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SIMATIC Expert Communication
Connecting S7-400H to PC Station (WinCC)

Getting Started Edition 08/ 2001
Connecting S7-400H to PC Station (WinCC)

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Connecting S7-400H to PC Station (WinCC)

1 Automation problem

Connecting S7-400H to WinCC Station with S7-RedConnect has always been a problem, not because the system is difficult to handle, but rather due to lack of information provided on the manuals. This solution will show you the necessary steps that you have to do in order to establish a fault-tolerant connection between S7-400H and WinCC Station.

2 Solution description

This solution is valid for:

<table>
<thead>
<tr>
<th>H-CPU</th>
<th>Order Number</th>
<th>Hardware Version</th>
<th>Firmware Version</th>
<th>H optional package Version</th>
<th>STEP 7 Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 414-4H</td>
<td>6ES7 414-4HJ00-0AB0</td>
<td>1</td>
<td>V 2.1.2</td>
<td>V5.1</td>
<td>V5.1 + SP1</td>
</tr>
<tr>
<td>CPU 417-4H</td>
<td>6ES7 417-4HL01-0AB0</td>
<td>1</td>
<td>V 2.1.2</td>
<td>V5.1</td>
<td>V5.1</td>
</tr>
<tr>
<td>CPU 417-4H</td>
<td>6ES7 417-4HL00-0AB0</td>
<td>3</td>
<td>V 2.1.2</td>
<td>V5.1</td>
<td>V5.1</td>
</tr>
</tbody>
</table>

*) If STEP7 V5.1+SP2 is installed, then H optional package V5.1+SP2 must be used!

If you have H-CPU that is different from the above specification, then you can still use this solution as your guide because the idea behind is the same, but please make sure that you have the components (hardware and software) that can be used for the version of H-CPU you used.

Before starting the commissioning you have to take-care of the following:

2.1 S7-400H

The following ethernet CPs (CP 443-1) can be used for fault-tolerant communications:

<table>
<thead>
<tr>
<th>Order Number</th>
<th>Hardware Version</th>
<th>Firmware Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>6GK7 443-1EX02-0XE0</td>
<td>1</td>
<td>V5.2</td>
</tr>
<tr>
<td>6GK7 443-1EX10-0XE0</td>
<td>1</td>
<td>V1.0.1</td>
</tr>
<tr>
<td>6GK7 443-1EX11-0XE0</td>
<td>1</td>
<td>V1.1.0</td>
</tr>
</tbody>
</table>

Please always refer to the product information of CPU 417-4H / CPU 414-4H, because with the new firmware version of the H-CPU, some modules must be upgraded.

The product information should be considered as a separate document and, in case of doubt, takes precedence over information contained in manuals and catalogs.
Please note that only ISO transport protocol can be used for fault-tolerant communications!

In contrast to the description on the H manual, the Profibus network cannot be used for fault-tolerant communication between S7-400H and WinCC station, because the latest version of S7-RedConnect V1.4 does not support the Profibus CPs (CP 5613 and CP 5614).

For fault-tolerant communication between S7-400H and WinCC station, an “S7 connection redundant” must be configured in NetPro.

2.2 S7-RedConnect

In order to be able to use fault-tolerant connections between S7-400H and PC (for example, WinCC), the “S7-RedConnect” software package is required on the PC.

The S7-RedConnect software package has the following characteristics:

- Fault detection, switching over, monitoring of the communication and synchronization are handled in the background invisible to the application.
- No additional programming required for PC and fault-tolerant system.
- The application, for example WinCC, communicates with both parts of the fault-tolerant system in the same way as with one S7-CPU.
- S7-RedConnect provides the same S7 user interfaces (PG/OP functions, S7 Communication) as other SIMATIC NET S7 software products for PCs.
- Existing Windows applications can continue to be used.
- An application can monitor the status of the redundant connections using status queries.
- The status of the connection can be displayed with the aid of the diagnostic tool.
- Configurable two-path and four-path redundancy
2.2.1 Important notes on S7-RedConnect

<table>
<thead>
<tr>
<th>S7-RedConnect Version</th>
<th>Operating System supported</th>
<th>Network Card supported</th>
<th>Redundancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.3¹)</td>
<td>6GK1716-0HB13-3AA0</td>
<td>NT 4.0</td>
<td>CP 1413 or CP 5412 (A2)</td>
</tr>
<tr>
<td>V1.4 V1.4 Upgrade</td>
<td>6GK1716-0HB14-3AA0</td>
<td>NT 4.0 or 2000 Pro</td>
<td>Only CP 1613</td>
</tr>
</tbody>
</table>

1) Please also install the Service Pack 3 for S7-RedConnect V1.3
2) Four-path redundancy connections can only be configured with STEP 7 V5.1 + SP1 or higher

S7-RedConnect supports only S7 communication, since the fault-tolerant connections are possible only using the S7 protocol. The transport protocol that can be used is ISO transport protocol or additionally Profibus in case of V1.3.

The S7-RedConnect can be used along with other SIMATIC NET products on the same CP.

Operating other protocols (for example, TCP/IP, Novell, etc., as used in office networks) on the same network card and on the same network can lead to problems in fault-tolerant communication. It is therefore recommended that you use a separate network card and a separate network.
2.2.2 Two-path or Four-path Redundancy

Two-path Redundancy (Redundant bus)

<table>
<thead>
<tr>
<th>Rack 0</th>
<th>Rack 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 417</td>
<td>CPU 417</td>
</tr>
<tr>
<td>CP 1 443-1</td>
<td>CP 1 443-1</td>
</tr>
</tbody>
</table>

SIMATIC H station

SIMATIC PC station

CP 1 1613
CP 2 1613

Communication path 1
Communication path 2

Network 1
Network 2

Two-path communication can, for example, be set up with the following components:

- SIMATIC H station, two CPUs each with a CP
- Two networks
- PC station with two CPs

A fault-tolerant S7 connection therefore has two communication paths. The failure of one component leads to an automatic failover to the other redundant communication path.
Two-path Redundancy (Single bus)

Two-path communication can also be set up with a line topology (single bus, PC station with one CP).
Four-path Redundancy

Fault-tolerant communication on four-paths with increased redundancy can be set up, for example, with the following components:

- SIMATIC H station, two CPUs each with two CPs
- Two networks
- PC station with two CPs

A fault-tolerant S7 connection therefore has four communication paths. Now, for example, rack 0 can fail and network 2 can be down. Since four paths are available, rack 1 and network 1 continue to function automatically.
3 Configuration

The following steps show you how to configure a two-path redundancy system as showed in page 6.

3.1 Configuring S7-400H

The following steps show you how to configure the hardware of the S7-400H.

Procedure
1. Open SIMATIC Manager, and create a new project. Then insert a new H station: Insert > Station > SIMATIC H Station

![Image of SIMATIC Manager interface]

2. Open the hardware configuration (HWConfig) of the SIMATIC H Station(1) created (you can change the name) by double-clicking the hardware object (or right-click the Open Object popup menu command).

3. First place a mounting rack from the RACK-400 catalog. You can use one UR2-H rack or alternatively two UR1 or two UR2 racks.
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4. Insert the standard power supply in slot 1 of the mounting rack.

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5. Place the fault-tolerant CPU in slot 3. Please take care of the hardware and firmware version of the CPU.

6. Create a PROFIBUS-DP subnet for the H-CPU in rack 0.
7. Insert two synchronization modules (H Sync module) at IF1 and IF2.

8. Insert the ethernet communication processor CP 443-1.

9. Configure the ethernet subnet; Deactivate the TCP/IP protocol, assign the MAC-Address and ..... activate the flag for the fast switchover of the fault-tolerant connections.
10. If the hardware components in rack 0 are the same as in rack 1, you can copy the rack 0 and paste it as rack 1. While pasting, you will be asked to create the second PROFIBUS-DP subnet and configure the second ethernet subnet.

11. Now, you can configure the PROFIBUS slaves (for example, ET-200M). Add the IM 153-2 directly onto one of the two PROFIBUS subnets, and enter the address. The ET-200M is connected to both subnets automatically. (There is a Redundancy tab in the properties dialog box of the ET-200M).
12. Insert the input/output modules in ET-200M.

13. Save and compile the current configuration. The system blocks (SDB) are generated and stored in the program container.

14. Download the hardware configuration to the CPU in rack 0 (or CPU 0 for short).


3.2 Configuring PC-station

Before the PC can establish a connection with a fault-tolerant SIMATIC S7 system with S7-REDCONNECT, it requires certain information, such as the addresses of the nodes involved, the network adapters used etc.

This information is generated automatically when you configure your S7 project with STEP 7 (version 5 and higher), include the PC as a “SIMATIC PC station”, and when the communications partners are attached to the same networks.

Procedure

1. Insert a new PC station: **Insert > Station > SIMATIC PC Station**

2. Open the hardware configuration (HWConfig) of the SIMATIC PC Station(1) created.

3. Insert an Application in slot 1 of the PC rack. You can change the name of the Application (for example, WinCC-Application)
4. Insert the communication processor in slot 2 (for example, CP1613).

5. Configure the ethernet network; Deactivate the TCP/IP and assign the MAC-Address.

6. Insert the second communication processor in slot 3 in the same way as described before. Then, save and compile the configuration.
### 3.3 Configuring fault-tolerant connections

**Procedure**

1. Open **NetPro** by right-clicking the **Connections** of the first CPU 414-4H and then choose **Open Object**.

2. Click on the first CPU 414-4H (Connection table will then be displayed on the lower part of the window).

3. Double-click the first line of the connection table. **New Connection** window pops up, then choose the connection partner, connection type and activate **Display Properties Dialog**.
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Connection Partner          Station          SIMATIC PC Station(1)
                                Application       WinCC-Application
Connection                      Type            S7 connection redundant

4. Click the **Add** button and in the following dialog, the configured S7 fault-tolerant connections will be displayed.

**NOTE:** If you configure the four-path redundancy, you must activate the check box **Enable max. CP redundancy (with 4 connection paths)**. This is only possible with STEP7 V5.1 + SP1 or higher and S7-RedConnect V1.4 or higher.

5. Save and compile the configuration.

6. Download the configuration to the CPU 0 (CPU in rack 0).
Connecting S7-400H to PC Station (WinCC)
3.4 Setting the PG/PC-Interface of the WinCC-Station

The connection information created by STEP7 (NetPro) for the PC station must also be transferred to the WinCC-Station.

The communication configuration is adopted on the PC from the STEP 7 project in the form of an XDB file. The XDB file contains certain information required for the PC, such as the addresses of the nodes involved, the network adapters used etc.

In the Properties dialog of the SIMATIC PC station you can see the storage location of the XDB file.
Connecting S7-400H to PC Station (WinCC)

Procedure
Open the Set PG/PC-Interface. Under register Configure STEP7, define where the XDB file is located (Click on Search button to search for the XDB file).

NOTE:
As you can see, the WinCC can also run on different PC. Important is that the XDB file must be defined in Set PG/PC-Interface of the WinCC-PC. Please make sure that whenever the connection configuration is changed in STEP 7, an up-to-date XDB file must be copied to the WinCC-PC.
3.5 Configuring WinCC-Station

Procedure

1. Open WinCC, create a new WinCC project and insert the SIMATIC S7 Protocol Suite driver.

2. Insert a new connection under the Named Connections channel.
3. Click on the **Properties** button to define the connection parameter. In register **Connection**, search for the **Application name** and **Connection name** from the XDB file.

**NOTE:** If the XDB file is not defined in **Set PG/PC-Interface**, then there will be no selection for the application name and connection name in WinCC.
4. Now, as usual, you can define your WinCC tags and WinCC screens.

NOTE:
S7-RedConnect provides diagnostic tool, which can be used to diagnose the S7 fault-tolerant connections.

The diagnostic tool can be found under SIMATIC > SIMATIC NET > S7 Connection Diagnostic.
4 Reference

S7-400H Programmable Controller, Fault-Tolerant Systems
Order Number: 6ES7 988-8HA10-8BA0

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6 Warranty and Support

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...........................................................................................................................................................

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☐ Coverage suitable ☐ Too detailed ☐ Too superficial
☐ Clear ☐ More or less clear ☐ Not clear
☐ Well designed ☐ Satisfactorily designed ☐ Poorly designed
☐ Often used ☐ Seldom used ☐ Used once only

Time saved by using document compared with before:
☐ No time saved ☐ Approx. 5% ☐ Approx. 10% ☐ Other:......%

Suggestions:
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