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Local Download Software Controller

SIMATIC Software Controller / TIA Portal / STEP 7

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1 Introduction

1.1 Overview

This document shows you how to load a TIA portal project locally into a SIMATIC S7-1500 software controller. In this case, both the Engineering SIMATIC STEP 7 TIA Portal and the SIMATIC S7-1500 Software Controller are installed on the same SIMATIC IPC.

This allows you to dispense with an additional engineering notebook during engineering.

1.2 Components used

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

Table 1-1: Hardware and software components

Component	Article number	Note
SIMATIC IPC 427E	6AG4141-0BA00-0AA0	
SIMATIC S7-1500 Software Controller V2.6	6ES7672-8AC01-0YG0	CPU 1508S
SIMATIC STEP 7 V15.1	6ES7822-1AA05-0YA5	TIA Portal

1.3 Versions of the SIMATIC S7-1500 Software Controller

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

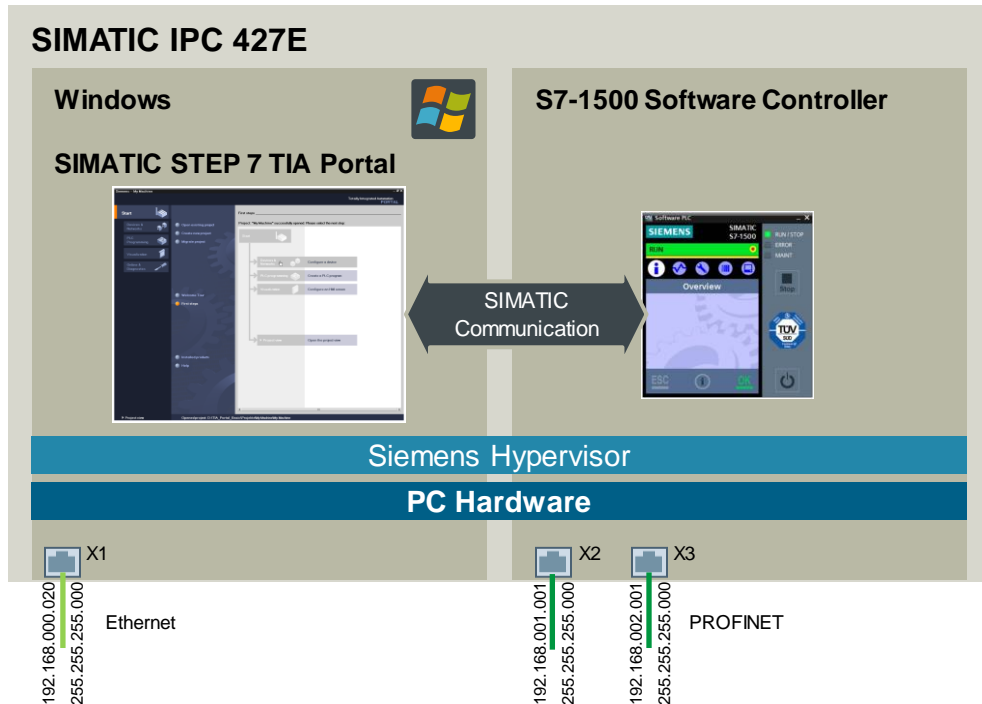
Note

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. Engineering and control are installed on the SIMATIC IPC 427E. The download of the TIA Portal project into the software controller is done via an internal SIMATIC Communication.

Figure 1-1: Hardware setup of the SIMATIC IPC



Note The download does not take place via the virtual interface (available from V2.5), but via an internal SIMATIC channel.

1.5 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

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>

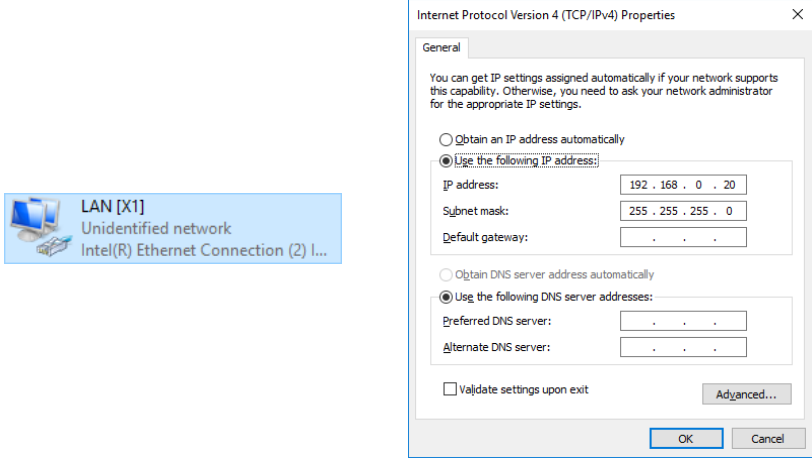
2 Necessary Windows settings

Before you can execute the local download of the software controller, you must install the software on the SIMATIC IPC and make a few Windows settings.

Windows settings SIMATIC IPC 427E

The network settings for the Windows interface of the SIMATIC IPC must be made. The procedure is described in [Table 2-1](#).

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

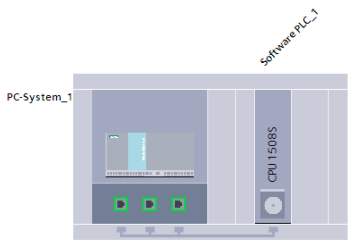
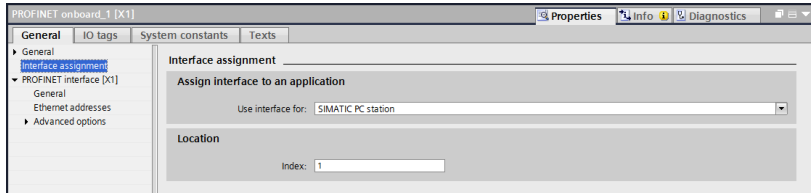
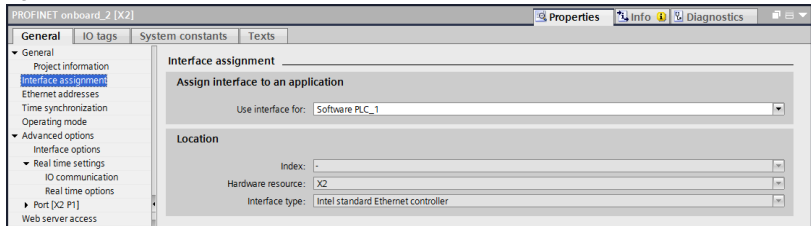
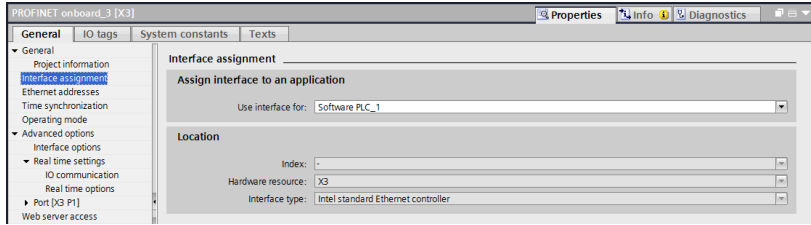
Step	Action
1.	<p>Open the Windows Network Center of the SIMATIC IPC and set the corresponding IP address / subnet mask for the Windows interface.</p>  <p>The screenshot shows the Windows Network Center window with a blue box highlighting the 'LAN [X1]' connection. To the right, the 'Internet Protocol Version 4 (TCP/IPv4) Properties' dialog box is open, showing the 'General' tab. The 'Use the following IP address' radio button is selected, with the IP address set to 192.168.0.20 and the subnet mask set to 255.255.255.0. The 'Obtain DNS server address automatically' radio button is also selected. The 'Validate settings upon exit' checkbox is unchecked. The 'OK' button is highlighted.</p>

3 Engineering of the application

Engineering SIMATIC S7-1500 Software Controller

[Table 3-1](#) describes how to create a corresponding TIA Portal project.

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

Step	Action
1.	Open TIA Portal and create a new project.
2.	Add a SIMATIC IPC 427E and a SIMATIC S7-1500 Software Controller to your project. <div style="text-align: center;">  </div>
3.	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>Assign the left interface (X1) to the SIMATIC PC station.</p> <div style="text-align: center;">  </div> <p>Assign the middle interface (X2) to the PLC_1 software.</p> <div style="text-align: center;">  </div> <p>Assign the right interface (X3) to the PLC_1 software.</p> <div style="text-align: center;">  </div>
4.	With a double click on the Software Controller Runtime you can set further properties of the software PLC according to your requirements.

4 Download the TIA Portal Project

4.1 Useful information about Software controller download

The SIMATIC S7-1500 software controller can be configured in any version, as with all SIMATIC controllers with STEP 7 TIA portal. Operation and functions are identical to those of a S7-1500 hardware controller.

Software Controller - First download

With the first download the initialization of the system takes place with allocation of the respective PC station components. The initialization runs automatically during the download.

Software Controller - Reboot Request

When the TIA Portal project is loaded into the Software Controller for the first time, a reboot is requested to complete the initialization of the system. The reboot takes place automatically at the end of the download.

Depending on project changes to the hardware settings, a reboot of the system may be necessary. [Table 4-1](#) provides an overview.

Table 4-1: Software controllers – Overview Station Download, Reboot, Reset

Configuration changes required	Station Download	Reboot	Reset Configuration
CPU name change	x		
Change to the startup behavior of the Software PLC	x		
Change of the index (PC internal address)	x	x	
Activating / deactivating the HW LED Usage	x	x	
Change to the interface assignment	x	x	x
Changing the remanence memory	x	x	x

Note

It is recommended that you download via the Windows interface after making changes to the hardware configuration.

Software Controller - download behavior

Downloading the TIA Portal project for the software controller is generally done in two steps. In the first step, the hardware configuration of the entire PC system is loaded, then the software is downloaded.

If a reboot of the system is necessary because you have made changes to certain hardware settings, this will be performed automatically between the two download steps.

At the first successful download, the name of the CPU shortcut on the desktop changes to the name you gave the CPU in your TIA Portal project.

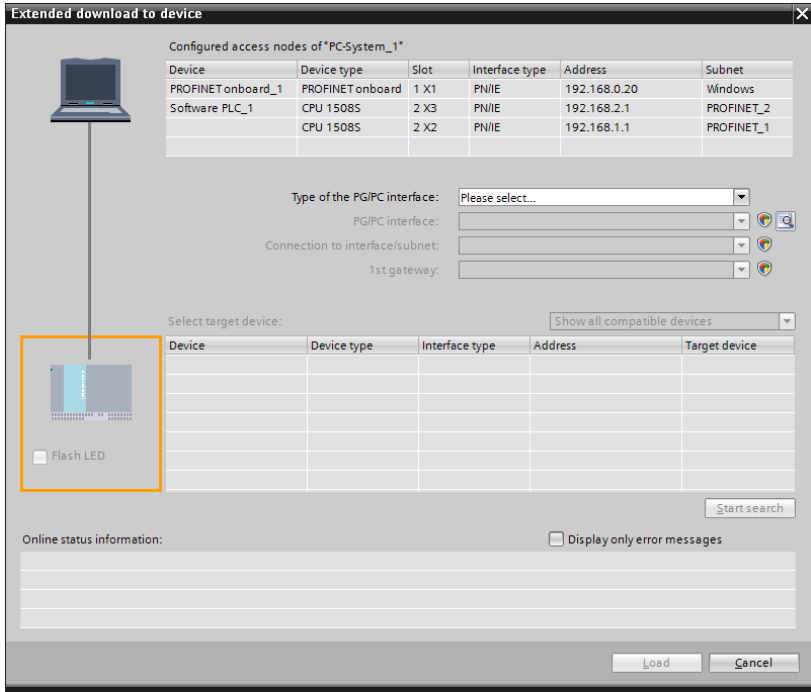
The reboot of the SIMATIC IPC terminates all running programs and processes. Even an open TIA Portal project is closed in such a case and the download process is "finished" after the first step. After the reboot only the hardware configuration of the PC system is loaded. You must therefore reopen the TIA Portal and initiate another download of your project. This second download then loads the software into the software controller.

4.2 Procedure for local download

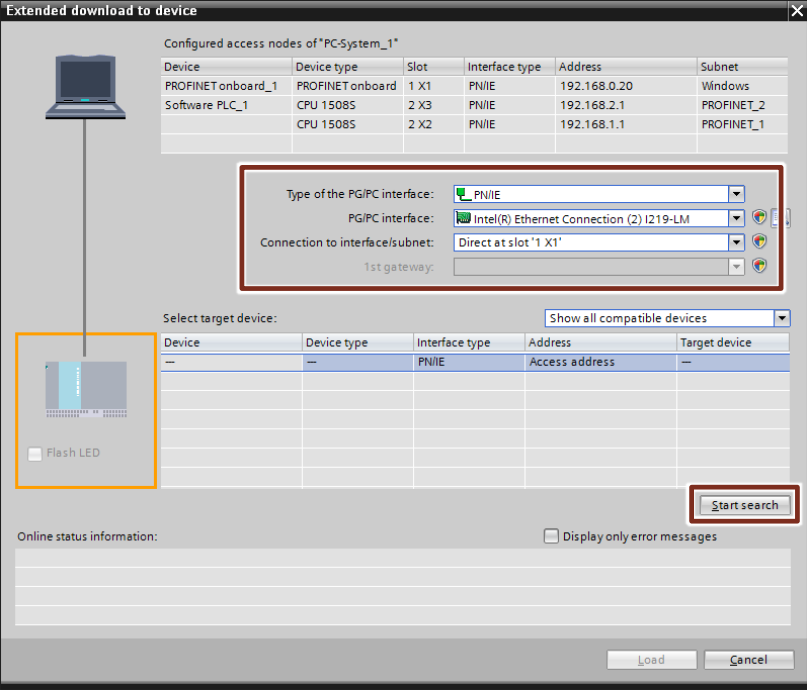
CAUTION	<p>Loss of the TIA Portal Project!</p> <p>It is strongly recommended that you save your entire TIA Portal project before each local download, as some changes to the PC station configuration will reboot the system.</p> <p>The Windows reboot of the system is executed without waiting for Windows applications (e.g. "Save when changing data"). This implementation is required for headless applications or for SIMATIC IPCs that are far away or difficult to access.</p>
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[Table 4-2](#) describes the steps required to perform a local download of a TIA Portal project to a software controller.

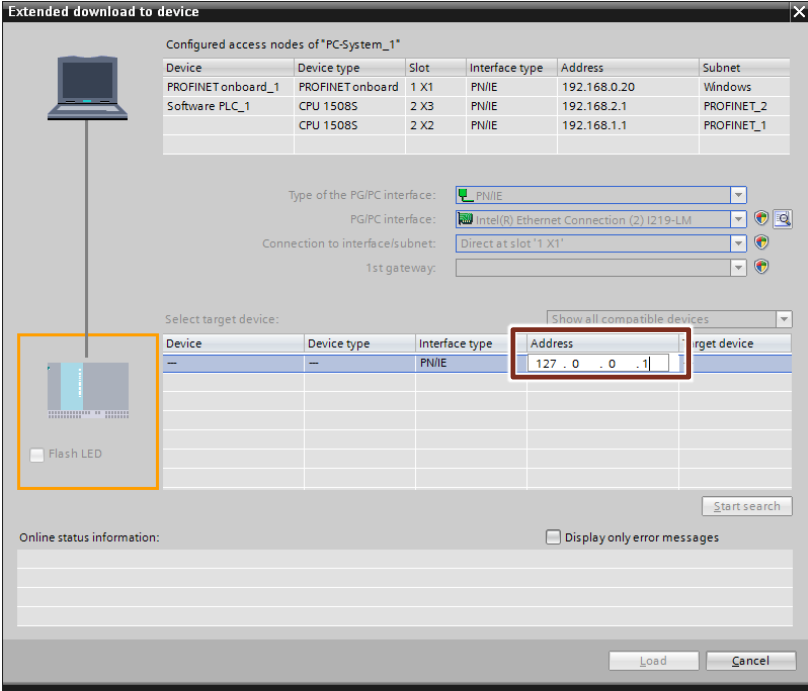
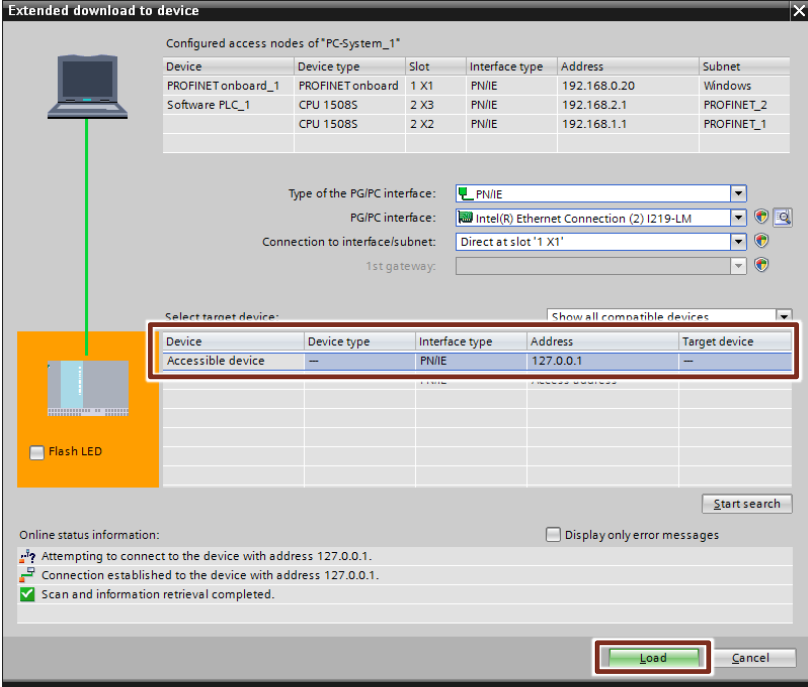
Table 4-2: Steps for local download

Step	Action
1.	Start the software controller on the SIMATIC IPC with the Power ON button.
2.	Select the complete PC system in TIA Portal and start the download via the Download to device button.
3.	<p>The window Extended download to device opens.</p>  <p>The screenshot shows the 'Extended download to device' dialog box. At the top, it displays 'Configured access nodes of *PC-System_1*'. Below this is a table with columns: Device, Device type, Slot, Interface type, Address, and Subnet. The table contains three rows: PROFINET onboard_1 (PROFINET onboard, 1 X1, PNIE, 192.168.0.20, Windows), Software PLC_1 (CPU 1508S, 2 X3, PNIE, 192.168.2.1, PROFINET_2), and Software PLC_1 (CPU 1508S, 2 X2, PNIE, 192.168.1.1, PROFINET_1). Below the table are several input fields: 'Type of the PG/PC interface' (Please select...), 'PG/PC interface', 'Connection to interface/subnet', and '1st gateway'. There is also a 'Select target device' section with a 'Show all compatible devices' button and a table with columns: Device, Device type, Interface type, Address, and Target device. A red box highlights the 'Flash LED' checkbox in this table. At the bottom right, there are 'Load' and 'Cancel' buttons.</p>

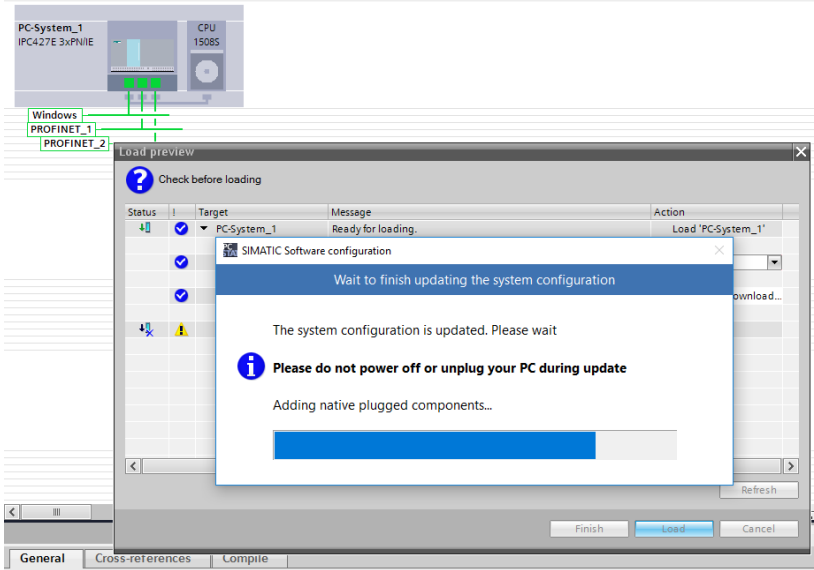

4 Download the TIA Portal Project

Step	Action
4.	<p>Select the following settings:</p> <ul style="list-style-type: none"> Type of the PG/PC interface: PN/IE PG/PC interface Any interface (download via localhost) Connection to interface/subnet: Direct slot '1 X1'  <p>Then click Start search.</p> <p>Note: Depending on the customer-specific configuration of the interfaces, the list of the three interfaces may differ from the figure shown.</p>

4 Download the TIA Portal Project

Step	Action
5.	<p>Double-click in the Address column and enter the localhost address 127.000.000.001. Confirm the entry with Enter, a search process starts automatically.</p> 
6.	<p>The device is found and displayed via the localhost address. Select the device and start the download by clicking the Load button.</p> 

4 Download the TIA Portal Project

Step	Action
7.	<p>If you have changed the hardware configuration, a reboot of the SIMATIC IPC may be necessary. The automatic reboot terminates TIA Portal. Wait for the PC system to reboot.</p> 
8.	<p>Open your TIA Portal project again after the reboot and mark the complete PC system again in TIA Portal and start the download via the button Download to device in order to load the software into the software controller.</p>
9.	<p>After the download is complete, start the software controller.</p> 

Note on Media Sense

You may not be able to download the TIA Portal project because the Windows interface is not recognized as active.

Further information can also be found on the Internet at:

<https://support.industry.siemens.com/cs/ch/en/view/109740471>

5 Appendix

5.1 Service and support

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5.2 Links and literature

Table 5-1: 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/109763251
\3\	SIMATIC S7-1500 Software Controller manual https://support.industry.siemens.com/cs/ww/en/view/109740725
\4\	SIMATIC IPC 427E manual https://support.industry.siemens.com/cs/ww/en/view/109742190
\5\	SIMATIC STEP 7 TIA Portal V15.1 Professional manual https://support.industry.siemens.com/cs/ww/en/view/109755202

5.3 Change documentation

Table 5-2: Overview history

Version	Date	Change
V1.0	12/2018	First version