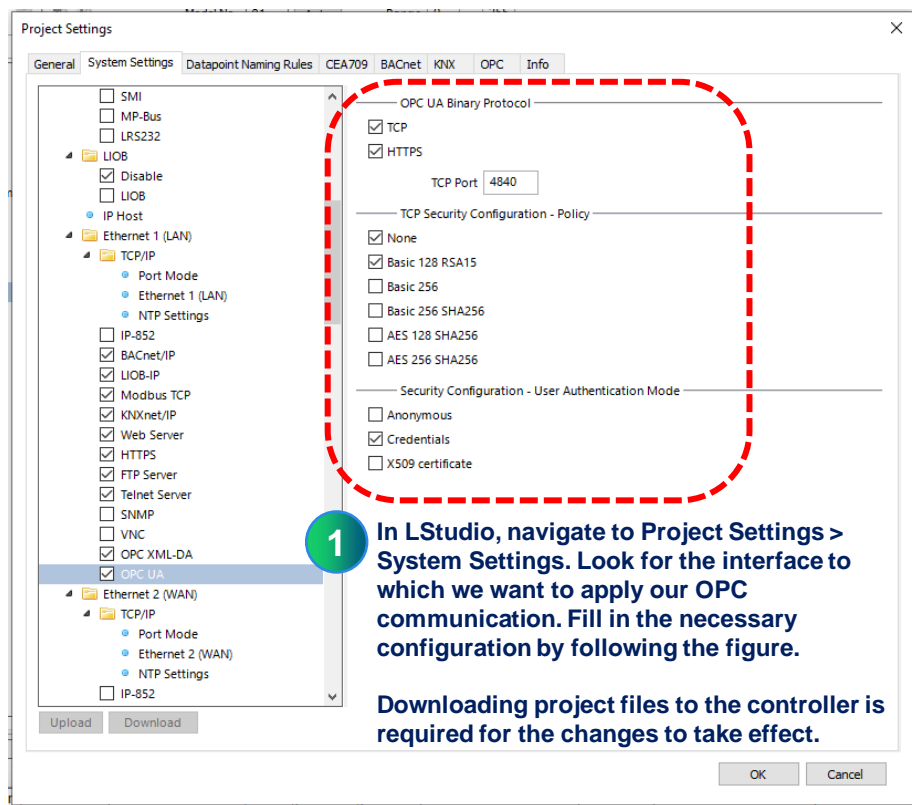
OK

Cancel

# Method 3: Signed/Encrypted And Authenticated connection mode

**Security Policy** : Basic128Rsa15

**Authentication Mode**: Credential



Username : operator  
Password : 12345

Please note that servers listening on the default port (4840) can only be found.

Select Basic128 Rsa15 key pair method that we configured in Loytec OPC UA configuration.

**Security Settings**

Message Security Mode: **Sign And Encrypt**

Endpoints:

- opc.tcp://192.168.1.215:4840 - Sign And Encrypt
- opc.tcp://192.168.1.215:4840 - Sign - Basic128 Rsa15
- opc.tcp://192.168.1.215:4840 - None - None

Trust List (empty = Config\TrustList):

Issuer Certificate List (empty = Config\IssuerList):

☒ Automatically add server certificate to certificate store on the next connection

**5** (points to the 'Sign And Encrypt' endpoint)

**6** (points to the 'Automatically add server certificate...' checkbox)

**7** (points to the 'Create self-signed certificate...' button)

**8** (points to the 'Certificate Creation' sub-dialog)

**Certificate Creation**

Common Name: My company

Country (2 letters): US

Organization: Organization

Machine: linkwise-linn

Organization Unit: Unit

Client Uri: opc.tcp://linkwise-linn.Studio.Scada.Ua

Location Name: City

Expiration Date: 1/ 1/2074

State/Province: State

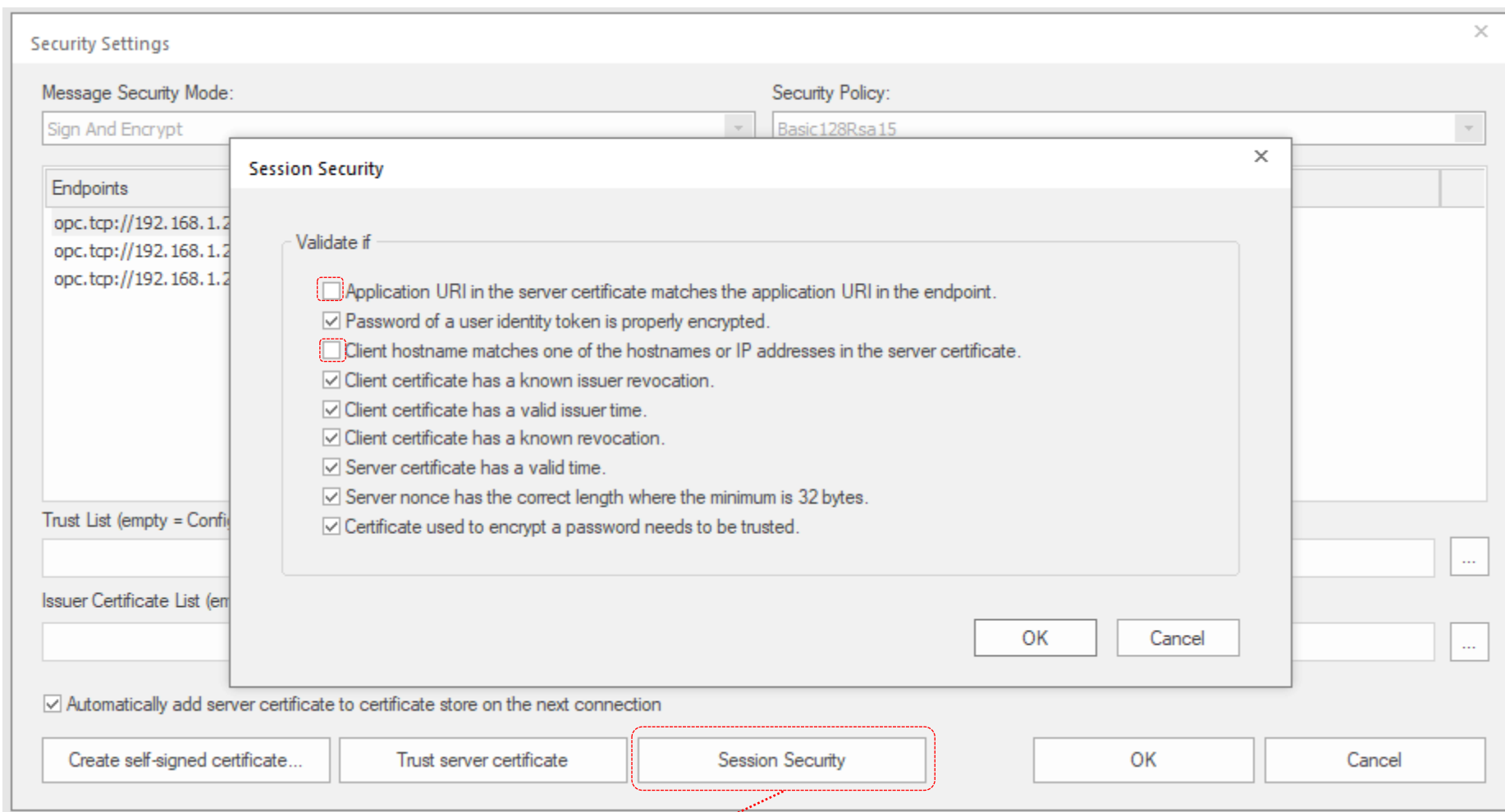
RSA Key Size (Bits): 1024

Generate Cancel

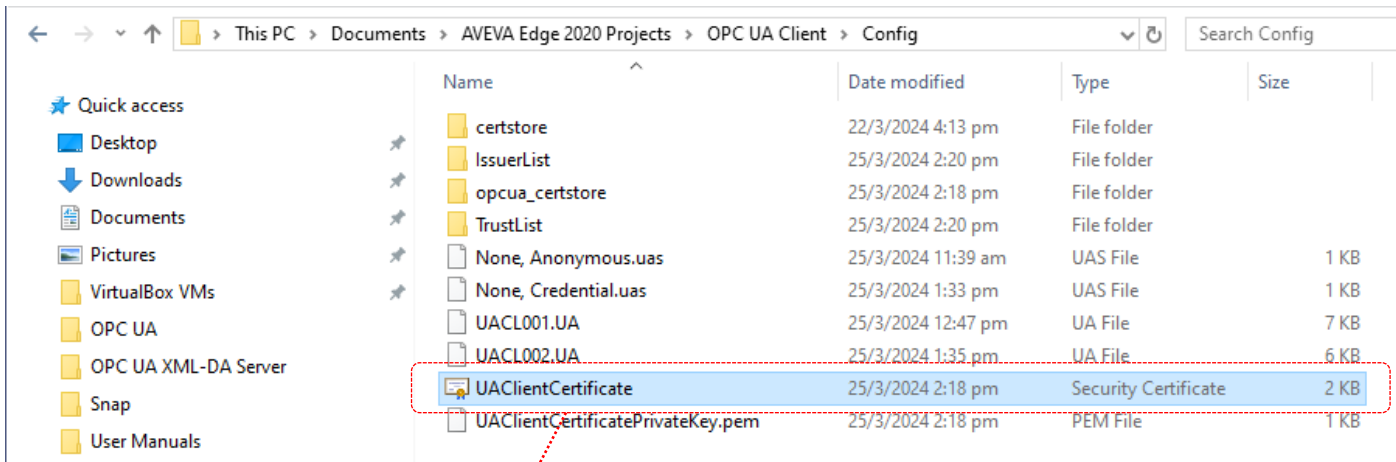
Create self-signed certificate... Trust server certificate Session Security OK Cancel

Check this box.  
(Then, Loytec OPC  
UA Server  
certificate will be  
trusted once we  
establish the  
connection.)

Next, we may need to generate a client self-signed certificate.  
(For this, the generated certificate will need to be copied to Loytec as  
a trusted certificate.)



9 click on session security, uncheck item 1 & 3.



The exported certificate will be saved inside your project folder:

( xxx / Config / UAClientCertificate)

LOYTEC

## Certificate Management

LINX-215  
Logged in as  
**admin**  
2024-03-25 06:37:03

- Device Info
- Statistics
- Data
- Commission
- Config
- Programming
- Security**
  - Passwords
  - **Certificates**
  - User Management
- L-WEB
- L-IOB
- Documentation
- Maintenance
- Contact
- Logout

Warning: Managing certificates over an insecure connection is not recommended!

Installed Certificate
Create Certificate
Import Certificate
OPC UA

Get OPC UA Certificate: [Server certificate](#)

Add Client Certificate: Choose File No file chosen

Trusted List of OPC UA Clients:

Status	Common Name	Organization	Valid until	File name	Reject	Delete
✓	linkwise	linkwise technology	2073-12-31	UAClientCertific...der	<input type="checkbox"/>	<input type="checkbox"/>

Rejected List of OPC UA Clients:

Status	Common Name	Organization	Valid until	File name	Trust	Delete
<div style="display: flex; justify-content: space-between; padding: 5px;"> <span>Save</span> </div>						

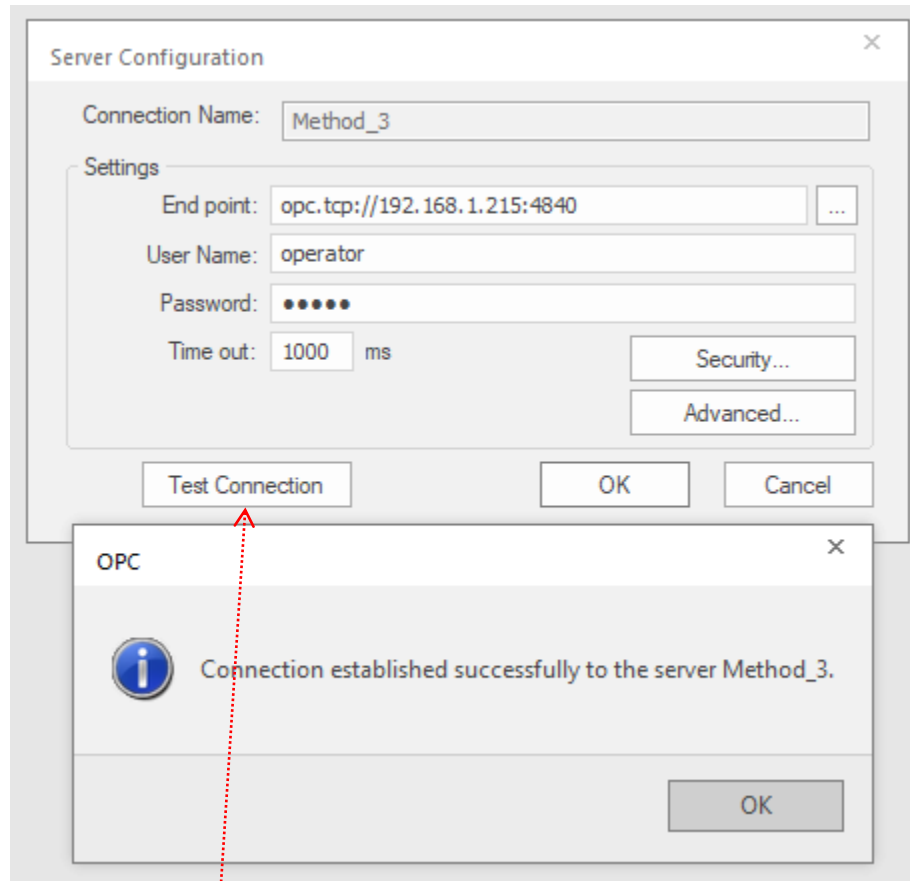
**10** Go to Security / Certificates / OPC UA

Click Add Client Certificate (Browse certificate file that we generated before)

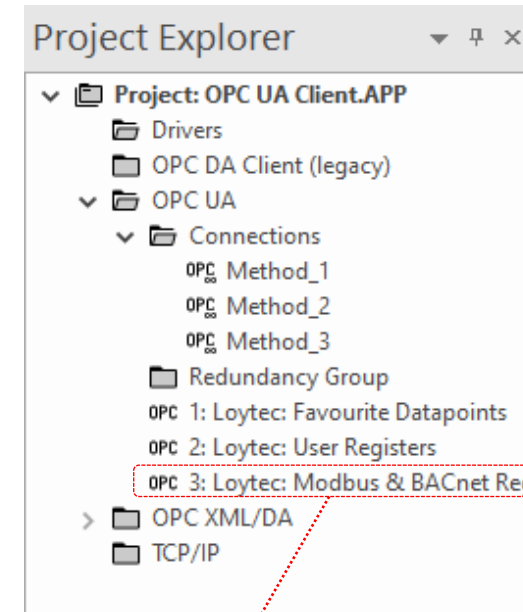
Click Save button to upload to Loytec.

**11**

If uploaded correctly, the certificates should now appear in the trusted client certificate list.



**12** Click 'Test Connection' to check whether the connection status is good or bad.



**13**

In Aveva Edge, go to project explorer again and, right click to create new *OPC driver worksheet* under UA folder.

(Refer to next sheet for further details)

17 Finally click on Advanced Button and assign asynReadTrigger Boolean Tag.

Asynchronous read trigger:

asynReadTrigger

Select connection method that we previously created.

14

Browsing root node will make it much easier when selecting hierarchical OPC data points.

15

Right click to browse OPC datapoints.

16

Available OPC datapoints will show in this area.

The screenshot shows the 'Project Tags' window with a table of existing tags. The 'UA Browser' window displays the hierarchy of OPC data points, with the 'BACnet Port' folder expanded to show 'Datapoints'. The 'Tag Properties' dialog box is open, showing the configuration for a new tag named 'asynReadTrigger'.

Tag Name	Path
modbus_M0	/1:Modbus Port T...
modbus_X0	/1:Modbus Port T...
modbus_Y0	/1:Modbus Port T...
bacnet_AI	/1:BACnet Port/1:...
bacnet_AO	/1:BACnet Port/1:...
bacnet_AV	/1:BACnet Port/1:...
bacnet_BI	/1:BACnet Port/1:...
bacnet_BO	/1:BACnet Port/1:...
bacnet_BV	/1:BACnet Port/1:...

UA Browser

- UA Server( /0:Objects/1:Loytec ROOT )
  - E-Mail
  - AlarmLogs
  - LI0B-IP
  - LI0B-FT
  - LI0B
  - Modbus Port TCP
  - CEA852 Port
  - BACnet Port
    - Datapoints
      - multistateValue
      - analogValue
      - analogOutput
      - analogInput
      - binaryValue
      - binaryOutput
      - binaryInput
    - CEA709 Port
    - User Registers
    - System Registers
    - Favorites

Selected Item: /1:BACnet Port/1:Dapoints/1:binaryOutput

Element Type: Variable Data Type: Boolean

Node Id: ns=1;i=97344

Value: false

Array Element:

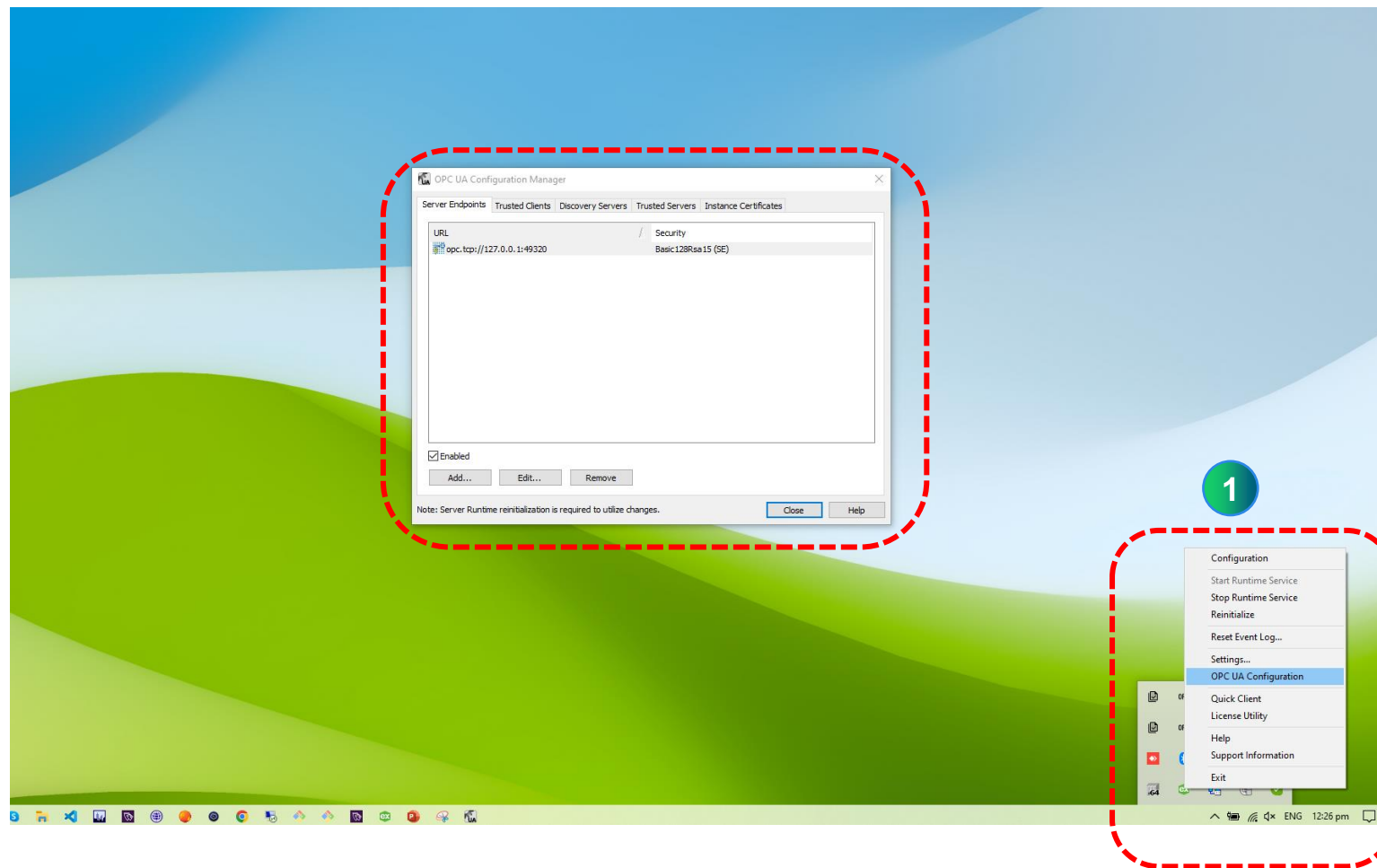
OK Cancel



## Method 4: Signed/Encrypted And Authenticated connection mode

**Security Policy** : Basic128Rsa15

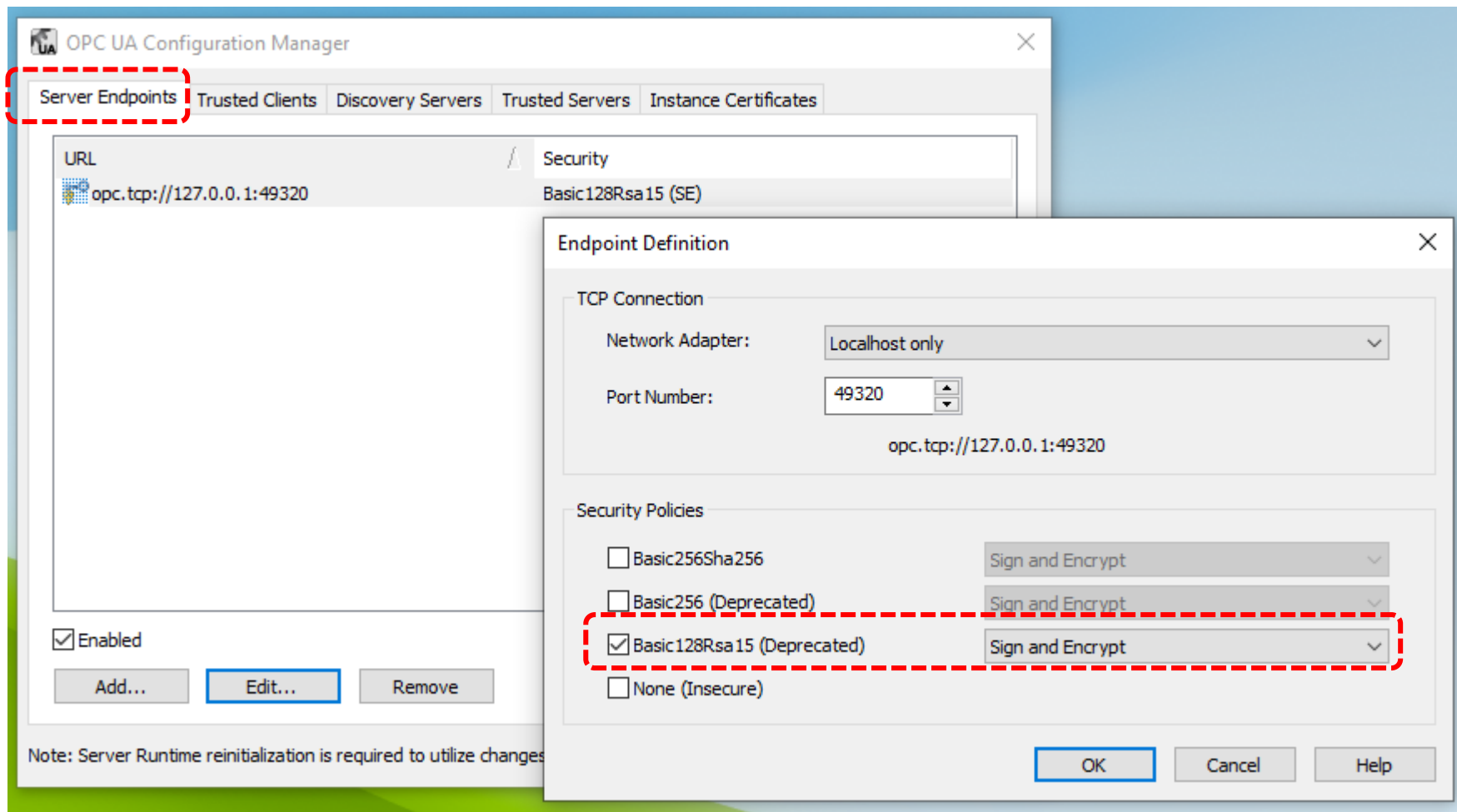
**Authentication Mode**: Credential



- Right click on the kepware icon in system tray to open the configuration menu
- Click on OPC UA Configuration

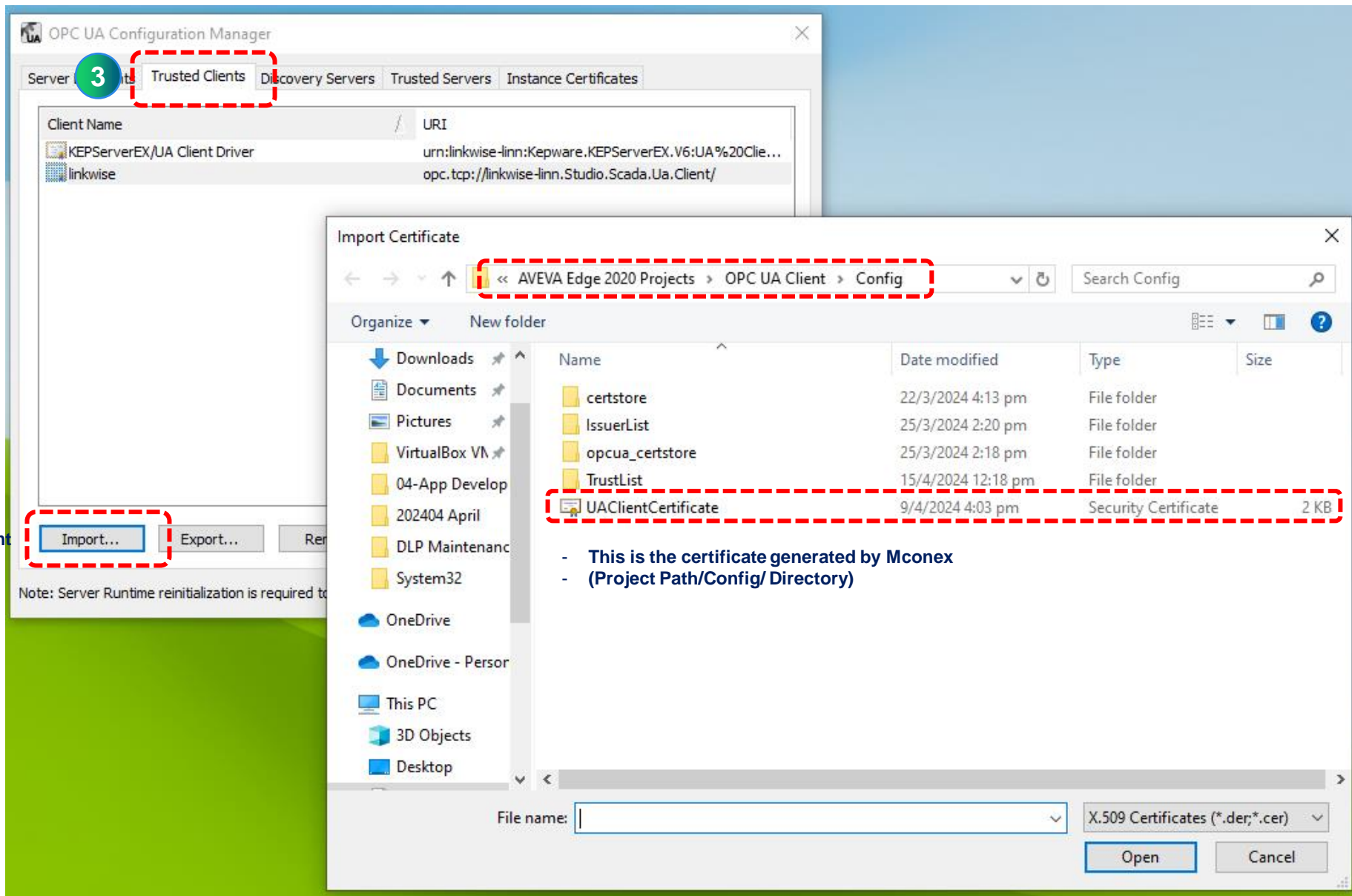
- Here, we may need to configure our OPC UA server settings

2



- Select connection mode
- (For production env, always consider for most secure encryption method and connection mode)

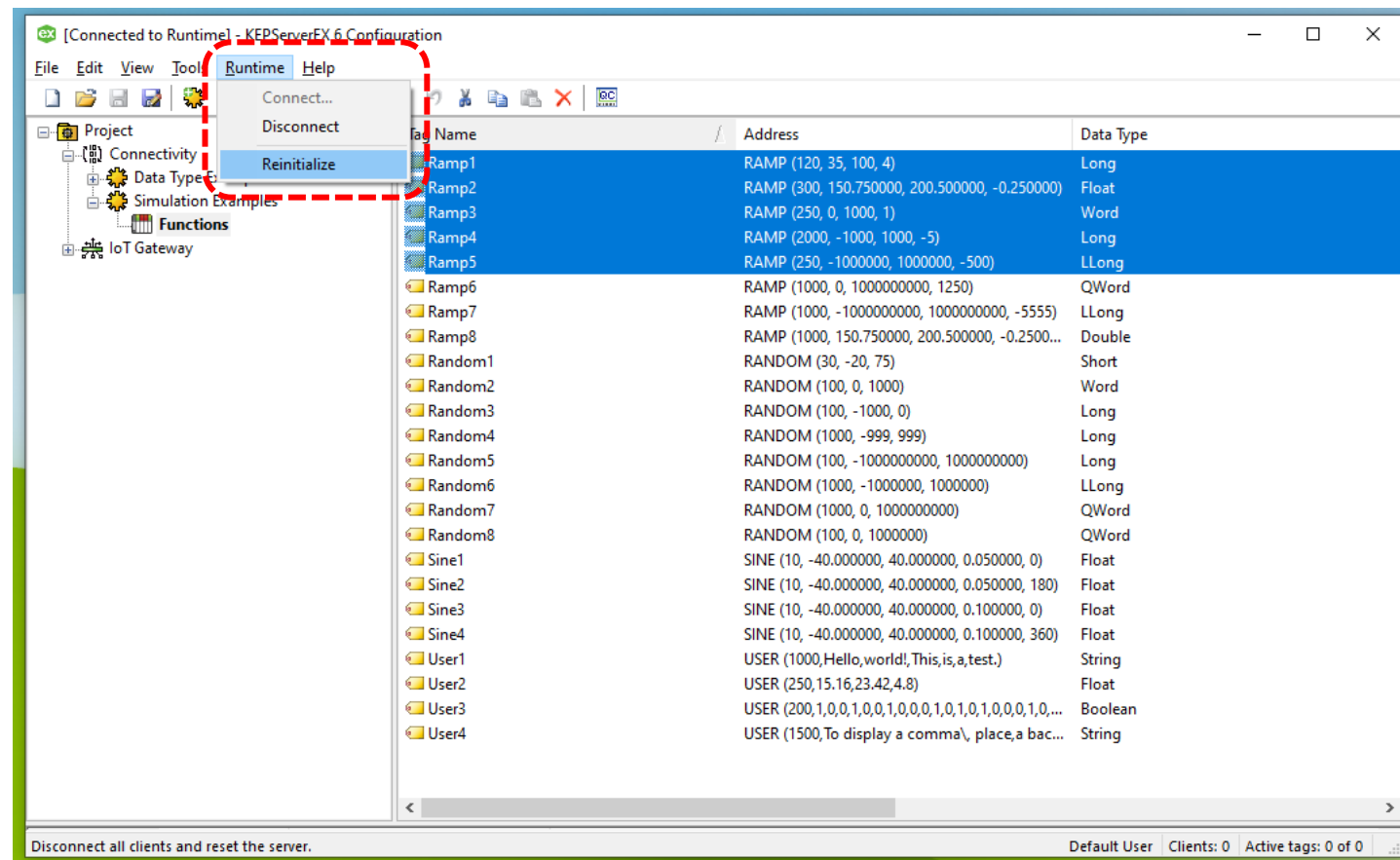
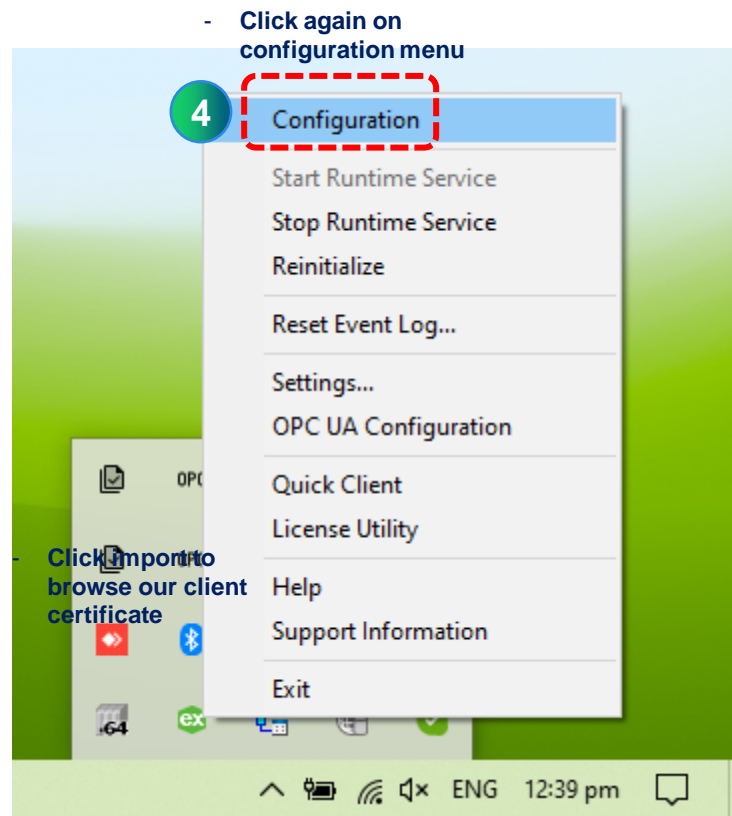
- Click Trusted Client Tab
- From here we may need to add our self signed certificate to OPC UA Server in order to get successful communication

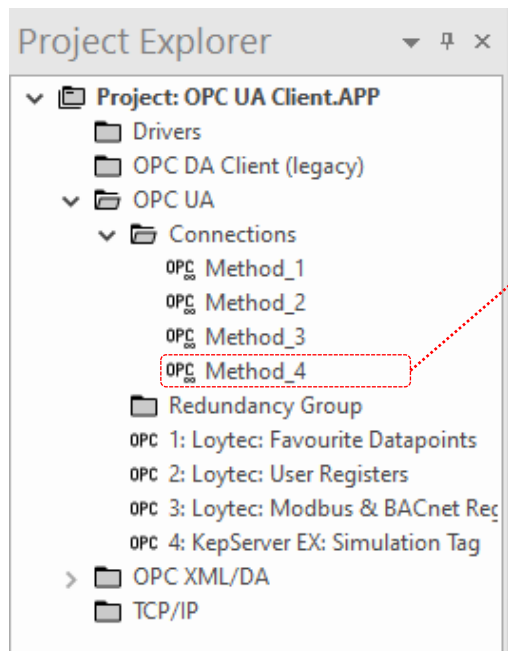


- Click import to browse our client certificate

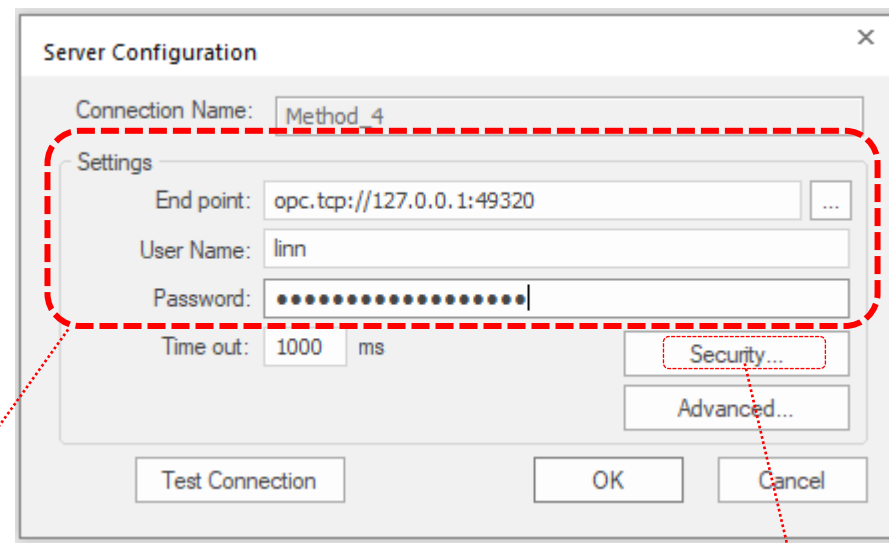
- This is the certificate generated by Mconex
- (Project Path/Config/ Directory)

- Click Reinitialize in order to restart OPC UA Server Runtime Service





**5** Right click to create new *Connections* under OPC UA/Connections folder.

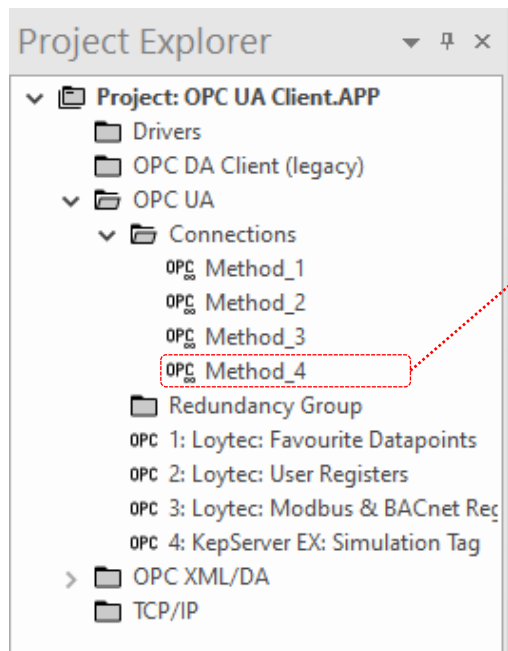


**6**

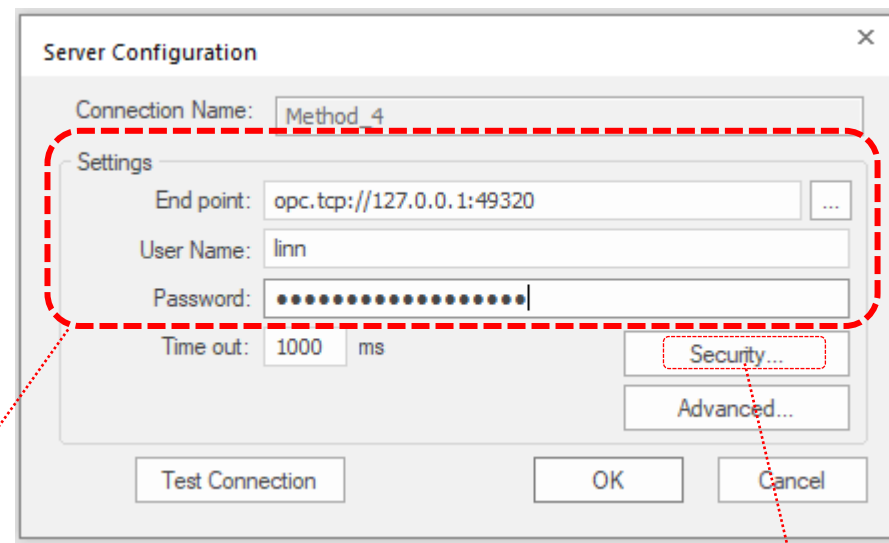
The endpoint URL for OPC TCP Binary communication should be `opc.tcp://ip_address:49320`. Alternatively, you can press the search icon to browse available OPC servers.

Username : auth from kepserver  
Password : auth from kepserver

Click the 'Security' button to configure a self-signed certificate and necessary encryption algorithms.



**7** Right click to create new *Connections* under OPC UA/Connections folder.



**8** The endpoint URL for OPC TCP Binary communication should be `opc.tcp://ip_address:49320`. Alternatively, you can press the search icon to browse available OPC servers.

Click the 'Security' button to configure a self-signed certificate and necessary encryption algorithms.

Username : auth from kepserver  
Password : auth from kepserver

Security Settings

Message Security Mode:

Sign And Encrypt

Security Policy:

Basic128Rsa15

Endpoints

opc.tcp://127.0.0.1:49320 - Sign And Encrypt - Basic128Rsa15 - [User Name]

Trust List (empty = Config\TrustList):

Issuer Certificate List (empty = Config\IssuerList):

☒ Automatically add server certificate to certificate store on the next connection

Create self-signed certificate...

Trust server certificate

Session Security

OK

Cancel

9

Select connection method.

Check this !

10

Select connection method that we previously created.

Browsing root node will make it much easier when selecting hierarchical OPC data points.

OPC UA004.UA x

Description:  
KepServer EX: Simulation Tag

Connection:  
Method\_4

Status:  
Status Mes

Publish rate (ms):  
1000

Disable:

Root node or view:  
/0:Objects/2:Simulation Examples/2:Functions

	Tag Name	
	Filter text	Filter text
1	keppure_Ramp1	/2:Ramp1
2	keppure_Ramp2	/2:Ramp2
3	keppure_Ramp3	/2:Ramp3
4	keppure_Ramp4	/2:Ramp4
5	keppure_Ramp5	/2:Ramp5
*		
*		
*		
*		
*		

Right click to browse OPC datapoints.

UA Browser

UA-Server( /0:Objects/2:Simulation Examples/2:Functions )

- \_System
- Ramp1
- Ramp2
- Ramp3
- Ramp4
- Ramp5
- Ramp6
- Ramp7
- Ramp8
- Random1
- Random2
- Random3
- Random4
- Random5
- Random6
- Random7
- Random8
- Sine1
- Sine2
- Sine3

Available OPC datapoints will show in this area.

Selected Item: /2:Ramp5

Element Type: Variable Data Type: Int64

Node Id: ns=2;s=Simulation Examples.Functions.Ramp5

Value: -1000000

Array Element:

OK Cancel