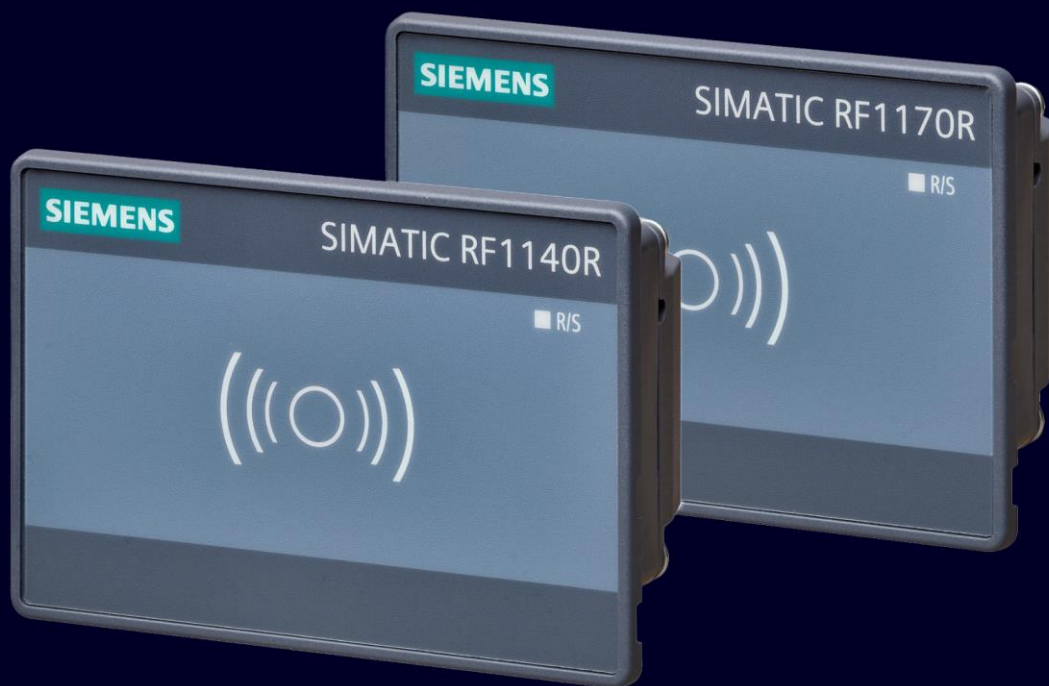




Siemens
Industry
Online
Support

FAQ

OPC UA-based Transfer of the UID of RFID Transponders between RF1100R and S7-1500

RF1100R readers

SIEMENS

This entry originates from Siemens Industry Online Support. The conditions of use specified there apply (www.siemens.com/nutzungsbedingungen).

Security Information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions form one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. firewalls and network segmentation) in place.

Further information on possible protective measures in the field of industrial security is available at <https://www.siemens.com/industrialsecurity> .

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase the customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at <https://www.siemens.com/cert> .

Contents

1.	Introduction	3
2.	Procedure.....	4
2.1.	Configuration of the OPC UA Server in the WBM of the RF1140R/RF1170R.....	4
2.2.	Hardware and Software Configuration of the S7-1500 PLC in TIA Portal	6
2.3.	Configuration of "RWData" in the Reader's Address Space	11
2.4.	Extension of the S7-1500 PLC Program	13
3.	Operation and Use.....	14

1. Introduction

This document describes how to establish an OPC UA connection between an RF1140R/RF1170R RFID reader and an S7-1500 PLC for transferring the UID of an RFID transponder.

Description

The OPC UA server of an RF1140R/RF1170R RFID reader can provide the data of an RFID transponder. This data can be transferred to the controller using the OPC UA client of an S7-1500 PLC.

For the sake of clarity, this description is based on an unencrypted OPC UA connection. In production environments use the signature and encryption options provided by OPC UA.

Requirements

You need a PC with a browser and TIA Portal for configuration. The following requirements must be met for the PC to access the devices:

- **Network access:** The PC needs network access to the RF1140R/RF1170R via port 443 (HTTPS).
- **Network access:** The PC requires network access to the S7-1500 PLC in order to transfer the configuration.
- **Browser compatibility:** RF1140R/RF1170R offers an HTML5 web interface that is displayed in the browser. Always use up-to-date browsers for security and compatibility.

2. Procedure

Configure the OPC UA interface on both devices and extend the program in the controller.

2.1. Configuration of the OPC UA Server in the WBM of the RF1140R/RF1170R

1. Open the Web Based Management of the reader by entering its IP address in a web browser.
2. In the reader's WBM go to "Settings > Reader configuration".
3. Under "Read point properties", enable the option "Autoread" (1), in the drop-down list "Default transponder data" chose "UID" (3) and (optional) in the drop-down list "Tag field" chose "0" (3).

SIEMENS

The screenshot shows the Siemens WBM interface for 'Reader configuration'. The left sidebar contains a menu with 'Start page', 'Settings' (expanded), 'Diagnostics', 'Edit transponder', 'User management', 'Certificates', 'System', and 'Help'. Under 'Settings', 'Reader configuration' is selected. The main area is titled 'Reader configuration' and includes a toolbar with download, upload, save, and refresh icons. Below the title is a checkbox for 'Output reverse UID'. The 'Tag field' section features a table with 'Field name' and a value of '0'. To the right, 'Tag field properties' are listed: Name (0), VHL ID (255), Start address (0000), and Length (008). Below this are 'Insert' and 'Delete' buttons. The 'Read point properties' section has a text input for 'Name of the read point' (Readpoint_11) and an 'Autoread' checkbox. The 'Default transponder data' section contains two dropdown menus: 'UID/tag field' (set to UID) and 'Tag field' (set to 0). Annotations with red circles and speech bubbles are present: (1) points to the 'Autoread' checkbox, (2) points to the 'Tag field' dropdown, and (3) points to the 'UID/tag field' dropdown. There are also 'DEC' and 'HEX' toggle buttons on the right side of the 'Tag field properties' section.

4. Switch to "Settings > Network settings" and select "OPC UA Settings" and make the following settings:
 - a. Enable the option "Observed Events". (4)
 - b. Under "Diagnostic events and items", enable the option "Presence events". (5)
 - c. Under "Diagnostic events and items", enable the option "Presence events". (6)
 - d. Under "Security settings, Security profiles", enable the option "No security". (7)
 - e. Under "Security settings, Certificate verification", enable the option "Allow anonymous access". (8)

OPC UA settings

☒ OPC UA interface

☒ Observed-Events ☐ Lost-Events

Application name: Default port:

Minimum sampling interval: ms Minimum supported publishing interval: ms

Diagnostic events and items

☒ Presence events ☒ Last access events ☐ Logbook events

Security settings

Security profiles

☒ No security ☐ Basic 256Sha256 - Sign ☐ Basic 256Sha256 - Sign & Encrypt ☐ Aes128Sha256RsaOaep - Sign ☐ Aes128Sha256RsaOaep - Sign & Encrypt ☐ Aes256Sha256RsaPss - Sign ☒ Aes256Sha256RsaPss - Sign & Encrypt

Certificate verification

☒ Validate certificate ☐ Accept expired certificates ☐ No strict validation ☒ Allow anonymous access ☒ Compatible certificate checking according to OpenSSL 1

[Certificate management](#)

[Generate OPC UA server certificate](#)

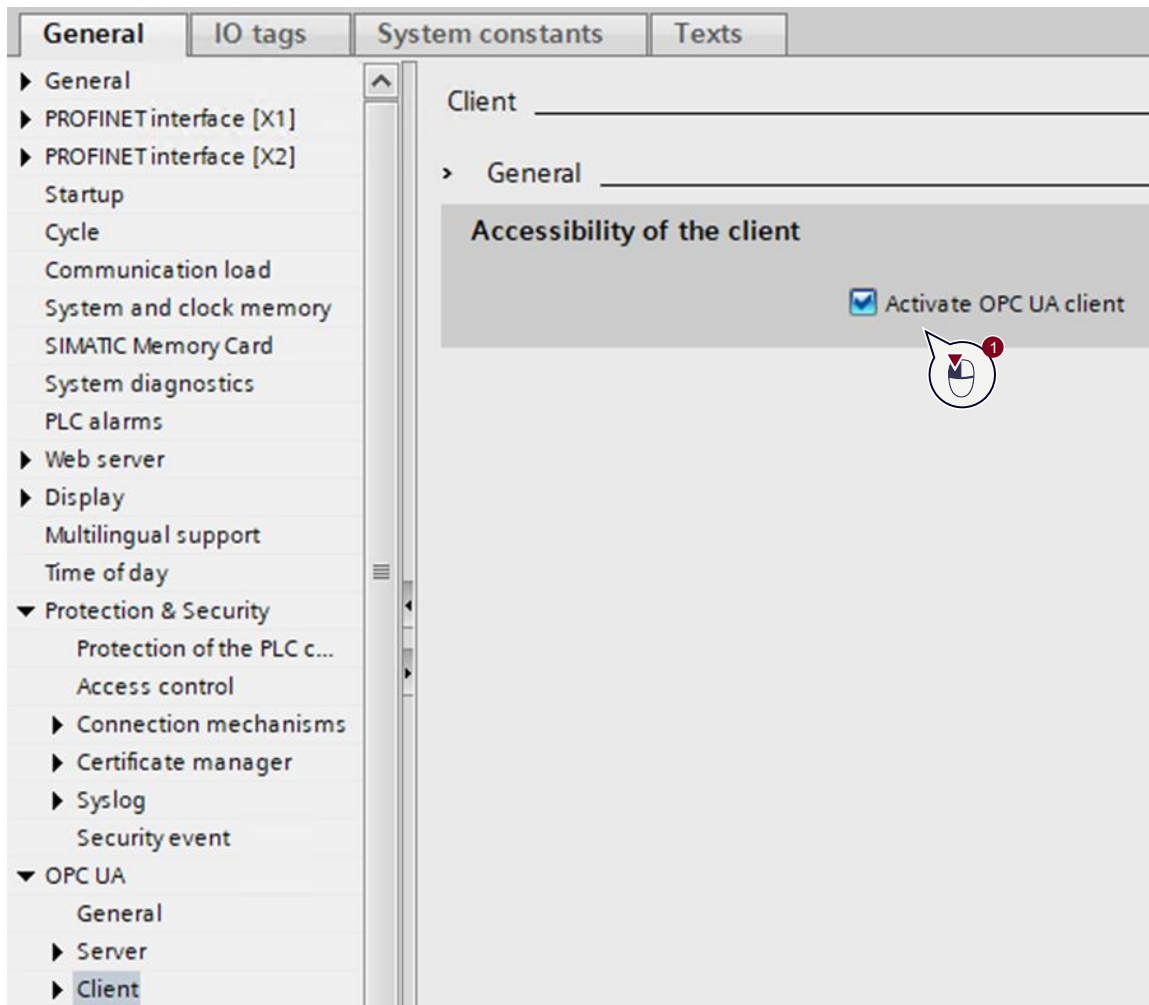
Note: The OPC UA Server certificate contains the application name and the IP address of the device. If any of this information

5. Leave the default settings for the other options.

2.2. Hardware and Software Configuration of the S7-1500 PLC in TIA Portal

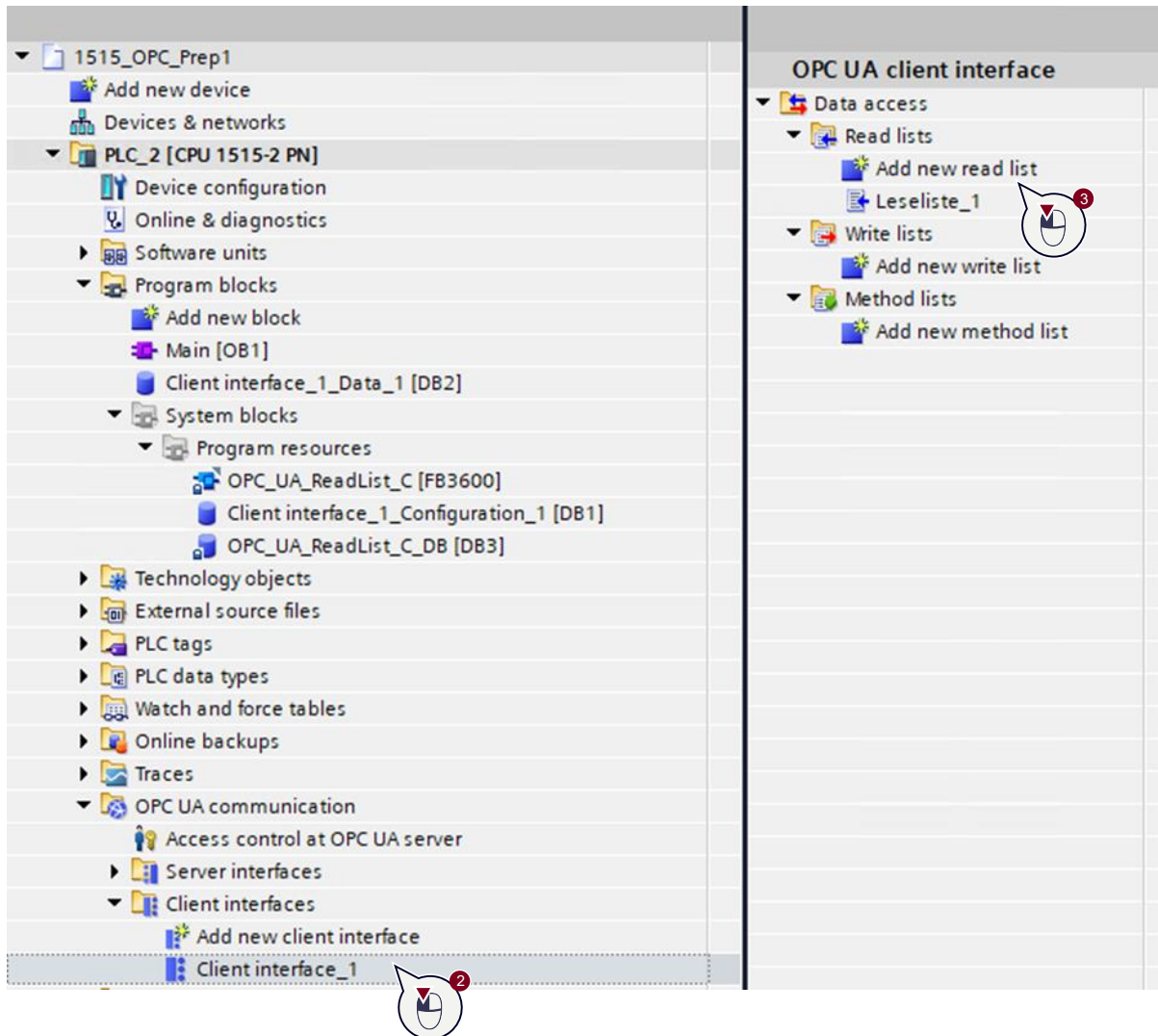
Hardware configuration

1. Open the project in the TIA Portal. In the product tree, you open the S7-1500 PLC.
2. In the "General" tab of the Properties inspector window, in the Properties tree you go to "OPC UA > Client".
3. Under "Accessibility of the client", you enable the option "Activate OPC UA client" (1).

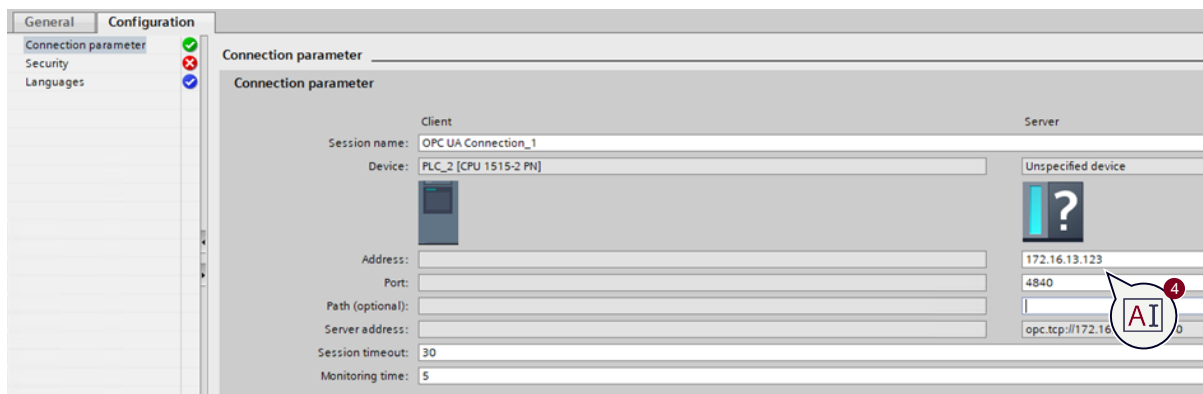


Configuration of the OPC UA client interface

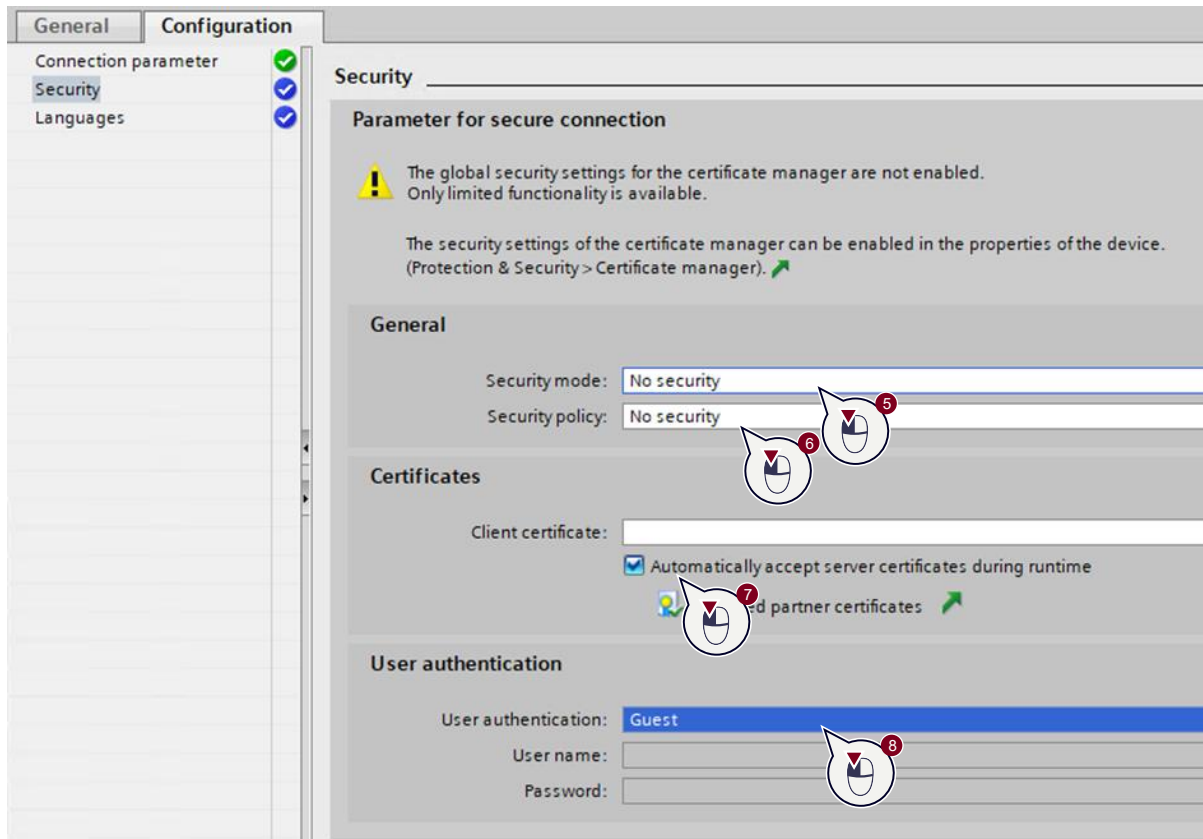
1. In the project tree go to "OPC UA communication > Client interfaces". Create a new interface via "Add new client interface" (2).
2. Create a new read list in the properties of the new interface via "Data access > Read lists > Add new read list" (3).



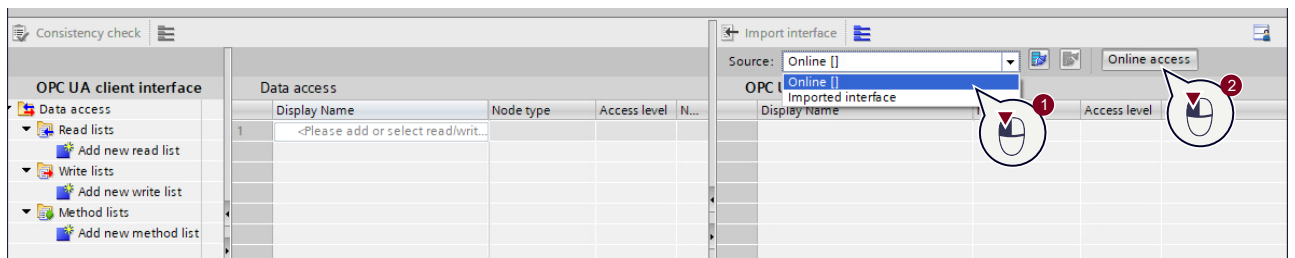
3. In the Properties inspector window of the OPC UA interface, switch to the "Configuration" tab.
4. Under "Connection parameter" in the "Server" column, under "Address:" you enter the IP address of the OPC UA server and under "Port" you enter the port of the OPC UA server (usually "4840") (4).



5. Open the "Security" window and
6. Make the following settings:
 - a. Under "General", in the drop-down list boxes "Security mode:" and "Security policy:" you select "No security" in each case (5, 6).
 - b. Under "Certificates" you enable the option "Automatically accept..." (7).
 - c. Under "User authentication", in the drop-down list box "User authentication:" you select "Guest" (8).

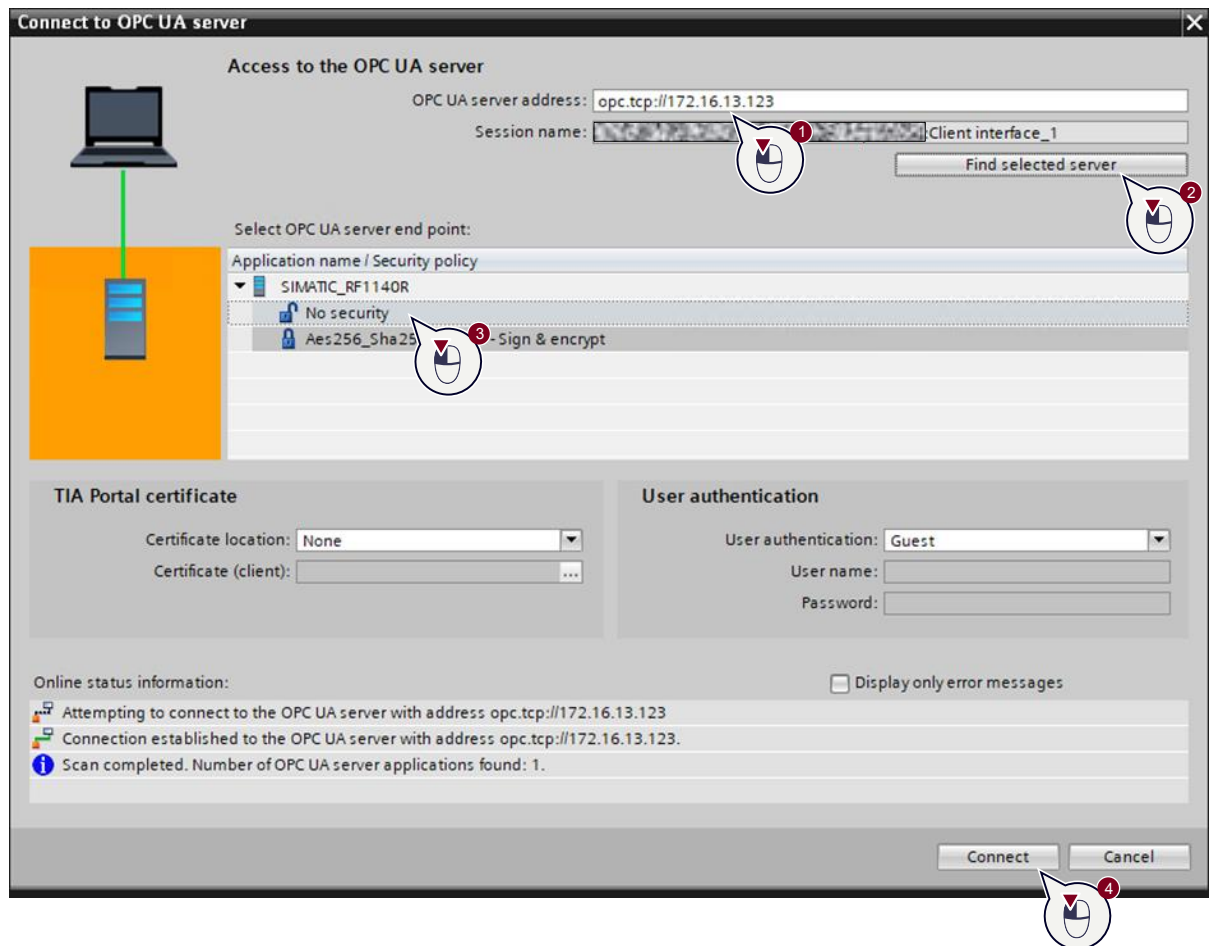


7. In TIA Portal, you open the OPC UA client interface that you created in [2.2](#).
8. In the window on the right you open the drop-down list box "Source:" and select "Online[]" (1).
9. Click the "Online access" button (2).



A dialog box for connecting to the OPC UA server opens.

10. Under "OPC UA server address:" you enter the address of the OPC UA server that you want to use (1).
11. Click the "Find selected server" button (2).
A table with server end points opens.
12. Select the item "No security" from the server end points shown (3).
Click the "Connect" button (4).
A connection to the specified OPC UA server is established and a table with tags provided by that OPC UA server opens.



13. Drag and drop the tags "Presence" and "Identifier" from this table into the read list for the OPC UA client of the S7-1500 PLC.

The screenshot shows the TIA Portal interface with two main panels. On the left, the 'OPC UA client interface' panel shows a tree view with 'Data access' expanded, containing 'Read lists', 'Write lists', and 'Method lists'. The 'Read lists' folder is expanded, showing 'Leseliste_1'. In the center, the 'Leseliste_1' table is displayed with columns: Display Name, Node type, Access level, Node ID, and Description. It contains two rows: 'Presence' (UINT, RD/WR) and 'Identifier' (WSTRING, RD). On the right, the 'OPC UA server interface' panel shows a tree view of the server's object model. A red arrow points from the 'Presence' and 'Identifier' tags in the 'Leseliste_1' table to the 'Presence' and 'Identifier' tags in the 'OPC UA server interface' table.

Display Name	Node type	Access level	Node ID	Description
1 Presence	UINT	RD/WR	http://www.siemens.com/.../1	Current pre...
2 Identifier	WSTRING	RD	http://www.siemens.com/.../2	The AutoID ...
3				Insert a new element here

Display Name	Node type
1 Objects	Folder
2 Server	Object
3 DeviceSet	Object
4 DeviceFeatures	Object
5 Readpoint_11	Object
6 AntennaNames	Array of Anten...
7 AutoidModelVersi...	String
8 DeviceInfo	String
9 DeviceLocation	Location
10 DeviceLocationN...	String
11 DeviceManual	String
12 DeviceName	String
13 DeviceRevision	String
14 DeviceStatus	DeviceStatusE...
15 Diagnostics	Object
16 LastAccess	Object
17 Antenna	Int32
18 Client	String
19 Command	String
20 Identifier	String
21 RNDData	String
22 Timestamp	UtcTime
23 Logbook	Object
24 Presence	UInt16
25 Hard...	String

TIA Portal creates two data blocks in the controller that enable access from the program: One data block for the process data transmitted via OPC UA ("Program blocks" folder) and one data block for the configuration data for the OPC UA server ("System blocks" folder).

The screenshot shows the TIA Portal project tree for 'PLC_2 [CPU 1515-2 PN]'. The tree structure is as follows:

- PLC_2 [CPU 1515-2 PN]
 - Device configuration
 - Online & diagnostics
 - Software units
 - Program blocks
 - Add new block
 - Main [OB1]
 - Client interface_1_Data_1 [DB2]
 - System blocks
 - Program resources
 - OPC_UA_ReadList_C [FB3600]
 - Client interface_1_Configuration_1 [DB1]

Red boxes highlight 'Client interface_1_Data_1 [DB2]' and 'Client interface_1_Configuration_1 [DB1]'.

2.3. Configuration of "RWData" in the Reader's Address Space

NOTE Indicates a possible advantage, Has the character of a Tipp.

The SIMATIC Ident RFID Reader RF1140R/RF1170R make the data of the user memory available in the OPC UA node "RWData" (browse path: "Readpoint_11\Diagnostics\LastAccess"). RWData is a variable node of the ByteString data type. Since the S7-1500 does not support this data type, it must be changed to the "String" type.

An OPC client is required for this, as this setting must be made directly on the OPC UA server of the reader. For example, the client of the following application example can be used:

<https://support.industry.siemens.com/cs/ww/en/view/109769038>

The variable "CodeTypesRWData" (browse path: "Readpoint_11\RuntimeParameters") must be described with the value "1".

NOTE This value is not stored remanently in the device. Therefore, it makes sense to add the variable in a read list and a write list in the client interface of the S7-1500. The variable can be monitored in the S7-1500 and changed again if necessary when the reader is restarted.

The following illustration shows you how to use the OPC UA client from the above entry:

The screenshot displays the Siemens SIMATIC Manager interface, specifically the OPC UA client configuration and monitoring section. The interface is divided into several panes:

- Address Space:** A tree view on the left showing the hierarchy of objects. The 'CodeTypesRWData' node is highlighted with a green box.
- Node Attributes:** A table on the right showing the attributes of the selected node. The attributes are listed in the first column, and their values are in the second column.
- Monitored Items:** A table at the bottom showing the monitored items. The 'Read_point_1|CodeTypesRWData' item is highlighted with a blue row.
- Write Value Dialog:** A dialog box on the right side of the 'Monitored Items' table, used for writing values to the selected item.

Node Attributes Table:

Attribute	Value
Node ID	ns=4;i=6249
Node Class	Variable
Browse Name	3.CodeTypesRWData
Display Name	CodeTypesRWData
Description	Supported CodeTypes and selected ...
Write Mask	0
User Write Mask	0
Value	0
Data Type	uint7
Value Rank	1
Array Dimension	0
Access Level	CurrentRead, CurrentWrite
User Access Level	3
Minimum Sampling Interval	0
Historizing	False

Monitored Items Table:

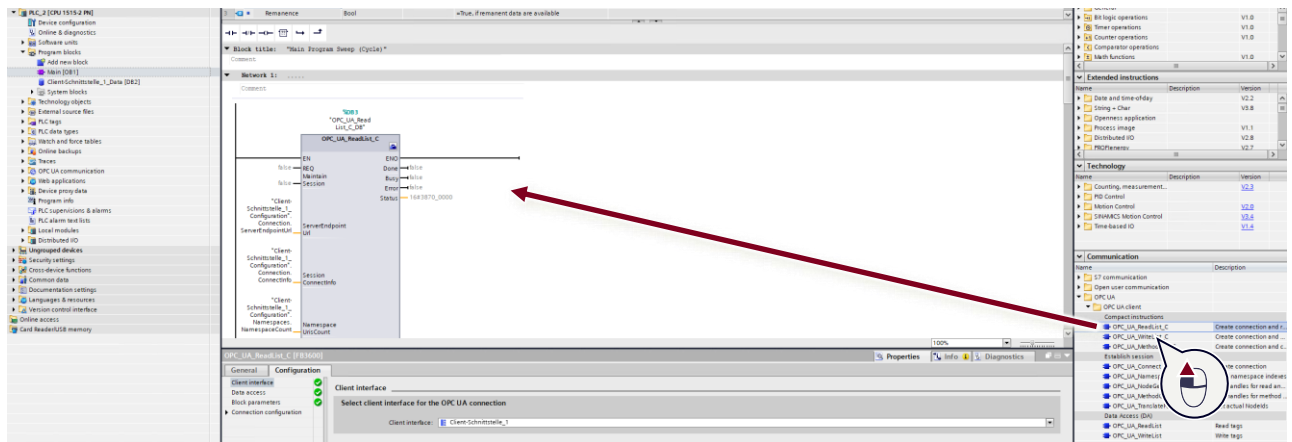
Node ID	Name	Sampling Interval	Value	Quality	Time Stamp
ns=4;i=6258	Read_point_1 RWData	500	(null)	Good	06.05.2026 11:02:27
ns=4;i=6249	Read_point_1 CodeTypesRWData	500	Supported CodeTypes	Good	06.05.2026 11:03:27

Write Value Dialog:

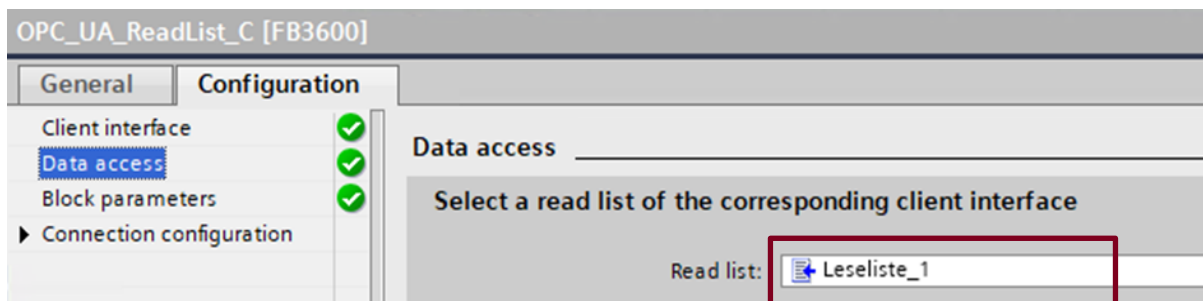
Write Value	NodeId	Name	Current Value
1	ns=4;i=6249	Read_point_1 CodeTypesRWData	0

2.4. Extension of the S7-1500 PLC Program

1. In TIA Portal, drag and drop the system function block "OPC-UA_ReadList_C" (FB3600) from the instruction list to a suitable location in the S7-1500 PLC program.



2. In the Properties inspector window of the block you switch to the "Configuration" tab and open the item "Client interface".
3. Under "Select client interface for the OPC UA connection", in the drop-down list box "Client interface:" you select "Client interface_1".
4. Still in the Properties inspector window of the block, in the "Configuration" tab you open the item "Data access".
5. Under "Select a read list of the corresponding client interface", in the drop-down list box "Read list:" you select "Read list_1" whose OPC UA tags you want to read.



6. Compile the configuration and load it into the S7-1500 PLC.

3. Operation and Use

Set the "REQ" bit on the "OPC-UA_ReadList_C" block. This establishes the OPC UA connection to the RF1140R/RF1170R reader.

The values of the configured tags are then read and stored in the data block. You can track these, for example, via the online connection of the tags, watch tables, or a visualization with an HMI device.

NOTE

This configuration gives you read-only access to the Tag Management of the OPC UA server, but no write access.