Industrial Edge OPC UA Application V1.0

Operating Manual
Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

**DANGER**
indicates that death or severe personal injury will result if proper precautions are not taken.

**WARNING**
indicates that death or severe personal injury may result if proper precautions are not taken.

**CAUTION**
indicates that minor personal injury can result if proper precautions are not taken.

**NOTICE**
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

**WARNING**
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
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Siemens adheres to the principles of data protection, in particular the principles of data minimization (Privacy by Design).

For this product, Industrial Edge (IE) OPC UA application, this means:

**Personal data**

There is no personal data* collected but following data is stored to allow machine to machine communication:

- Industrial Edge Databus credentials
- OPC-UA server user credentials
- User defined OPC-UA server certificates for encryption and signing
- Tag data and metadata from SIMATIC S7 Connector
- Timestamps
- Choice of security and user authentication
- Application usage data

If the customer links the data mentioned above to other data (e.g. shift plans) or if the customer saves personal information on the same medium (e.g. hard disk) and thus creates a personal reference, the customer has to ensure that the guidelines regarding data protection are observed.

**Note**

* This section refers to any personal data processed by the application other than the personal data contained in log-files / tracking data (if any). "Personal data" are any information relating to an identified or identifiable natural person. Please note that IP-addresses, device identifiers such as IMEI, UDID, IMSI, MAC-address, MSISDN, location data or machine data (if machine data tracks events triggered by user interaction with the machine) usually qualify as personal data.

**Purposes**

The data mentioned above is required for the following purpose:

- Access protection and security measures

Storage of the data is affected for a suitable purpose and is limited to what is strictly necessary, as the information is indispensable in order to identify the authorized operators.
Securing of data

The above data will not be stored anonymously or pseudonymized, as the purpose (identification of the operating personnel) cannot be achieved otherwise. This data will be used only within the product and within the Edge eco-system and will not be automatically passed on to third parties or unauthorized persons. This data is secured by adequate technical measures, such as encryption.

The customer must ensure the access protection as part of his process configuration while using the OPC UA client to connect to the server.

Deletion policy

This product does not provide an automatic deletion for the databus and server user credentials already provided by the user. In case the user provides a different databus credentials, the previous credentials will be overwritten. Since, there is no explicit delete option, the user could provide invalid databus credentials to overwrite the existing valid credentials. The OPC UA server user credentials can be overwritten and appended.

Data configuration

The customer can configure the above data for the product using the App Configurator on Industrial Edge Device. Once the configuration is completed, the data will be stored securely.
IE OPC-UA application on Industrial Edge (IE) devices provide open standard access to data that is available to the customers. Industrial Edge (IE) OPC UA application allows to connect to the data source and extract the data using Industrial Edge Databus (IE Databus). The data source can be SIMATIC S7 Connector, PROFINET IO Connector, Modbus TCP Connector, or Ethernet/IP Connector. You can also customize data sources of your choice which supports common payload format.

The IE OPC UA application installed on the IE devices and configured using IE OPC UA configurator. The application can be accessed using the end point as opc.tcp://Ip-Adress-of-Edge-Device:48010.

Note
A client can connect to IE OPC UA server at end point opc.tcp://Ip-Adress-of-Edge-Device:48010.

Any OPC UA client can be used to connect to IE OPC UA application as follows (UA expert is used as an example client):
Note
IE OPC UA supports only DATA ACCESS (DA) as access method.
• The non mandatory fields for server configuration, server Capabilities - aggregate function and operation limits are set to default and should not be referred
• Maximum number of data points - 6800 data points
• Maximum number of data sources - 4
• Maximum Number of client connections - 4
• Number of client sessions per connection with values - 4
• Maximum number of monitored Items - 1000
• Minimal sample time- As per the IE data bus capability

About OPC UA Configurator
The IE OPC UA application uses IE OPC UA configurator to configure data source, security configuration, and create users for OPC UA client to access the data.
Requirements for IE OPC UA Configurator

- When SIMATIC S7 Connector is defined as a data source, there must be at least one connection in SIMATIC S7 Connector Configurator. All connections must be enabled with 'Bulk Publish'.

- A user with username and password must be created in IE Databus. The required topics to fetch the tags must be configured in IE Databus.

- The topics must be created for the user as shown in the below format:
  - `ie/m/j/{msgStructureScheme}/({msgStructureSchemeMajorVersion})/{providerAppInstanceId}/dp`
  - `ie/d/j/{msgStructureScheme}/({msgStructureSchemeMajorVersion})/{providerAppInstanceId}/dp/r{dpConnectionNamePath} {dpCollectionNamePath}`

For example:
  - SIMATIC S7 Connector Configurator metadata and data subscriptions topics
    `ie/m/j/simatic/v1/s7c1/dp`
    `ie/d/j/simatic/v1/s7c1/dp/r/#`
User Interface for OPC UA Configurator Home Page

Prerequisite
The IE OPC UA Configurator app must be installed and running on the Industrial Edge Device.

Home page
When you launch the IE OPC UA Configurator, the Configurator home page is displayed as follows:

1. Server Status Tab
2. Data Source Tab
3. Data Points Tab
4. Security Tab
5. User Management Tab
6. Message Logging Section
7. Deploy Button
The message logging section displays the latest message at the end, and hence you need to scroll down towards the end of the message box.

The IE OPC UA Configurator provides the following different user interface tabs:

**Server Status Tab**

This tab is displayed by default on the IE OPC UA Configurator home page. Once you deploy the configuration, this tab provides an overview on the current server status.

**Data Source Tab**

This tab allows you to add a data source for server. All existing configured data sources are displayed as follows:

The following table lists the different UI elements in the "Data Source" tab page:

<table>
<thead>
<tr>
<th>UI Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Check Box</td>
<td>Using this check box, you can select all data source configurations.</td>
</tr>
<tr>
<td>Add Data Source Icon</td>
<td>Using this icon, you can add a data source.</td>
</tr>
</tbody>
</table>

① Global Check Box
② Add Data Source Icon
③ Connect Data Source Icon
④ Global Delete Icon
⑤ Delete Icon
⑥ Edit Icon
⑦ Check Box
<table>
<thead>
<tr>
<th>UI Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect Data Source Icon</td>
<td>Using this icon, you can connect the data sources to Industrial Edge Runtime.</td>
</tr>
<tr>
<td>Global Delete Icon</td>
<td>Using this icon, you can delete all selected data source configurations.</td>
</tr>
<tr>
<td>Delete Icon</td>
<td>Using this icon, you can delete a data source configuration.</td>
</tr>
<tr>
<td>Edit Icon</td>
<td>Using this icon, you can edit the data source configuration.</td>
</tr>
<tr>
<td>Check Box</td>
<td>Using this check box, you can select a data source.</td>
</tr>
</tbody>
</table>

When you make changes in the "Data Source" tab, you must either click "Deploy" or click 🔄 to reflect the changes on the corresponding data points.

**Data Points Tab**

This tab allows you to view all data points, and select data points from the configured data sources. All data points from the configured data sources are displayed as follows:

![Data Points Tab](image)

You must select atleast one data point to "Deploy".

**Security Tab**

This tab allows you to specify the security settings for the server. You can specify security policies and certificates as required as follows:
Note
You can use CA authorised certificate or generate self signed certificate also for the secured connections.

IE OPC UA app supports only .der binary certificate and unprotected .pem private key for the secured communication.

User Management Tab
This tab allows you to add a user for server. All existing users are displayed as follows:
The following table lists the different UI elements in the "User Management" tab page:

<table>
<thead>
<tr>
<th>UI Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Check Box</td>
<td>Using this check box, you can select all users.</td>
</tr>
<tr>
<td>Add User Icon</td>
<td>Using this icon, you can add a user.</td>
</tr>
<tr>
<td>Global Delete Icon</td>
<td>Using this icon, you can delete all selected users.</td>
</tr>
<tr>
<td>Delete Icon</td>
<td>Using this icon, you can delete a user.</td>
</tr>
<tr>
<td>Check Box</td>
<td>Using this check box, you can select a user.</td>
</tr>
</tbody>
</table>

**Note**

The guest access should be disabled when users with passwords are used for a secure setup.

**Deploy Button**

Deploys the changes to Industrial Edge Runtime. It "Deploys" the configuration in each tab. Each tab displays its respective statuses, and in case of issues "Message" section in "Server" status tab can be referred for detailed information.
4.1 Add Data Source

You can add a data source in IE OPC UA Configurator to fetch the data from the PLCs/data published through the IE Databus. This data is sent to OPC UA clients.

Prerequisite

- The IE OPC UA Configurator must be running.
- A data source must be installed.

Procedure

To add a data source, follow these steps:

1. Launch the IE OPC UA Configurator.
   The IE OPC UA Configurator home page is displayed.

2. Click "Data Source" tab.
   The page is displayed as follows:
3. Click "Add".
   The "Add Data Source" dialog box is displayed as follows:
4. Complete the following fields:

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Source Name</td>
<td>Specifies the data source name. The data sources (connectors) that are installed in Industrial Edge Device, are displayed in the drop-down. Additionally, you can define another connector as required.</td>
</tr>
<tr>
<td>Data Source type</td>
<td>Displays the data source type.</td>
</tr>
<tr>
<td>Topic</td>
<td>When you specify the data source in &quot;Data Source Name&quot; field, the meta data topic is added in this field automatically. Additionally, you can define a meta data topic as required.</td>
</tr>
<tr>
<td>User name</td>
<td>Defines the username of IE Databus user.</td>
</tr>
<tr>
<td>Password</td>
<td>Defines the password of IE Databus user.</td>
</tr>
</tbody>
</table>

**Note**

You can add multiple data sources as required but the IE Databus username and password must be same for all the configured data sources.

5. Click "OK".

The data source is added and displayed as follows:

![IE OPC UA Configurator for jarvis](image)

**Note**

- You can add more data sources using 📌.
- You can edit a data source using 📋.
- You can delete a data source using 🗑️.
- You can connect the added data sources to Industrial Edge Runtime using 🚁.
- Duplicate entries of similar metadata topics are allowed.
4.2 Add IE OPC UA Server User

You can create a user for OPC UA client to access OPC UA server. This provides a secure way of connection from OPC UA client for a session.

Prerequisite

The IE OPC UA Configurator must be running.

Procedure

To add a user, follow these steps:

1. Launch the IE OPC UA Configurator.
   The IE OPC UA Configurator home page is displayed.

2. Click "User Management" tab.
   The page is displayed as follows:

3. Click +.
   The "Add User" dialog box is displayed as follows:
4. Complete the following fields:

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Name</td>
<td>Defines the username of the new user.</td>
</tr>
<tr>
<td>Password</td>
<td>Defines the corresponding password of the user.</td>
</tr>
<tr>
<td>Confirm Password</td>
<td>Confirms the defined password.</td>
</tr>
</tbody>
</table>

5. Click "OK".
The user is added and displayed as follows:

![User Management Tab](image)

**Note**
- You can add more users using the + icon.
- You can delete a user using the trash can icon.
- Any change in Security and User Management tab will restart the OPCUA Server on deploy.

### 4.3 Start IE OPC UA Server

The IE OPC UA Configurator allows you to configure data source, security configuration, and create user for OPC UA client to access OPC UA server. When you deploy the connections and data points, the OPC UA server is started. The OPC UA clients can access this data through OPC UA server.

**Prerequisite**

The IE OPC UA Configurator must be running.

**Procedure**

To deploy the connections to the OPC UA server, follow these steps:
Step 1: Configure data source connection under "Data Source" tab.
1. Add a data source as described in Add Data Source (Page 19) section.
2. Connect the data source using 📜.

Step 2: Select tags under "Data Points" tab.
1. Mark true against the check boxes of the connections and tags that you want to deploy as required. By default, all are marked true.

Step 3: Select security policy under "Security" tab.
1. Mark true against the check box of the security policy as required.
   The available options are as follows:
   • "None": It specifies no security. When you select the 'None' security policy, any OPC UA client can still connect using this setting, regardless of any security settings that follow.
   • "Sign-Basic256Sha256": It specifies secure communication with signed client and server certificates.
   • "Sign&Encrypt-Basic256Sha256": It specifies secure communication with signed client and server certificates with additional security where the data is encrypted from server application and sent to the client.
   You must ensure that your selected security policy matches the algorithm that was used to generate the certificates.

Step 4: Upload certificate and key under "Security" tab.
1. Upload the certificate and key using "Certificate" and "Key" field.
   This is an optional step. You may choose to upload the custom certificates or select "Generate self signed certificate" to generate self-signed certificates.

Note
Password protected privatekey.pem file is not supported.

Step 5: Create a user under "User Management" tab.
1. Create a user as described in Add IE OPC UA User (Page 22) section.

Note
Alternatively, you can mark true against "Enable guest access" check box to enable anonymous login. The default or recommended login procedure is by creating a user and using the user credentials. You must use the anonymous login at your own risk.

Step 6: Deploy Connections and tags.
1. Click "Deploy".
   The connections and tags are deployed, and the OPC UA server is started.
Note

• When the OPC UA server disconnects from the IE Databus, it tries to connect to it for a certain duration. If the connection is not restored within this duration, a message is displayed on the UI that the maximum retry limit has reached. The next attempt to connect to the IE Databus is made only after the deployment of the Data Sources.

• While using the IE OPC UA Configurator application, you must configure your client to validate the status code of the respective node. If the status code is set to 'bad', the value of the respective node should not be referenced.
4.3 Start IE OPC UA Server