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Connection between software controller and WinCC V7 via Windows network

SIMATIC Software Controller / WinCC V7.4

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1 Introduction

1.1 Overview

This document shows you how to establish an HMI connection between a SIMATIC S7-1500 Software Controller and SIMATIC WinCC V7.4 SP1 via the Windows network.

1.2 Components used

This application example was created using the hardware and software components described in the [Table 1-1](#).

Table 1-1: Hardware and software components

Component	Article number	Note
SIMATIC IPC 427E	6AG4141-0BA00-0AA0	
SIMATIC IPC 427D	6AG4140-0BB00-0AA0	
SIMATIC S7-1500 Software Controller V2.6	6ES7672-7AC01-0YG0	CPU 1507S
SIMATIC WinCC V7.4 SP1	6AV6381-2BE07-4AX0	
SIMATIC STEP 7 V15.1	6ES7822-1AA05-0YA5	TIA Portal

1.3 Versions of the SIMATIC S7-1500 Software Controller

With the 2nd generation of the SIMATIC ET 200SP Open Controller, the CPU versions with extended technology functions have been added.

The Open Controller (as of December 2018) is therefore available as...

- CPU 1505SP - Standard Version
- CPU 1505SP T - Standard Technology Version
- CPU 1505SP F – Failsafe Version
- CPU 1505SP TF – Failsafe Technology Version

The SIMATIC S7-1500 Software Controller for SIMATIC IPC has a further CPU type, the CPU 1508S, from version 2.6. Compared to the CPU 1507S, the CPU 1508S provides a larger program and data memory.

The SIMATIC S7-1500 Software Controller (as of December 2018) is therefore available as

- CPU 1507S – Default execution
- CPU 1507S F – Failsafe execution
- CPU 1508S – Default execution
- CPU 1508S F – Failsafe execution

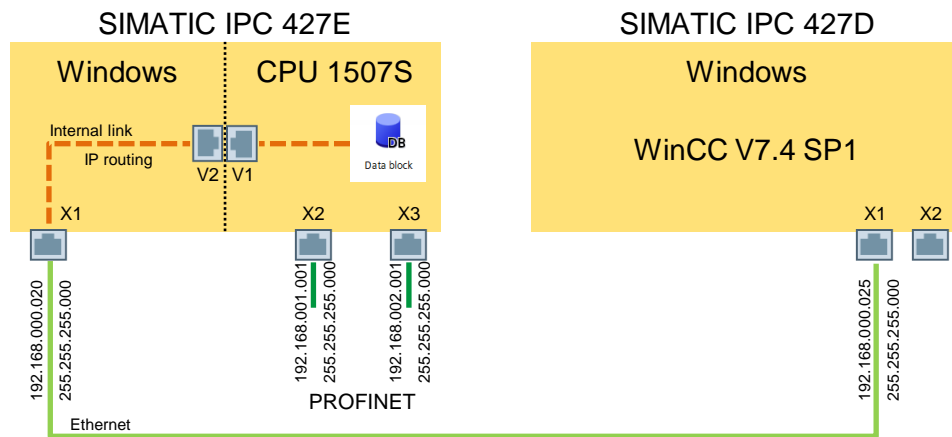
Note

To operate a SIMATIC S7-1500 Software Controller Failsafe you need a SIMATIC IPC with NVRAM (e.g. buffered SRAM).

1.4 Hardware configuration

Figure 1-1 shows the hardware setup of the application example. In the software CPU 1507S variables are made available in a global data block for the visualization software SIMATIC WinCC V7.4 SP1. The visualization computer does not have to be located in the PROFINET network, since a communication connection can be established via the virtual interface (V2 and V1) of the software controller (V2.5) with IP routing. Thus, the visualization computer can also be physically located in the Windows network and connected to the software controller computer via the Windows interface (X1).

Figure 1-1: Hardware configuration of both SIMATIC IPC

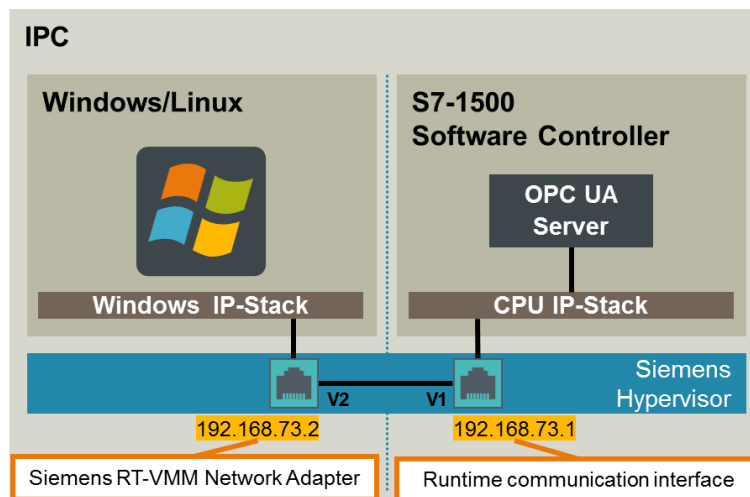


1.5 Network configuration

The IP addresses of the virtual interface are represented in the Figure 1-2.

The subnet masks of both interfaces are as follows 255.255.255.000.

Figure 1-2: Virtual interfaces of the SIMATIC IPC 427E



1.6 Requirements

In order to be able to put the application example into operation, you need

- Experience with SIMATIC industrial PCs
- Experience with Windows operating systems
- Experience with SIMATIC STEP 7 TIA Portal
- Experience with the SIMATIC S7-1500 Software Controller
- Experience with SIMATIC WinCC V7

Further information can also be found on the Internet at:

- www.siemens.com/pc-based
- <https://support.industry.siemens.com/cs/ww/en/view/75852684>

2 Necessary Windows settings

Before you can use the application example, you must make a few Windows settings on the SIMATIC IPC 427E (software controller computer) and the SIMATIC IPC 427D (visualization computer).

Without these Windows settings no connection between the SIMATIC S7-1500 Software Controller and SIMATIC WinCC V7.4 SP1 can be established.

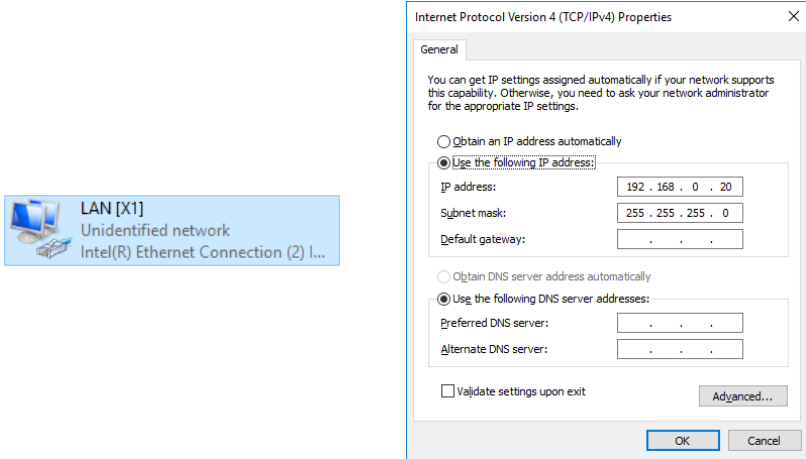
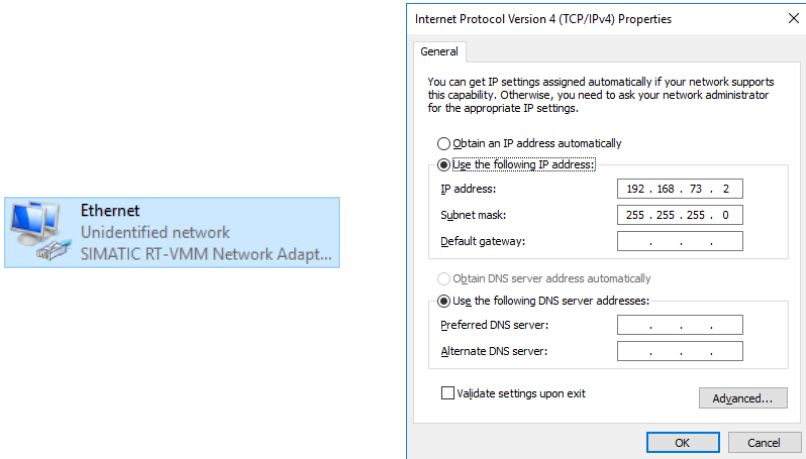
2.1 Windows settings SIMATIC IPC 427E

First you need to change the IP addresses/subnet masks for the Windows interface or virtual interface on the Windows side.

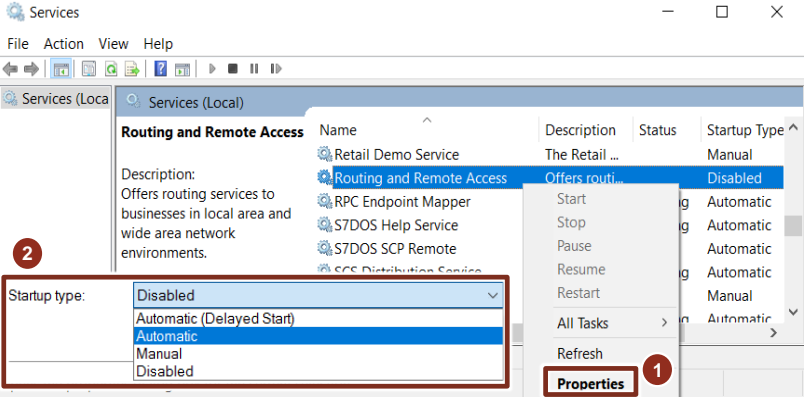
In addition, the **Routing and Remote Access** service must be activated.

Follow the steps as described in the [Table 2-1](#) and make the Windows settings on the SIMATIC IPC 427E (Software Controller Computer).

Table 2-1: SIMATIC IPC 427E – Windows settings

Step	Action
1.	<p>Open the Windows Network Center of the SIMATIC IPC 427E and set the corresponding IP address / subnet mask for the Windows interface.</p> 
2.	<p>Open the Windows Network Center of the SIMATIC IPC 427E and set the corresponding IP address / subnet mask for the virtual interface.</p> 

2 Necessary Windows settings

Step	Action
3.	<p>Open Computer Management of the SIMATIC IPC 427E. Under Services, search for Routing and Remote Access. Right-click on the service and change the start type under Properties to Automatic. Finally, start the service once for the current session.</p>  <p>The screenshot shows the Windows Services console. The 'Routing and Remote Access' service is selected. A context menu is open over the service, and the 'Properties' option is highlighted. A red box labeled '1' is around the 'Properties' option. The 'Startup type' dropdown menu is open, showing 'Automatic' selected. A red box labeled '2' is around the 'Startup type' dropdown menu.</p>
4.	<p>The Routing and Remote Access service is now executed. When the system is restarted, the service will start automatically based on the startup type.</p>

Note

When using the SIMATIC S7-1500 Software Controller under Windows Embedded Standard 7, the Service **Routing and Remote Access** is not available.

A Workaround is described under [V7](#) in section 4.

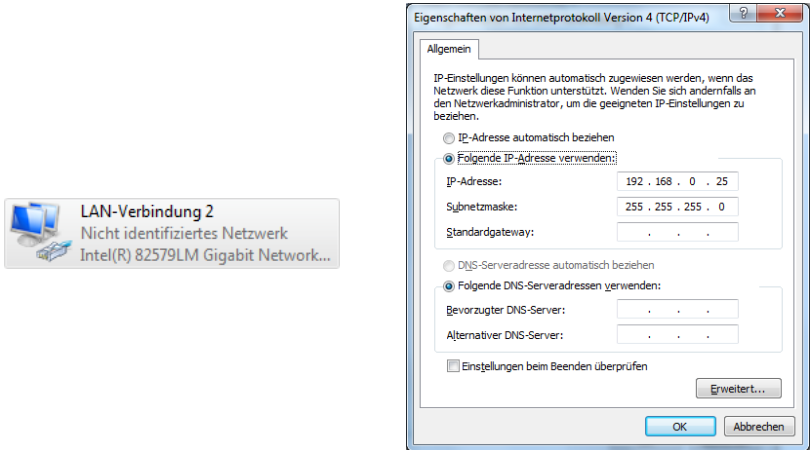
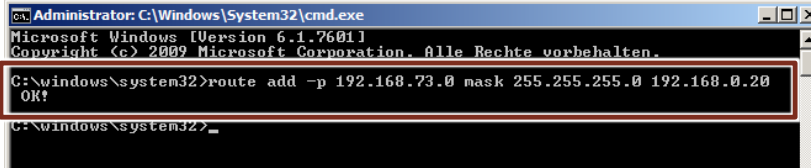
2.2 Windows settings SIMATIC IPC 427D

On the SIMATIC IPC 427D (visualization computer) you must also adapt the IP addresses/subnet masks for the Windows interface.

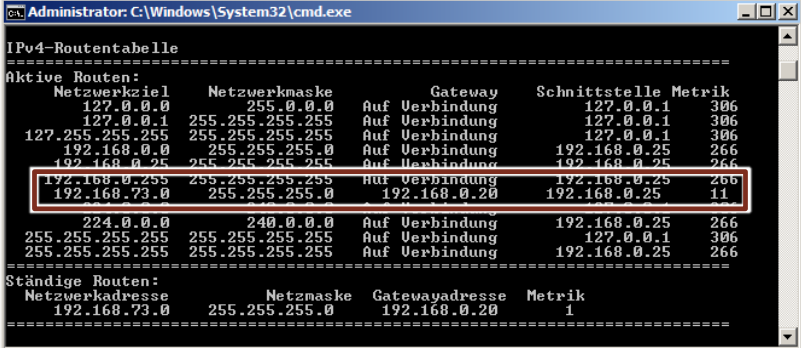

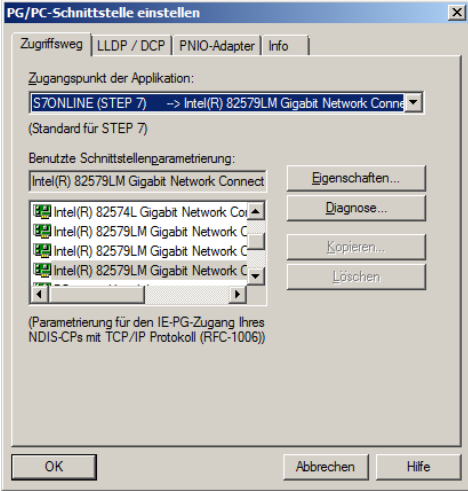
In addition, the routing table on the SIMATIC IPC 427D must be extended in order to establish a connection from the local interface to the virtual interface of the software controller.

Follow the steps as described in the [Table 2-2](#) and make the Windows settings on the SIMATIC IPC 427D (Software Controller Computer).

Table 2-2: SIMATIC IPC 427D – Windows settings

Step	Action
1.	<p>Open the Windows Network Center of the SIMATIC IPC 427D and set the IP address / subnet mask for the corresponding interface.</p> 
2.	<p>Then start the command line window (CMD) with administrator rights.</p> <p>Enter the following command:</p> <pre>route add -p <target address> mask <subnet mask> <gateway address></pre> <p>Analogous to this example</p> <pre>route add -p 192.168.73.0 mask 255.255.255.0 192.168.0.20</pre>  <p>This command makes the entire 192.168.73.xxx subnet accessible via the Windows interface of the SIMATIC IPC 427E.</p> <p>The <code>-p</code> setting is optional and will keep the route even after a reboot.</p>

2 Necessary Windows settings

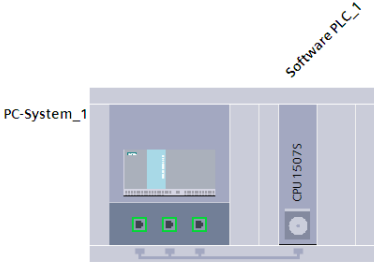
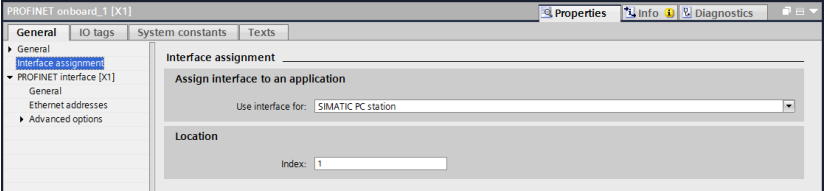
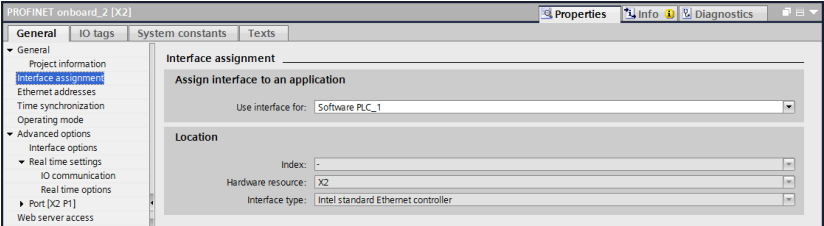
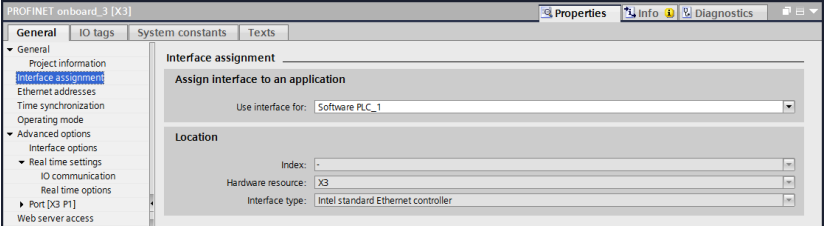
Step	Action
3.	<p>Then check whether the route has been entered.</p> <p>Enter the following command: route print</p>  <p>The routing table of the SIMATIC IPC 427D should now also contain the route just entered.</p>
4.	<p>With a simple PING test you can check whether the virtual interface of the SIMATIC S7-1500 software controller is accessible.</p> <p>Enter the following command: ping 192.168.73.1</p>
5.	<p>Open the system control of the SIMATIC IPC 427D and the PG/PC interface menu.</p> 
6.	<p>Make sure that the PG/PC interface is linked to the correct network adapter.</p> 

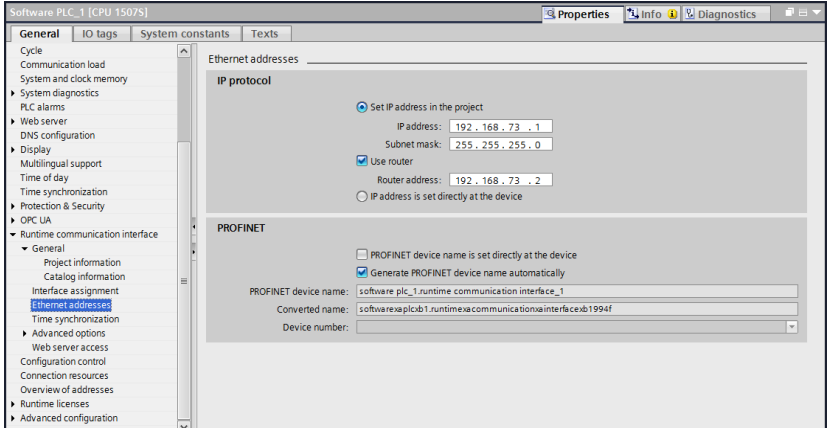

3 Engineering of the application

3.1 Engineering SIMATIC S7-1500 Software Controller

[Table 3-1](#) describes the minimum settings to be made in the TIA Portal project for the software controller in order to establish a connection to the visualization computer via the Windows interface.

Table 3-1: SIMATIC IPC 427E – Settings TIA Portal project


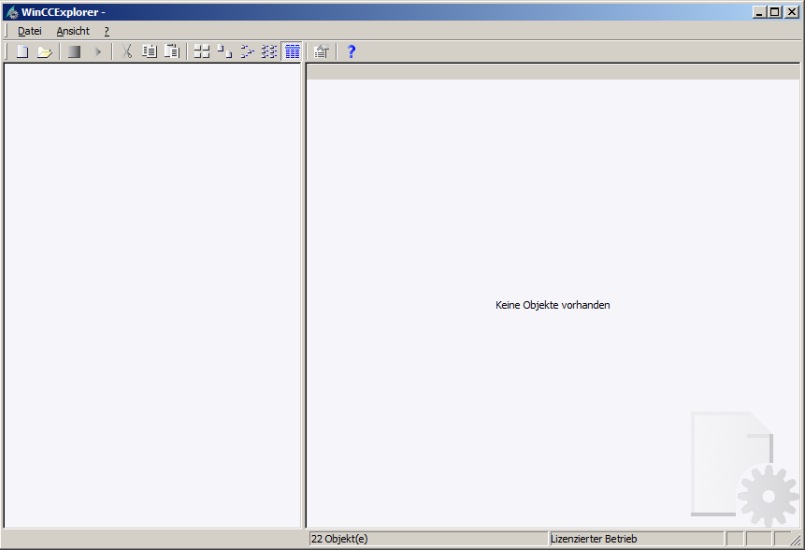
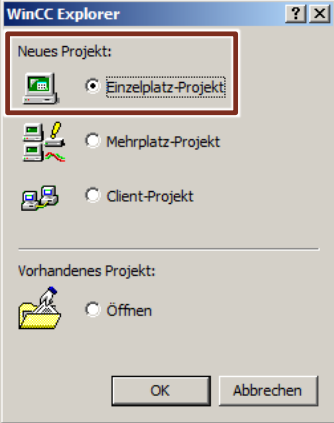
Step	Action
1.	<p>Add a SIMATIC IPC 427E and a SIMATIC S7-1500 Software Controller V2.6 to your project.</p> 
2.	<p>Double-click the three Ethernet / PROFINET interfaces of the SIMATIC IPC 427E and assign the interfaces as well as the IP addresses / subnet mask settings.</p> <p>Assign the left interface (X1) to the SIMATIC PC station.</p>  <p>Assign the middle interface (X2) to the PLC_1 software.</p>  <p>Assign the right interface (X3) to the PLC_1 software.</p> 

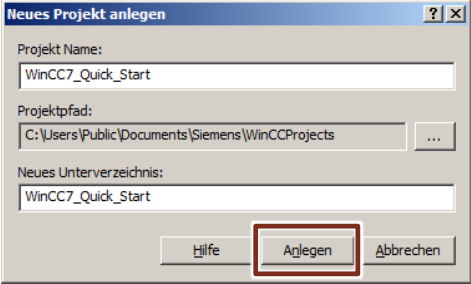
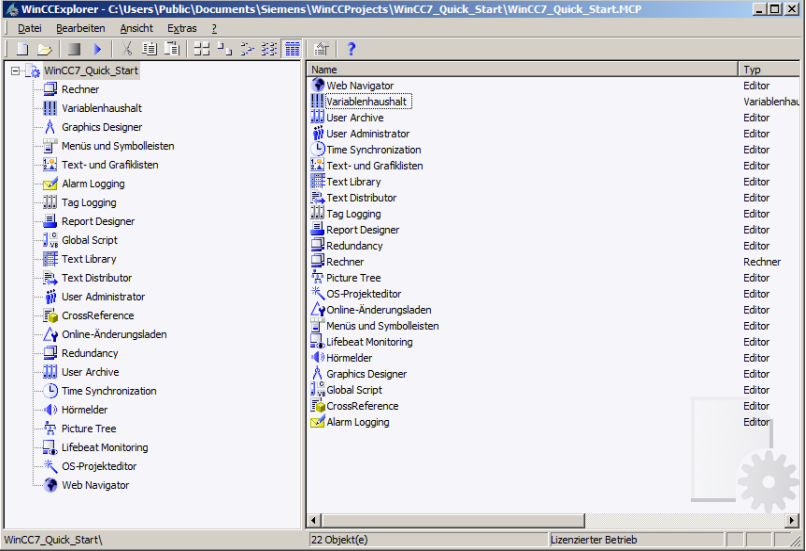
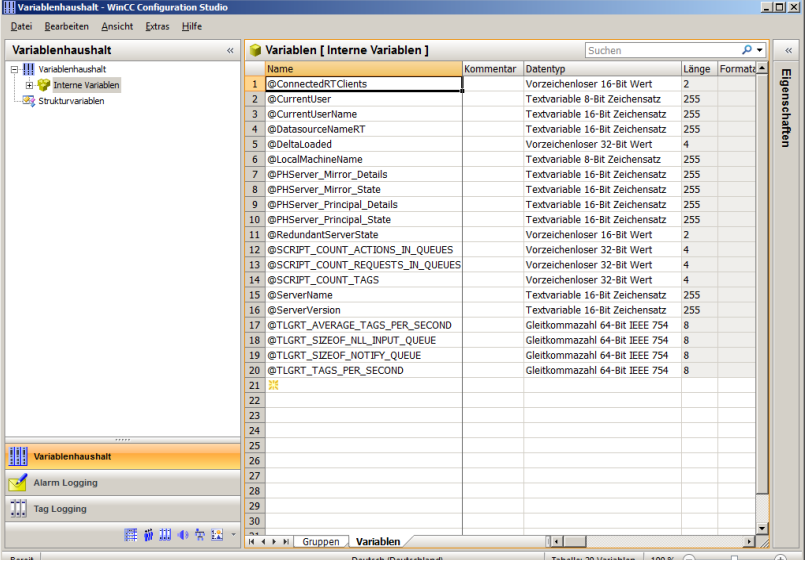
Step	Action
3.	<p>Double-click the CPU 1507S Runtime in the overview and open the submenu Runtime communication interface.</p> <p>Activate the Use router checkbox and enter the IP address of the virtual interface on the Windows side under Router address.</p> 
4.	<p>Load the TIA Portal project into the Software Controller.</p> <p>Note: The first download of the SIMATIC S7-1500 software controller must always be performed via the Windows interface of the SIMATIC IPC 427E.</p>
5.	<p>After successful download, start the software controller and set it to Run mode.</p> 

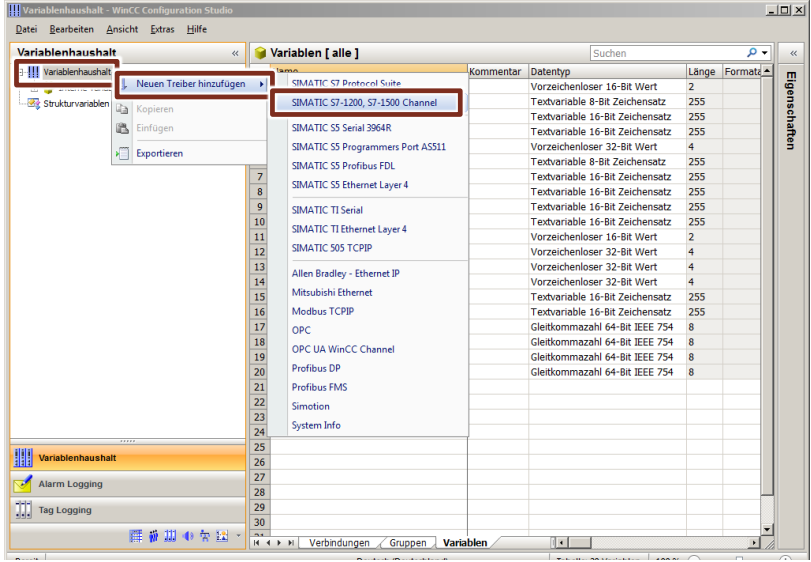
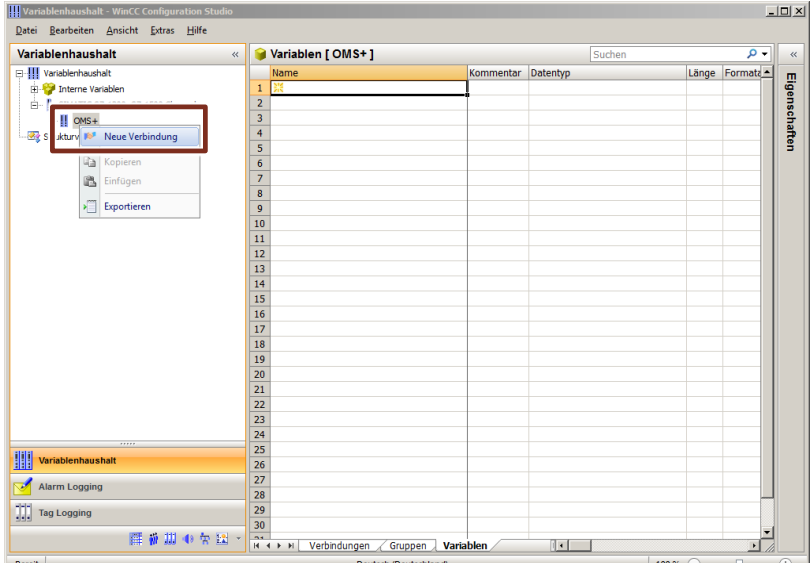
3.2 Engineering SIMATIC WinCC V7.4 SP1

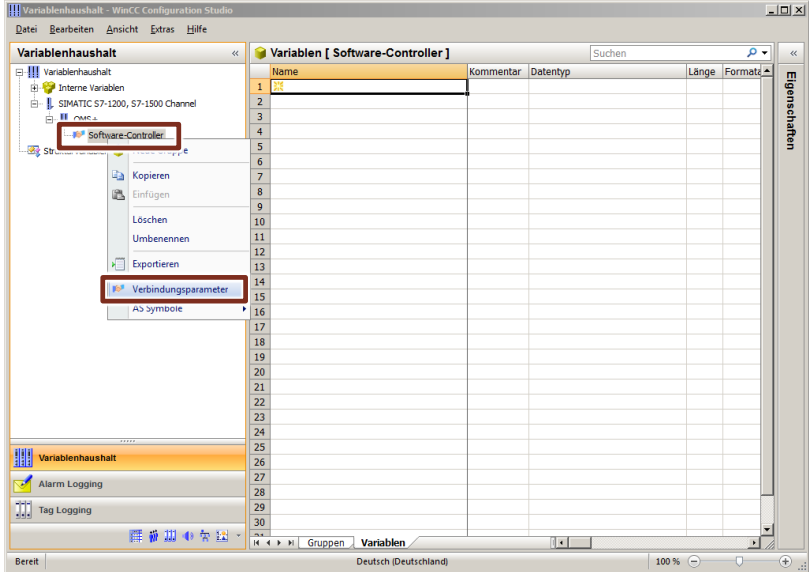
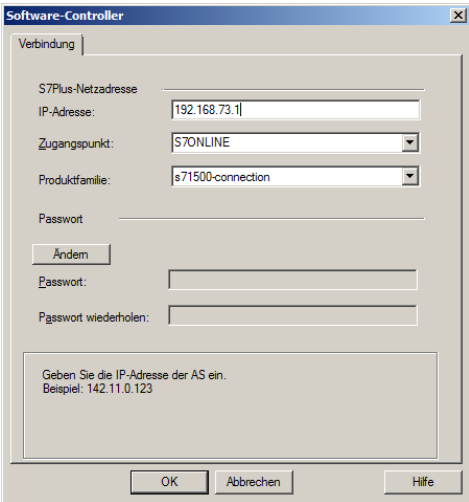
[Table 3-2](#) helps you how to create a project in SIMATIC WinCC V7.4 SP1 and how to establish a connection to the SIMATIC S7-1500 Software Controller.

Table 3-2: SIMATIC IPC 427D – Settings WinCC V7.4 SP1

Step	Action
1.	<p>Open the SIMATIC WinCC Explorer with a double click on the SIMATIC IPC 427D.</p>  <p>The overview window opens.</p> 
2.	<p>Use the New button to create a new project. In this case, select Single-user project.</p> 

Step	Action																																																																																																									
<p>3.</p>	<p>Give the project an appropriate name and click Create to complete.</p>  <p>After creating the project you will see the overview window.</p> 																																																																																																									
<p>4.</p>	<p>Double-click on Variable household to open the overview window for the variable household.</p>  <table border="1" data-bbox="798 1377 1324 1713"> <thead> <tr> <th>Name</th> <th>Kommentar</th> <th>Datentyp</th> <th>Länge</th> <th>Format</th> </tr> </thead> <tbody> <tr><td>1 @ConnectedRTClients</td><td></td><td>Vorzeichenloser 16-Bit Wert</td><td>2</td><td></td></tr> <tr><td>2 @CurrentUser</td><td></td><td>Textvariable 8-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>3 @CurrentUserName</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>4 @DataSourceNameRT</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>5 @DeltaLoaded</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>6 @LocalMachineName</td><td></td><td>Textvariable 8-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>7 @PHServer_Mirror_Details</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>8 @PHServer_Mirror_State</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>9 @PHServer_Principal_Details</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>10 @PHServer_Principal_State</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>11 @RedundantServerState</td><td></td><td>Vorzeichenloser 16-Bit Wert</td><td>2</td><td></td></tr> <tr><td>12 @SCRIPT_COUNT_ACTIONS_IN_QUEUES</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>13 @SCRIPT_COUNT_REQUESTS_IN_QUEUES</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>14 @SCRIPT_COUNT_TAGS</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>15 @ServerName</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>16 @ServerVersion</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>17 @TLGRT_AVERAGE_TAGS_PER_SECOND</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> <tr><td>18 @TLGRT_SIZEOF_NULL_INPUT_QUEUE</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> <tr><td>19 @TLGRT_SIZEOF_NOTIFY_QUEUE</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> <tr><td>20 @TLGRT_TAGS_PER_SECOND</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> </tbody> </table>	Name	Kommentar	Datentyp	Länge	Format	1 @ConnectedRTClients		Vorzeichenloser 16-Bit Wert	2		2 @CurrentUser		Textvariable 8-Bit Zeichensatz	255		3 @CurrentUserName		Textvariable 16-Bit Zeichensatz	255		4 @DataSourceNameRT		Textvariable 16-Bit Zeichensatz	255		5 @DeltaLoaded		Vorzeichenloser 32-Bit Wert	4		6 @LocalMachineName		Textvariable 8-Bit Zeichensatz	255		7 @PHServer_Mirror_Details		Textvariable 16-Bit Zeichensatz	255		8 @PHServer_Mirror_State		Textvariable 16-Bit Zeichensatz	255		9 @PHServer_Principal_Details		Textvariable 16-Bit Zeichensatz	255		10 @PHServer_Principal_State		Textvariable 16-Bit Zeichensatz	255		11 @RedundantServerState		Vorzeichenloser 16-Bit Wert	2		12 @SCRIPT_COUNT_ACTIONS_IN_QUEUES		Vorzeichenloser 32-Bit Wert	4		13 @SCRIPT_COUNT_REQUESTS_IN_QUEUES		Vorzeichenloser 32-Bit Wert	4		14 @SCRIPT_COUNT_TAGS		Vorzeichenloser 32-Bit Wert	4		15 @ServerName		Textvariable 16-Bit Zeichensatz	255		16 @ServerVersion		Textvariable 16-Bit Zeichensatz	255		17 @TLGRT_AVERAGE_TAGS_PER_SECOND		Gleitkommazahl 64-Bit IEEE 754	8		18 @TLGRT_SIZEOF_NULL_INPUT_QUEUE		Gleitkommazahl 64-Bit IEEE 754	8		19 @TLGRT_SIZEOF_NOTIFY_QUEUE		Gleitkommazahl 64-Bit IEEE 754	8		20 @TLGRT_TAGS_PER_SECOND		Gleitkommazahl 64-Bit IEEE 754	8	
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16 @ServerVersion		Textvariable 16-Bit Zeichensatz	255																																																																																																							
17 @TLGRT_AVERAGE_TAGS_PER_SECOND		Gleitkommazahl 64-Bit IEEE 754	8																																																																																																							
18 @TLGRT_SIZEOF_NULL_INPUT_QUEUE		Gleitkommazahl 64-Bit IEEE 754	8																																																																																																							
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20 @TLGRT_TAGS_PER_SECOND		Gleitkommazahl 64-Bit IEEE 754	8																																																																																																							

Step	Action
<p>5.</p>	<p>Right-click on Variable household in the left column. In the context menu, select Add new driver and then SIMATIC S7-1200, S7-1500 Channel.</p> 
<p>6.</p>	<p>A new connection option is created in the left column Variable household. Right-click OMS+ and select New Connection from the context menu. Give this connection the name Software Controller.</p> 

Step	Action
7.	<p>The new Software Controller connection is now displayed in the left column Variable household.</p> <p>Right-click on Software Controller and select Connection Parameters from the context menu.</p> 
8.	<p>A pop-up window opens with the connection settings of the software controller connection.</p> <p>You must enter the IP address of the virtual interface on the Software Controller page - in this example 192.168.73.1.</p> <p>You must select S7ONLINE as the access point.</p> <p>For the product family, select s71500-connection.</p> 
9.	<p>Then start the SIMATIC WinCC V7.4 SP1 Runtime on the SIMATIC IPC 427D.</p>

4 Operation of the Application Example

4.1 Connection Check

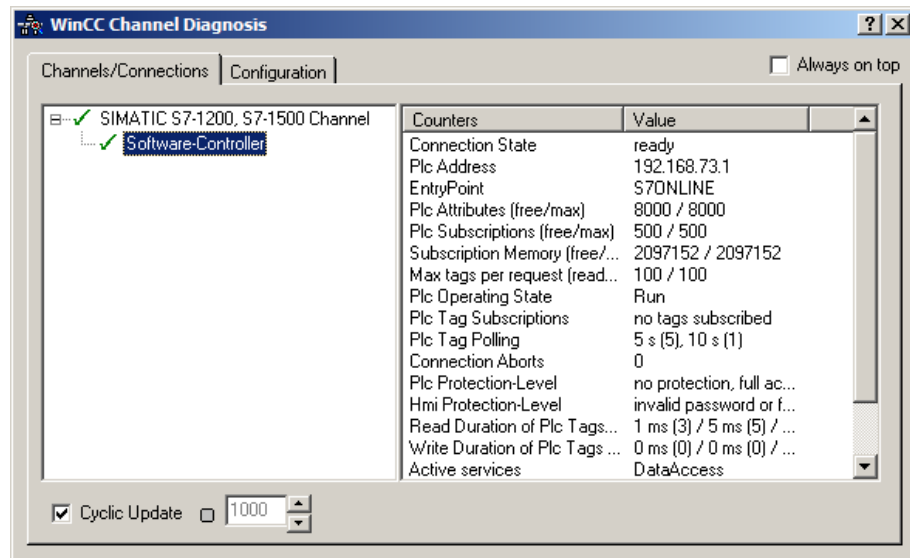
After you have loaded or completed all projects on both SIMATIC IPCs, you can check the connection for correct functionality.

Conditions for establishing a connection:

- SIMATIC S7-1500 Software Controller in operating mode RUN
- SIMATIC WinCC V7.4 SP1 Runtime started

Start the diagnostic tool **Channel Diagnosis** on the SIMATIC IPC 427D in addition to the SIMATIC WinCC V7.4 SP1 Runtime. (Figure 4-1) With this tool you can monitor and control all configured connections.

Figure 4-1: Channel Diagnosis Tool

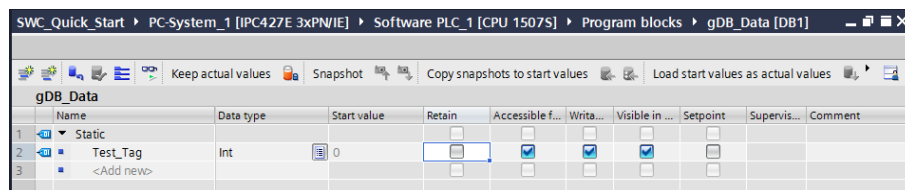


If you see a green check mark on the connection, the connection is established and intact. A red cross indicates an unestablished/inactive connection.

4.2 Creating a Data Block in the TIA Portal Project

In the TIA Portal project, create a global data block with a test variable for the software controller. (Figure 4-2) Then download the TIA Portal project to the Software Controller again.

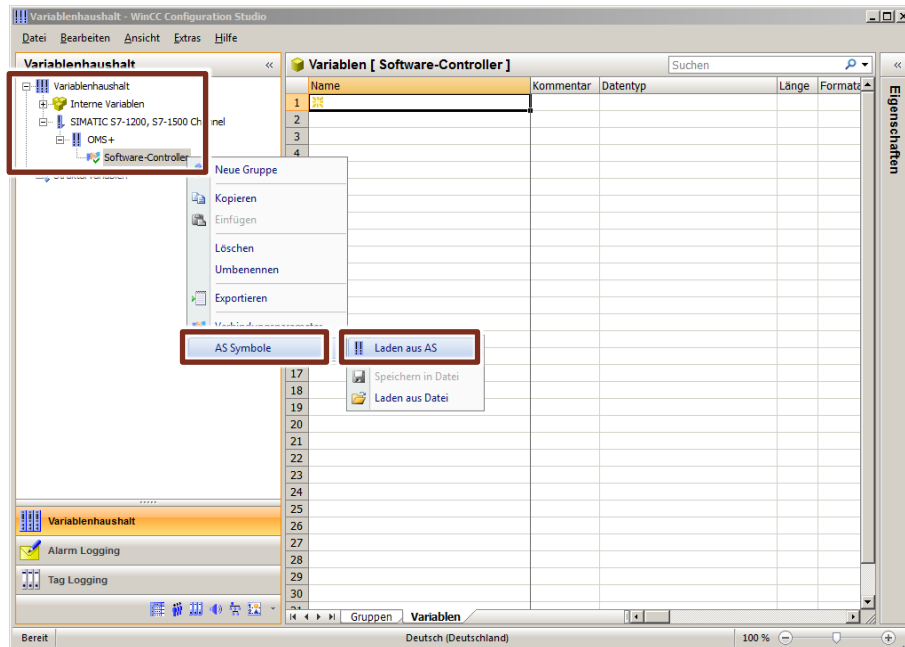
Figure 4-2: DB with test variables



4.3 Linking Variables to HMI Elements

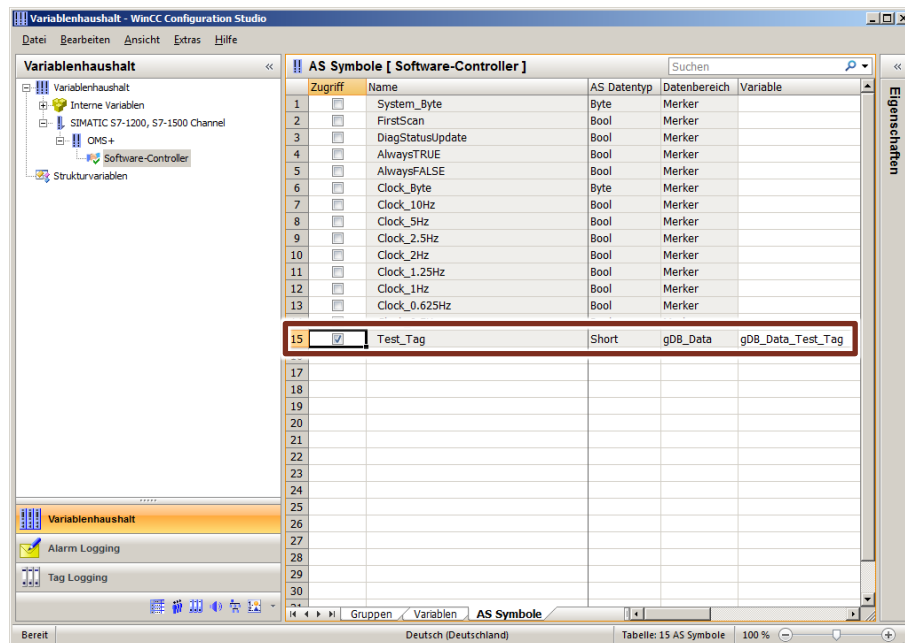
Open the overview window again by double-clicking on **Variable household**. A right click on the **software controller** connection opens the context menu. Select the entry **AS Symbols** and click on **Load from AS**. (Figure 4-3)

Figure 4-3: Search Software Controller Connection



By clicking, the available variables provided by the software controller are displayed in the variable household of SIMATIC WinCC V7.4 SP1. (Figure 4-4)

Figure 4-4: Reachable variables in the variable household

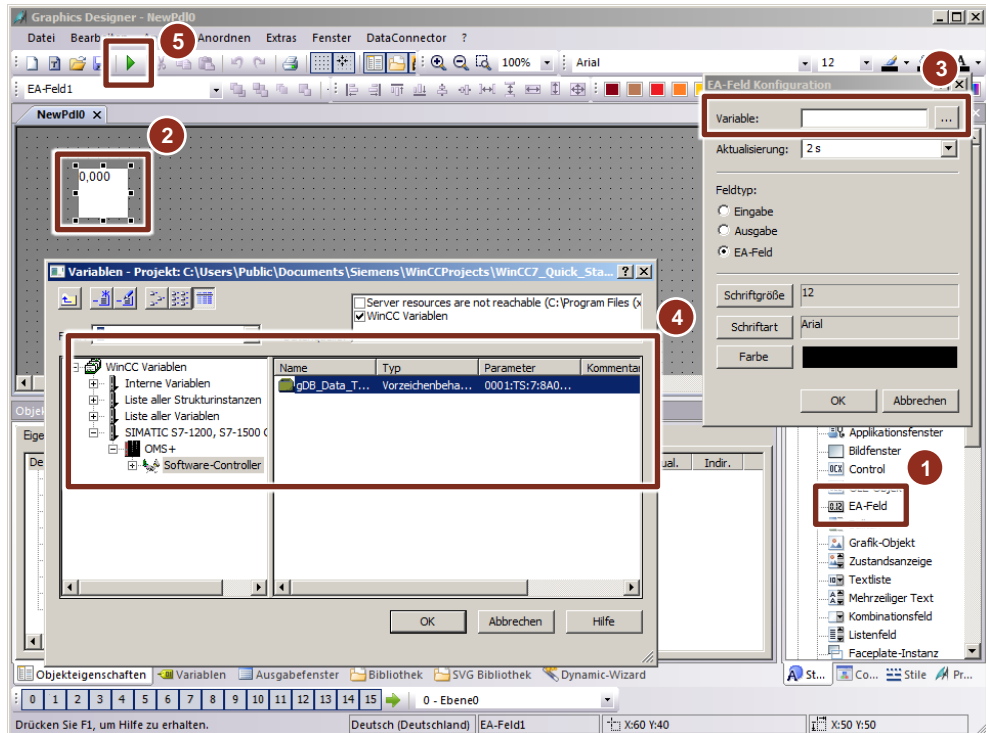


For all variables that you want to associate with HMI elements, check the box in the **Access** column, as shown in Figure 4-4.

4 Operation of the Application Example

Then create an image with an I/O field in your SIMATIC WinCC V7.4 SP1 project. Link the test variable from the DB of the software controller to the I/O field. ([Figure 4-5](#))

Figure 4-5: Configuration of an I/O field with SIMATIC WinCC V7.4 SP1

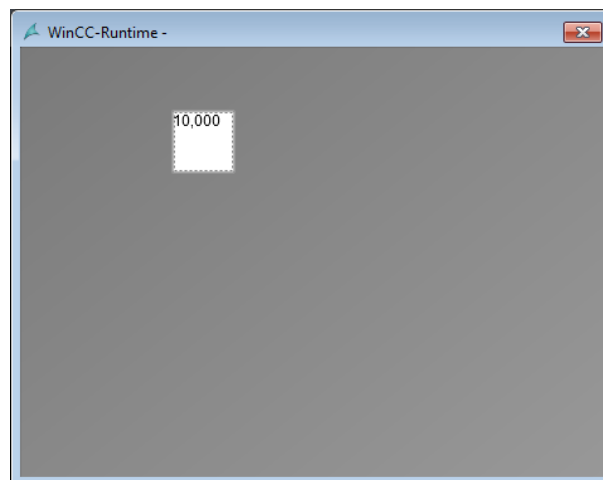


Save the SIMATIC WinCC V7.4 SP1 project and start the visualization.

Establish an online connection to the software controller with TIA Portal. You can then change the test variable online in the DB of the SIMATIC controller.

If the value changes, the display value in the I/O field of SIMATIC WinCC V7.4 SP1 also changes. ([Figure 4-6](#))

Figure 4-6: SIMATIC WinCC V7.4 SP1 Screen



5 Data exchange via OPC UA

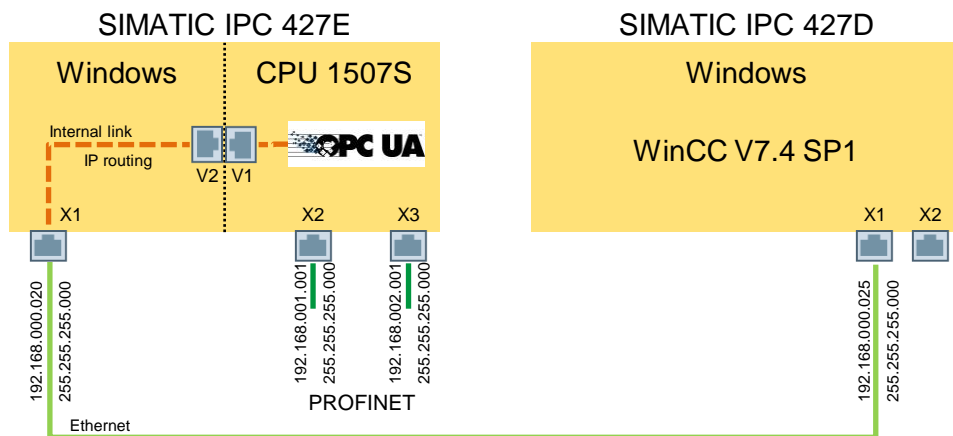
5.1 Overview

With the integrated OPC UA Server of the SIMATIC S7-1500 Software Controller you can also establish a communication via the Windows interface to the SIMATIC WinCC V7.4 SP1.

This section describes the differences to establishing a connection via the SIMATIC S7-1200, S7-1500 channel of WinCC V7.4 SP1.

[Figure 5-1](#) You can see the changed hardware structure.

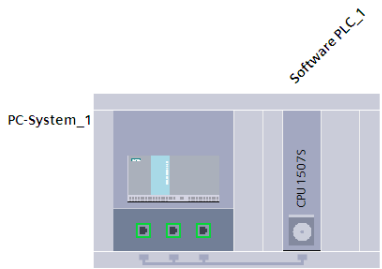
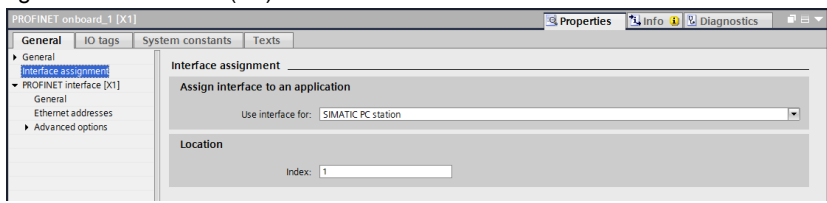
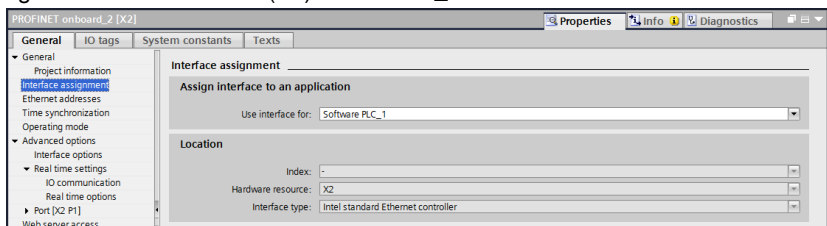
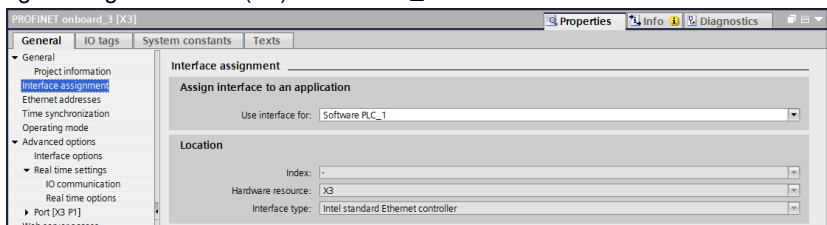
Figure 5-1: Hardware structure for data exchange via OPC UA

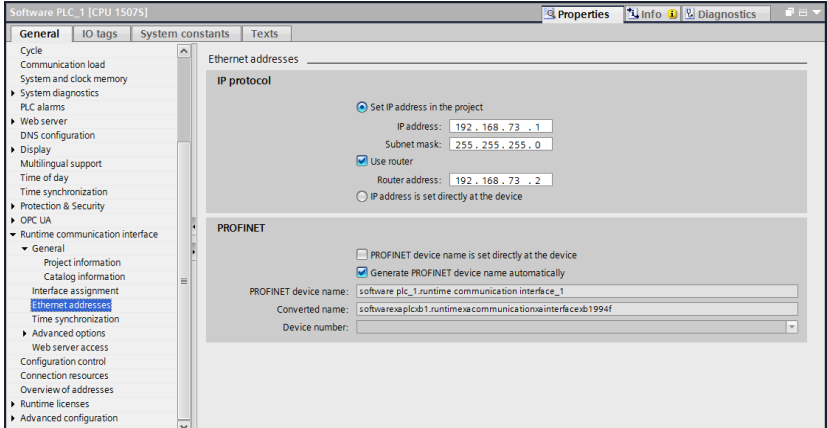
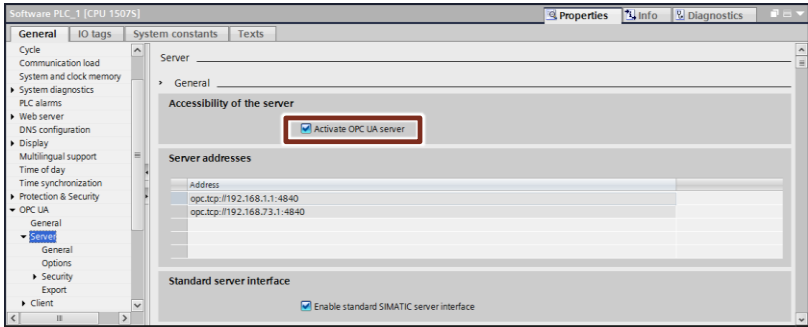
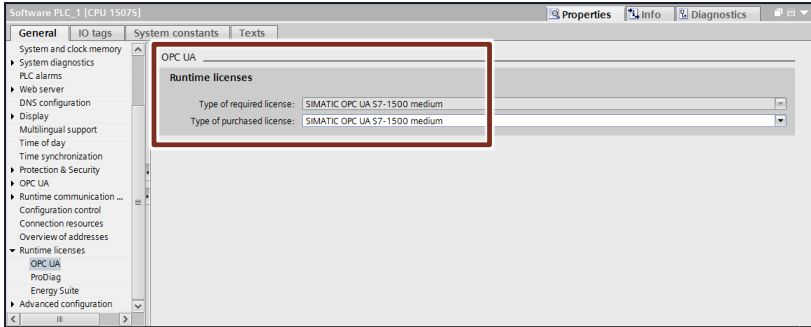


5.2 Engineering SIMATIC S7-1500 Software Controller

[Table 5-1](#) describes the minimum settings to be made in the TIA Portal project for the software controller in order to establish a connection to the visualization computer via the Windows interface and OPC UA.

Table 5-1: SIMATIC IPC 427E – Settings TIA Portal project


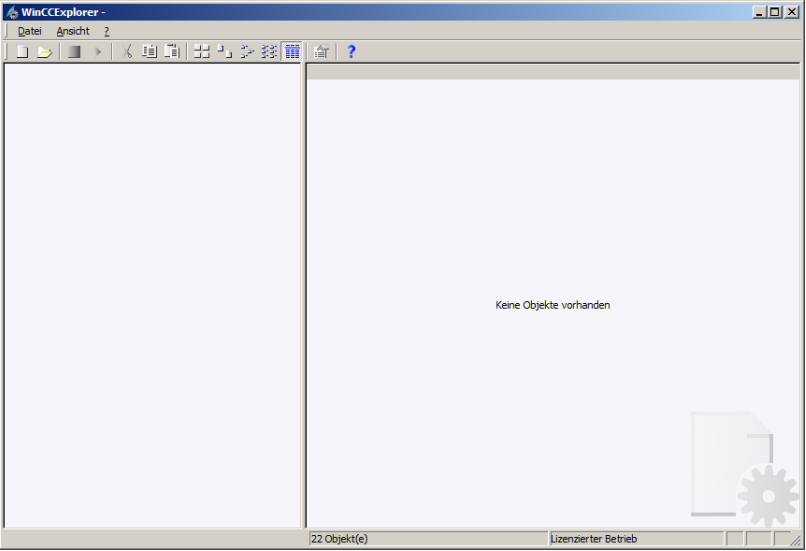
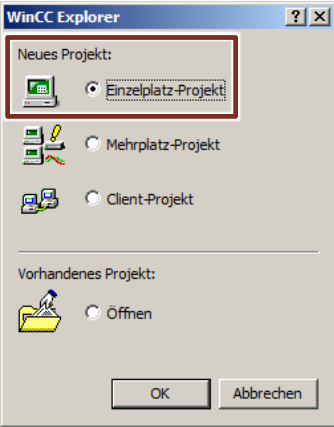
Step	Action
1.	<p>Add a SIMATIC IPC 427E and a SIMATIC S7-1500 Software Controller V2.6 to your project.</p>  <p>The screenshot shows a hardware rack configuration in TIA Portal. On the left, a rack labeled 'PC-System_1' contains three slots with green Ethernet/PROFINET interface icons. On the right, a rack labeled 'Software PLC_1' contains a slot with a 'CPU 1507S' icon.</p>
2.	<p>Double-click the three Ethernet / PROFINET interfaces of the SIMATIC IPC 427E and assign the interfaces as well as the IP addresses / subnet mask settings.</p> <p>Assign the left interface (X1) to the SIMATIC PC station.</p>  <p>The screenshot shows the 'Interface assignment' dialog for 'PROFINET onboard_1 [X1]'. The 'Use interface for:' dropdown is set to 'SIMATIC PC station'. The 'Location' section shows 'Index: 1'.</p> <p>Assign the middle interface (X2) to the PLC_1 software.</p>  <p>The screenshot shows the 'Interface assignment' dialog for 'PROFINET onboard_2 [X2]'. The 'Use interface for:' dropdown is set to 'Software PLC_1'. The 'Location' section shows 'Index: -', 'Hardware resource: X2', and 'Interface type: Intel standard Ethernet controller'.</p> <p>Assign the right interface (X3) to the PLC_1 software.</p>  <p>The screenshot shows the 'Interface assignment' dialog for 'PROFINET onboard_3 [X3]'. The 'Use interface for:' dropdown is set to 'Software PLC_1'. The 'Location' section shows 'Index: -', 'Hardware resource: X3', and 'Interface type: Intel standard Ethernet controller'.</p>

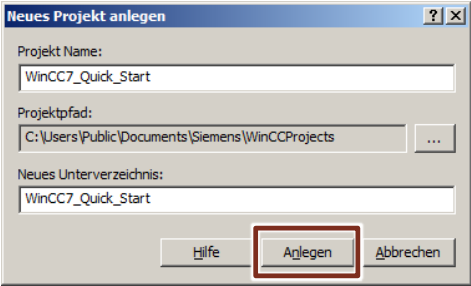
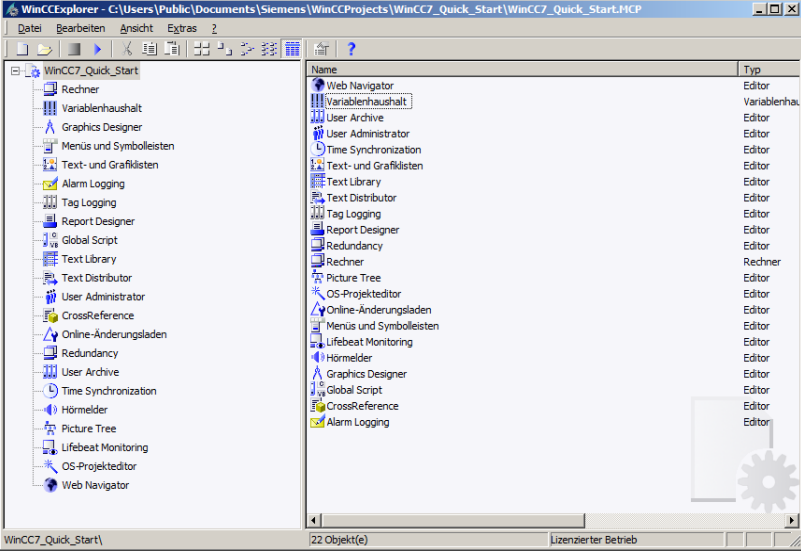
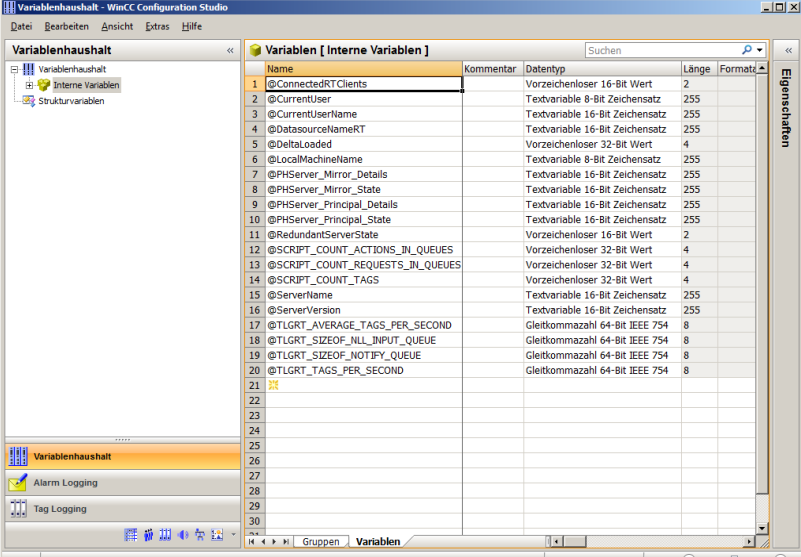
Step	Action
3.	<p>Double-click the CPU 1507S Runtime in the overview and open the submenu Runtime communication interface.</p> <p>Activate the Use router checkbox and enter the IP address of the virtual interface on the Windows side under Router address.</p> 
4.	<p>Double-click the CPU 1507S Runtime in the overview and open the submenu OPC UA and Server.</p> <p>Activate the Activate OPC UA server checkbox.</p> 
5.	<p>Double-click the CPU 1507S Runtime in the overview and open the submenu Runtime licenses and OPC UA.</p> <p>Select the SIMATIC OPC UA S7-1500 medium license.</p> 
6.	<p>Load the TIA Portal project into the software controller and then set the software controller to Run mode.</p> <p>Note: The first download of the SIMATIC S7-1500 software controller must always be performed via the Windows interface of the SIMATIC IPC 427E.</p>

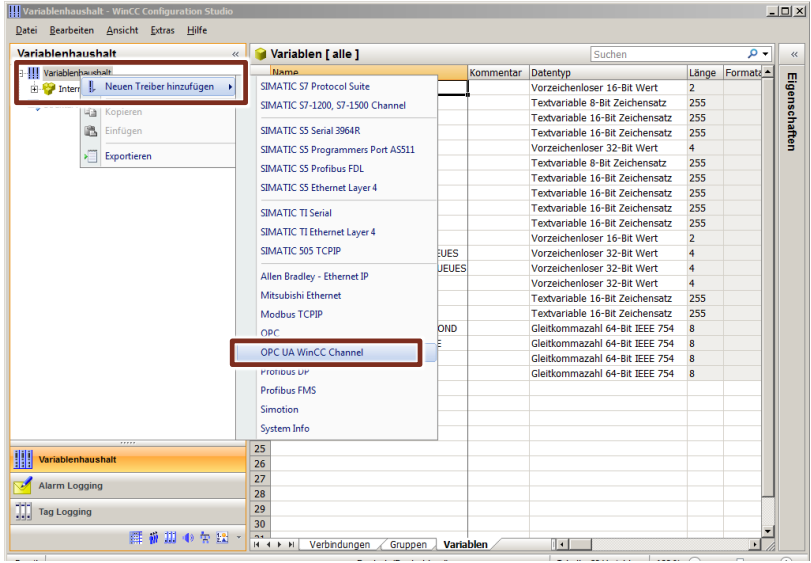
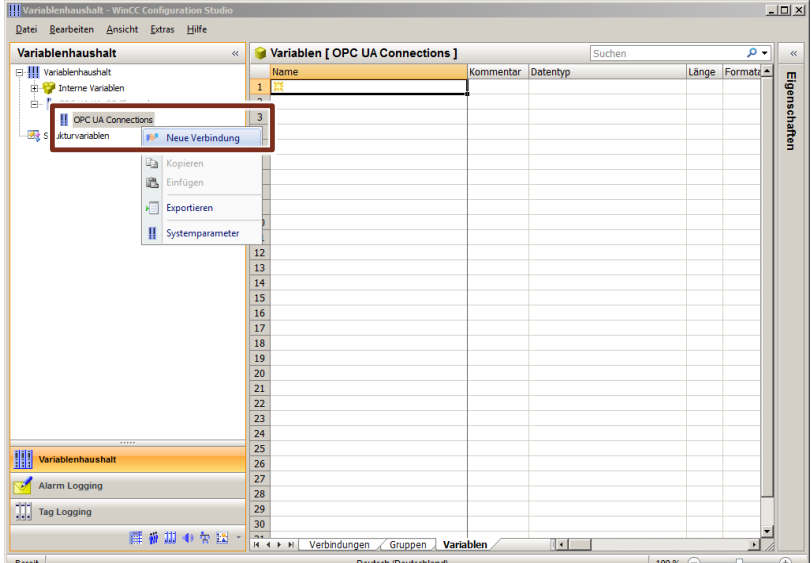
5.3 Engineering SIMATIC WinCC V7.4 SP1

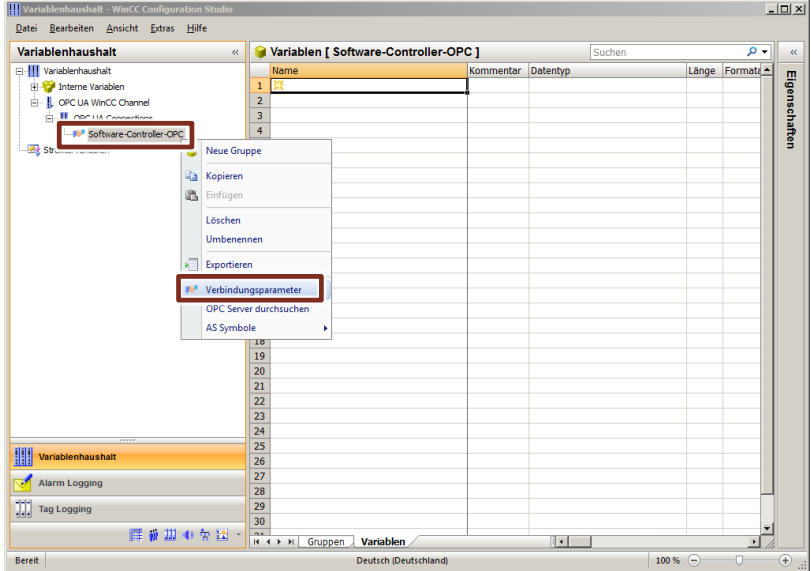
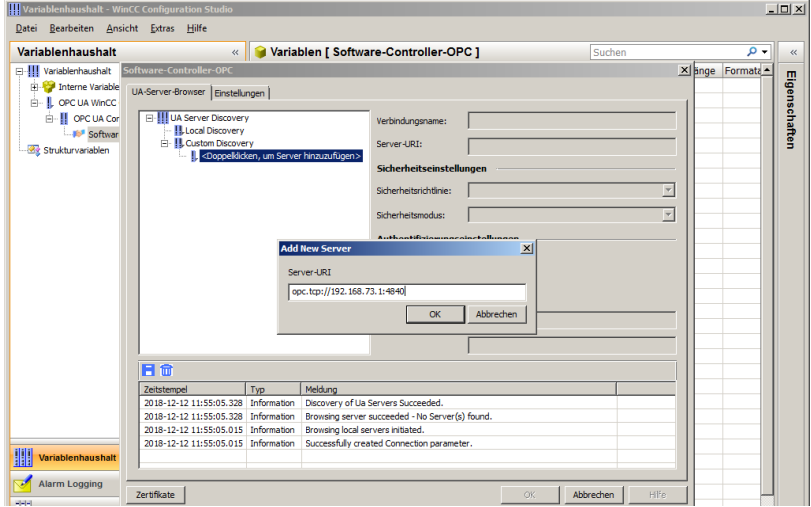
[Table 5-2](#) helps you to create a project in SIMATIC WinCC V7.4 SP1 and to establish a connection to the SIMATIC S7-1500 Software Controller via OPC UA.

Table 5-2: SIMATIC IPC 427D – Settings WinCC V7.4 SP1

Step	Action
1.	<p>Open the SIMATIC WinCC Explorer with a double click on the SIMATIC IPC 427D.</p>  <p>The overview window opens.</p> 
2.	<p>Use the New button to create a new project. In this case, select Single-user project.</p> 

Step	Action																																																																																																									
3.	<p>Give the project an appropriate name and click Create to complete.</p>  <p>After creating the project you will see the overview window.</p> 																																																																																																									
4.	<p>Double-click on Variable household to open the overview window for the variable household.</p>  <table border="1" data-bbox="798 1368 1337 1704"> <thead> <tr> <th>Name</th> <th>Kommentar</th> <th>Datentyp</th> <th>Länge</th> <th>Format</th> </tr> </thead> <tbody> <tr><td>1 @ConnectedRTClients</td><td></td><td>Vorzeichenloser 16-Bit Wert</td><td>2</td><td></td></tr> <tr><td>2 @CurrentUser</td><td></td><td>Textvariable 8-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>3 @CurrentUserName</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>4 @DataSourceNameRT</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>5 @DeltaLoaded</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>6 @LocalMachineName</td><td></td><td>Textvariable 8-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>7 @PHServer_Mirror_Details</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>8 @PHServer_Mirror_State</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>9 @PHServer_Principal_Details</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>10 @PHServer_Principal_State</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>11 @RedundantServerState</td><td></td><td>Vorzeichenloser 16-Bit Wert</td><td>2</td><td></td></tr> <tr><td>12 @SCRIPT_COUNT_ACTIONS_IN_QUEUE</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>13 @SCRIPT_COUNT_REQUESTS_IN_QUEUE</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>14 @SCRIPT_COUNT_TAGS</td><td></td><td>Vorzeichenloser 32-Bit Wert</td><td>4</td><td></td></tr> <tr><td>15 @ServerName</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>16 @ServerVersion</td><td></td><td>Textvariable 16-Bit Zeichensatz</td><td>255</td><td></td></tr> <tr><td>17 @TLGRT_AVERAGE_TAGS_PER_SECOND</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> <tr><td>18 @TLGRT_SIZEOF_NULL_INPUT_QUEUE</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> <tr><td>19 @TLGRT_SIZEOF_NOTIFY_QUEUE</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> <tr><td>20 @TLGRT_TAGS_PER_SECOND</td><td></td><td>Gleitkommazahl 64-Bit IEEE 754</td><td>8</td><td></td></tr> </tbody> </table>	Name	Kommentar	Datentyp	Länge	Format	1 @ConnectedRTClients		Vorzeichenloser 16-Bit Wert	2		2 @CurrentUser		Textvariable 8-Bit Zeichensatz	255		3 @CurrentUserName		Textvariable 16-Bit Zeichensatz	255		4 @DataSourceNameRT		Textvariable 16-Bit Zeichensatz	255		5 @DeltaLoaded		Vorzeichenloser 32-Bit Wert	4		6 @LocalMachineName		Textvariable 8-Bit Zeichensatz	255		7 @PHServer_Mirror_Details		Textvariable 16-Bit Zeichensatz	255		8 @PHServer_Mirror_State		Textvariable 16-Bit Zeichensatz	255		9 @PHServer_Principal_Details		Textvariable 16-Bit Zeichensatz	255		10 @PHServer_Principal_State		Textvariable 16-Bit Zeichensatz	255		11 @RedundantServerState		Vorzeichenloser 16-Bit Wert	2		12 @SCRIPT_COUNT_ACTIONS_IN_QUEUE		Vorzeichenloser 32-Bit Wert	4		13 @SCRIPT_COUNT_REQUESTS_IN_QUEUE		Vorzeichenloser 32-Bit Wert	4		14 @SCRIPT_COUNT_TAGS		Vorzeichenloser 32-Bit Wert	4		15 @ServerName		Textvariable 16-Bit Zeichensatz	255		16 @ServerVersion		Textvariable 16-Bit Zeichensatz	255		17 @TLGRT_AVERAGE_TAGS_PER_SECOND		Gleitkommazahl 64-Bit IEEE 754	8		18 @TLGRT_SIZEOF_NULL_INPUT_QUEUE		Gleitkommazahl 64-Bit IEEE 754	8		19 @TLGRT_SIZEOF_NOTIFY_QUEUE		Gleitkommazahl 64-Bit IEEE 754	8		20 @TLGRT_TAGS_PER_SECOND		Gleitkommazahl 64-Bit IEEE 754	8	
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Step	Action
<p>5.</p>	<p>Right-click on Variable household in the left column. In the context menu, select Add new driver and choose OPC UA WinCC Channel.</p> 
<p>6.</p>	<p>A new connection option is created in the left column Variable household. Right-click on OPC UA Connections and select New Connection from the context menu. Give this connection the name Software Controller OPC.</p> 

Step	Action
7.	<p>The new Software Controller-OPC connection is now displayed in the left column Variable household. Right-click on Software Controller-OPC and select Connection Parameters from the context menu.</p> 
8.	<p>A pop-up window opens with the connection settings of the Software controller-OPC connection. You must enter the OPC UA Server address of the virtual interface on the Software Controller page. You can find them in the TIA Portal. In this example opc.tcp://192.168.73.1:4840.</p> 
9.	<p>Then start the SIMATIC WinCC V7.4 SP1 Runtime on the SIMATIC IPC 427D.</p>

5.4 Connection Check

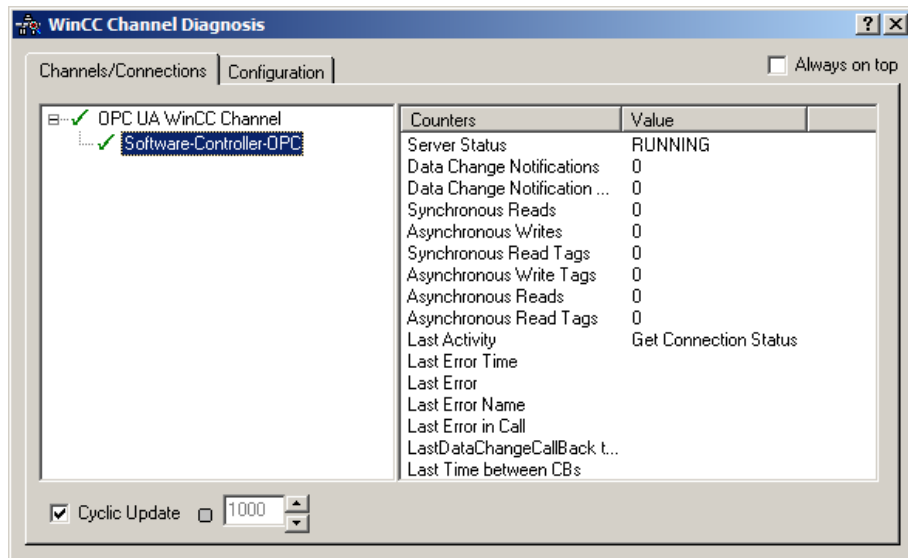
After you have loaded all projects to the two SIMATIC IPCs, you can check the connection for correct functionality.

Conditions for establishing a connection:

- SIMATIC S7-1500 Software Controller in operating mode RUN
- SIMATIC WinCC V7.4 SP1 Runtime started

Start the diagnostic tool **Channel Diagnosis** on the SIMATIC IPC 427D in addition to the SIMATIC WinCC V7.4 SP1 Runtime. (Figure 5-2) With this tool you can monitor and control all configured connections.

Figure 5-2: Channel Diagnosis Tool

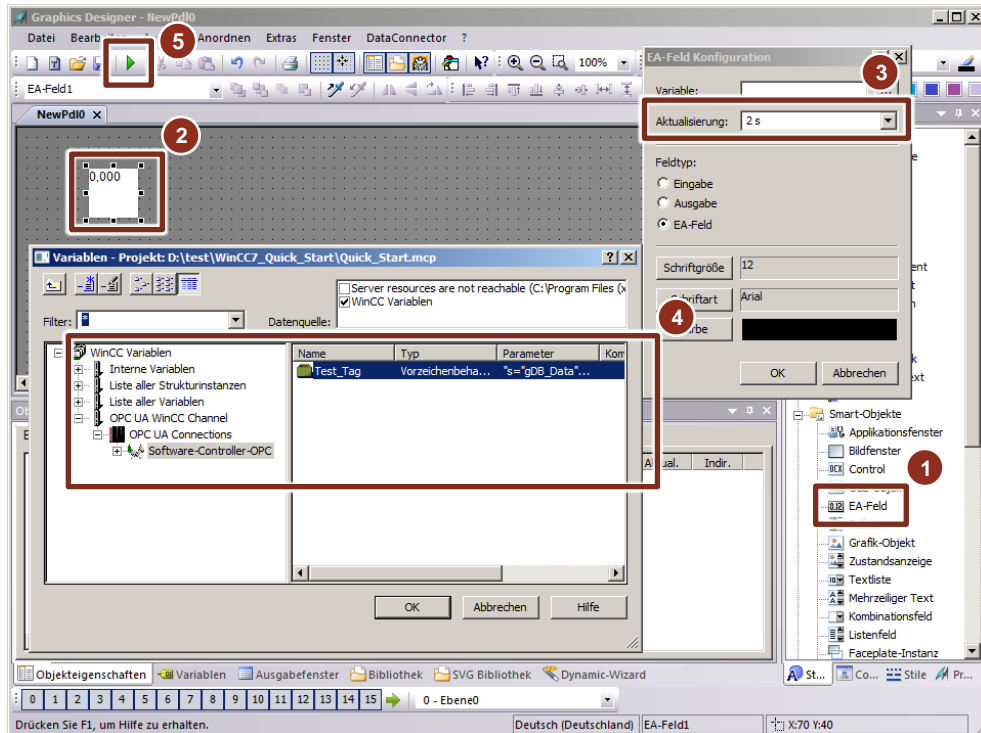


If you see a green check mark on the connection, the connection is established and in clock. A red cross indicates an unestablished/inactive connection.

5 Data exchange via OPC UA

Then create an image with an I/O field in your SIMATIC WinCC V7.4 SP1 project. Link the test variable from the OPC UA server of the software controller with the I/O field. (Figure 5-5)

Figure 5-5: Configuration of an I/O field with SIMATIC WinCC V7.4 SP1

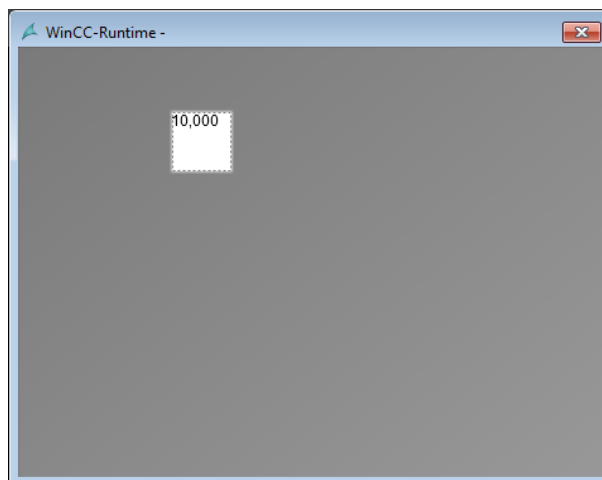


Save the SIMATIC WinCC V7.4 SP1 project and start the visualization.

Establish an online connection to the software controller with TIA Portal. You can then change the test variable online in the SIMATIC controller.

If the value changes, the display value in the I/O field of SIMATIC WinCC V7.4 SP1 also changes. (Figure 5-6)

Figure 5-6: SIMATIC WinCC V7.4 SP1 Screen



6 Appendix

6.1 Service und support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

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We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

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- Repair services
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- Retrofitting and modernization services
- Service programs and contracts

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<https://support.industry.siemens.com/cs/ww/en/sc/2067>

6.2 Links and Literature

Table 6-1: Important links

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the article page of the application example https://support.industry.siemens.com/cs/ww/en/view/109763254
\3\	SIMATIC S7-1500 Software Controller manual https://support.industry.siemens.com/cs/ww/en/view/109740725
\4\	SIMATIC WinCC V7.4 SP1 manual https://support.industry.siemens.com/cs/ww/en/view/109736220
\5\	SIMATIC IPC 427E manual https://support.industry.siemens.com/cs/ww/en/view/109742190
\6\	SIMATIC IPC 427D manual https://support.industry.siemens.com/cs/ww/en/view/67235073
\7\	Internal and external connection via the virtual interface of the software controller https://support.industry.siemens.com/cs/ww/en/view/109760541

6.3 Change documentation

Table 6-2: Overview history

Version	Date	Change
V1.0	12/2018	First version