

# Use of two PROFINET interfaces with SIMOTION

PROFINET & SIMOTION

Application Example • July 2012

Applications & Tools

Answers for industry.

**SIEMENS**

## Siemens Industry Online Support

This article is taken from the Siemens Industry Online Support. The following link takes you directly to the download page of this document:

<http://support.automation.siemens.com/WW/view/en/59396321>

### Caution

The functions and solutions described in this article confine themselves to the realization of the automation task predominantly. Please take into account furthermore that corresponding protective measures have to be taken up in the context of Industrial Security when connecting your equipment to other parts of the plant, the enterprise network or the Internet. Further information can be found under the Item-ID 50203404.

<http://support.automation.siemens.com/WW/view/en/50203404>

You can also actively use our Technical Forum from the Siemens Industry Online Support regarding this subject. Add your questions, suggestions and problems and discuss them together in our strong forum community:

<http://www.siemens.com/forum-applications>

# SIEMENS

## SIMOTION PROFINET & SIMOTION

Application Example

Problem

1

Solution

2

Basics

3

Configuration

4

Contact

5

History

6

## Warranty and liability

### Note

The Application Examples are not binding and do not claim to be complete regarding the circuits shown, equipping and any eventuality. The Application Examples do not represent customer-specific solutions. They are only intended to provide support for typical applications. You are responsible for ensuring that the described products are used correctly. These application examples do not relieve you of the responsibility to use safe practices in application, installation, operation and maintenance. When using these Application Examples, you recognize that we cannot be made liable for any damage/claims beyond the liability clause described. We reserve the right to make changes to these Application Examples at any time without prior notice. If there are any deviations between the recommendations provided in these application examples and other Siemens publications – e.g. Catalogs – the contents of the other documents have priority.

We do not accept any liability for the information contained in this document.

Any claims against us – based on whatever legal reason – resulting from the use of the examples, information, programs, engineering and performance data etc., described in this Application Example shall be excluded. Such an exclusion shall not apply in the case of mandatory liability, e.g. under the German Product Liability Act (“Produkthaftungsgesetz”), in case of intent, gross negligence, or injury of life, body or health, guarantee for the quality of a product, fraudulent concealment of a deficiency or breach of a condition which goes to the root of the contract (“wesentliche Vertragspflichten”). The damages for a breach of a substantial contractual obligation are, however, limited to the foreseeable damage, typical for the type of contract, except in the event of intent or gross negligence or injury to life, body or health. The above provisions do not imply a change of the burden of proof to your detriment.

Any form of duplication or distribution of these Application Examples or excerpts hereof is prohibited without the expressed consent of Siemens Industry Sector.

# Table of contents

<b>Warranty and liability</b> .....	<b>4</b>
<b>1 Problem</b> .....	<b>6</b>
1.1 Overview .....	6
<b>2 Solution</b> .....	<b>7</b>
2.1 Overview of the overall solution .....	7
2.2 Hardware and software components used.....	8
<b>3 Basics</b> .....	<b>10</b>
3.1 PROFINET communication.....	10
3.2 Two PROFINET interfaces with SIMOTION .....	11
3.3 Servo and Servo <sub>Fast</sub> .....	12
<b>4 Configuration</b> .....	<b>13</b>
4.1 HW Config of the SIMOTION controller .....	13
4.2 HW Config of the distributed SIMATIC ET200 station .....	18
4.3 HW Config of the distributed SINAMICS drive .....	21
4.4 Configuring the isochronous communication .....	24
<b>5 Contact</b> .....	<b>34</b>
<b>6 History</b> .....	<b>34</b>

# 1 Problem

## 1.1 Overview

### Introduction

As of SIMOTION V4.3 two PROFINET interfaces are available on all SIMOTION D4x5-2 DP/PN controllers:

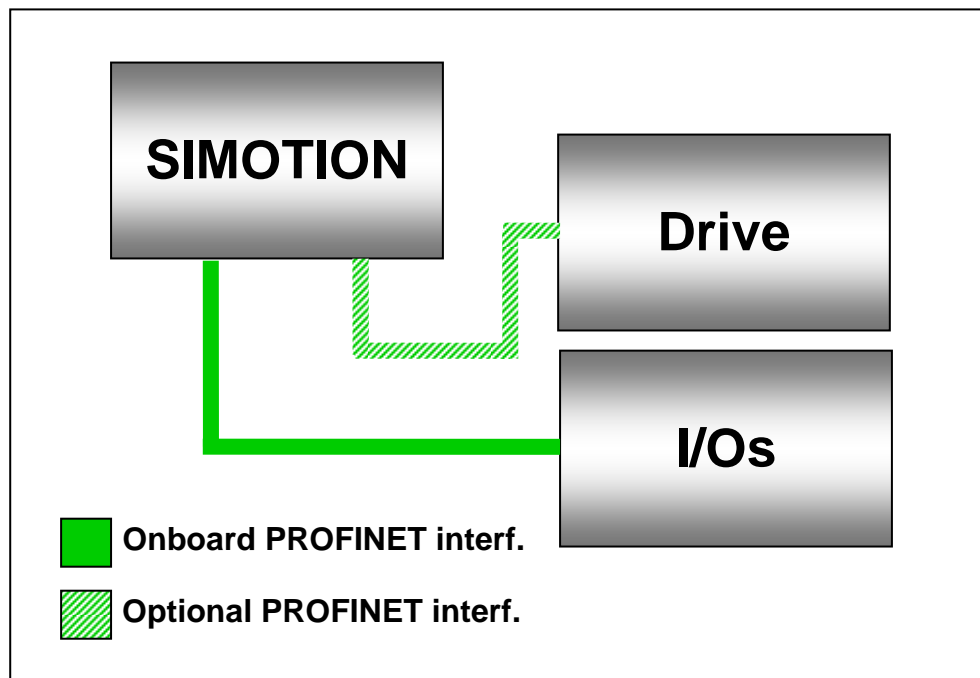
- Onboard PROFINET interface X150 (3 ports)
- Optional PROFINET interface X1400 via CBE30-2 (4 ports, not possible with D4x5-2 DP)

As the two interfaces are separate, two different PROFINET networks can be operated simultaneously on one SIMOTION controller.

### Overview of the automation task

The following figure provides an overview of the automation task.

Fig. 1-1



### Description of the automation task

Two PROFINET networks are to be operated simultaneously on a SIMOTION controller.

A drive and distributed I/Os are divided on to both networks.

The two devices (drive and I/Os) are assigned different isochronous tasks and are operated with different send cycle clocks.

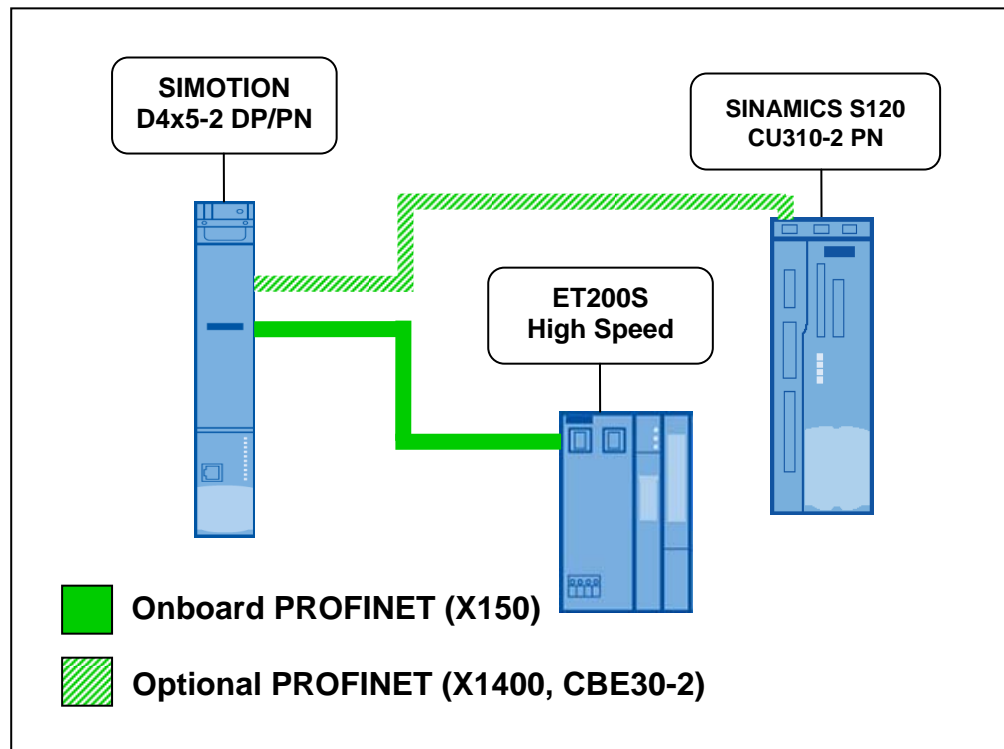
## 2 Solution

### 2.1 Overview of the overall solution

#### Display

The following figure displays the most important components of the solution:

Fig. 2-1



The application description explains how two different PROFINET networks can be operated simultaneously on a SIMOTION controller.

Isochronous communication between the SIMOTION controller and an ET200S High Speed is configured with PROFINET IRT via the onboard PROFINET interface (X150) of the SIMOTION D4x5-2 DP/PN.

Isochronous communication between the SIMOTION controller and the SINAMICS drive is also configured with PROFINET IRT via the optional plug-in PROFINET interface (X1400, CBE30-2).

The SIMOTION controller is the IRT IO Controller, drive and distributed I/Os are IRT IO Devices.

Different send cycle clocks are used in the two networks:

- 250  $\mu$ s on the onboard PROFINET interface (X150)
- 500  $\mu$ s on the optional PROFINET interface (X1400, CBE30-2)

The SINAMICS drive is assigned to the *Servo* isochronous task, the ET200S High Speed to the *Servo<sub>Fast</sub>* isochronous task.

**Delimitation**

This application does not include a description of:

- The general drive functions of the SINAMICS S120
- The SIMOTION controller

Basic knowledge of these topics is assumed.

**Required knowledge**

It is assumed that readers have basic knowledge of SIMOTION controllers and SINAMICS drives with SIMOTION SCOUT.

**2.2 Hardware and software components used**

The application was generated with the following components:

**Hardware components**

Table 2□1

Component	Qty.	MLFB / order number	Note
SIMOTION D455-2 DP/PN	1	6AU1455-2AD00-0AA0	V4.3.1
CBE30-2	1	6FC5312-0FA00-2AA0	
SINAMICS S120 CU310-2 PN	1	6SL3040-1LA01-0AA0	V4.5.0.1
SINAMICS Power Module 340	1	6SL3210-1SB14-0UA0	
SIEMENS motor	1	1FK7022-5AK71-1LG0	
ET200S High Speed	1	6ES7151-3BA60-0AB0	V3.0.1
PM-E 24 VDC	1	6ES7138-4CA01-0AA0	
2 DO 24 VDC / 0.5 A HF	1	6ES7132-4BB01-0AB0	

**Note**

The project example was created with the hardware components listed here.

Alternatively, other components with the same function may be used. A different parameter assignment and different wiring of the components may be required.

**Standard software components**

Tabelle 2-2

Component	Qty.	MLFB / order number	Note
STEP 7	1	6ES7810-4CC10-0YA5	V5.5 + SP2
SIMOTION SCOUT	1	6AU1810-1BA42-1XE0	V4.3 SP1
Drive ES BASIC	1	6SW1700-5JA00-4AA0	V5.5



### Sample files and projects

The following list includes all files and projects that are used in this example.

Tabelle 2-3

Component	Note
59396321_PROFINET_SIMOTION_V1_0_en.pdf	This document

### Supplementary conditions

To configure isochronous communication, the following software and hardware versions are required.

Table2-4

Component	Version
STEP 7	As of V5.5 HF4
SIMOTION SCOUT	As of V4.2.1.0
Drive ES BASIC	As of V5.4 + SP5
Firmware for SINAMICS	As of V4.4
Firmware for ET200S HS	As of V2.0

## 3 Basics

### 3.1 PROFINET communication

Not only the MAC address but also the device name is used to identify the devices for PROFINET. This device name must be unique across the PROFINET network.

During the commissioning phase, the HW Config or the Primary Setup Tool (PST) is used to make an initial assignment of a device name for each PROFINET device (a so-called node initiation). This assigned device name is stored retentively in the PROFINET device and must match the device name of the HW Config in the project.

If a device is replaced, e.g. because of a defect, the new device has a different MAC address. If it is initiated with the same device name as the replaced device (e.g. by reconnecting a CompactFlash card / MMC that stores the device name retentively), it can assume the function of the replaced device without any changes in the configuration (spare part).

#### Rules for assigning names

A device name must be stored retentively on a PROFINET device. This name must match the device name in the project. The following rules apply in this case:

- The device name stored retentively in the device must only contain lowercase letters.

#### Note

The device name in the project can also contain uppercase letters. During the initiation, the engineering system replaces the uppercase letters with lowercase letters.

- Letters a-z and digits 0-9 may be used.
- Special characters are not permitted: ! " § \$ % & / ( ) = ? \* ' \_ : ; > < , # + | ~ \ } ] [ {
- Blanks are also not permitted.
- The total maximum length of a name is 240 characters.
- Reserved names that cannot be used:  
"port-xyz" or "port-xyz-abcde" (a, b, c, d, e, x, y, z = 0...9)
- The minus character must not be used for a SIMOTION controller.

## 3.2 Two PROFINET interfaces with SIMOTION

Two independent PROFINET interfaces are available with the new SIMOTION D4x5-2 DP/PN hardware.

The use of two PROFINET interfaces with SIMOTION provides the following advantages:

- The maximum number of IRT devices that can be operated on a SIMOTION controller is doubled from 64 to 128.
- The available address space is doubled to 8 KB.
- Devices can be operated with different send cycle clocks and assigned different isochronous tasks (Servo and Servo<sub>Fast</sub>).
- The SIMOTION controller can be operated simultaneously as IRT I-Device and IRT Controller.

### Rules for two PROFINET interfaces

The following rules apply when using two PROFINET interfaces and when both interfaces are operated isochronously.

- The IP addresses of the two PROFINET interfaces must be in different subnets.
- Both interfaces can be configured as a PROFINET IO I-Device and/or as a controller (IRT I-Device not possible simultaneously on both interfaces).
- A higher-level controller must always be connected isochronously via the optional PROFINET interface CBE30-2. This applies not only for the controller-controller direct data exchange, but also for the I-Device communication with a higher-level controller. Subordinate isochronous drives/I/Os should be connected via the onboard PROFINET interface.
- The onboard PROFINET interface must be configured as SYNC master.
- The CBE30-2 can be configured as SYNC master or SYNC slave.
- An F-CPU can only be connected to one of the two PROFINET interfaces because fail-safe I/O transfer areas can only be configured either on the I-Device on the onboard PROFINET interface or on the CBE30-2. The maximum quantity structure for PROFIsafe on PROFINET is therefore not increased through the use of a second PROFINET interface.
- If Servo<sub>Fast</sub> is not used, the servo isochronous devices can be assigned to both PROFINET interfaces.
- No redundant SYNC master is permitted in the sync domain of the onboard PROFINET interface if both PROFINET interfaces are operated isochronously and the CBE30-2 is configured as a SYNC slave or IRT I-Device.

### 3.3 Servo and Servo<sub>Fast</sub>

With SIMOTION V4.2, Servo<sub>Fast</sub> has been introduced as second servo cycle clock for fast applications. Previously two bus systems (PROFINET and PROFIBUS) could be operated with different cycle clocks with the second servo cycle clock.

As of SIMOTION V4.3, two PROFINET IO interfaces can now also be operated with different cycle clocks in conjunction with the SIMOTION D4x5-2 DP/PN.

An assigned servo cycle clock and IPO cycle clock are available for each of the two application cycle clocks. In this way, an application can be split into a slower part (Servo and IPO) and a faster part (Servo<sub>Fast</sub> and IPO<sub>Fast</sub>).

The following settings are possible:

Table 3-1

Product version	Property	Application cycle of the devices on		
		PROFINET IO onboard (X150)	PROFINET IO (CBE30-2)	PROFIBUS DP
Up to SIMOTION V4.2	1 servo cycle clock	--	--	Servo
As of SIMOTION V4.2	2 servo cycle clocks	Servo <sub>Fast</sub>	--	Servo
As of SIMOTION V4.3	2 servo cycle clocks	Servo <sub>Fast</sub>	Servo	Servo

#### Rules with Servo<sub>Fast</sub>

The following rules apply when using Servo<sub>Fast</sub>:

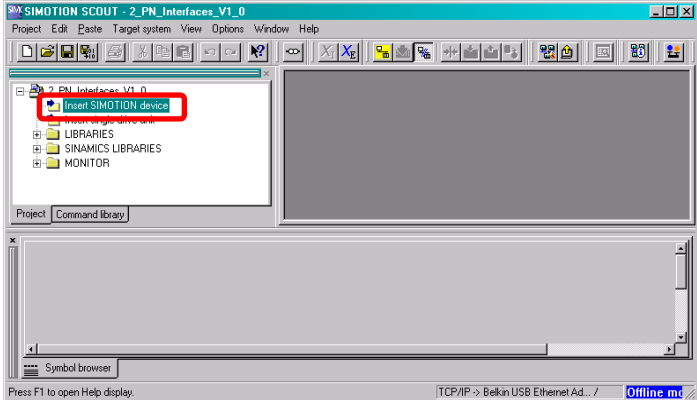
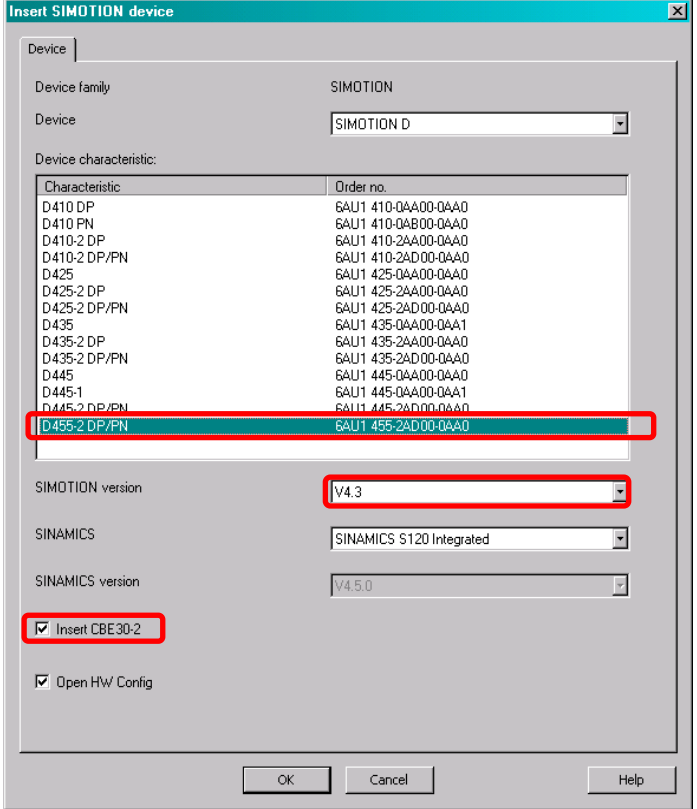
- The interfaces are permanently assigned:
  - Servo/IPO/IPO\_2 to the optional PROFINET interface (X1400, CBE30-2) or DP and DP Integrated
  - Servo<sub>Fast</sub> and IPO<sub>Fast</sub> to the onboard PROFINET interface (X150)
- For Servo and Servo<sub>Fast</sub> only one CACF (Controller Application Cycle Factor) =1 is permitted, i.e. the following must be set:
  - Servo cycle clock = send cycle clock PROFINET interface X1400 (CBE30-2)
  - Servo<sub>Fast</sub> cycle clock = send cycle clock PROFINET interface X150 (onboard interface)
- The Servo<sub>Fast</sub> must be reduced by a factor of 2, 4, 8 or 16 to the Servo, i.e.:
  - Servo send cycle clock = 2, 4, 8 or 16 x Servo<sub>Fast</sub> send cycle clock

## 4 Configuration

### 4.1 HW Config of the SIMOTION controller

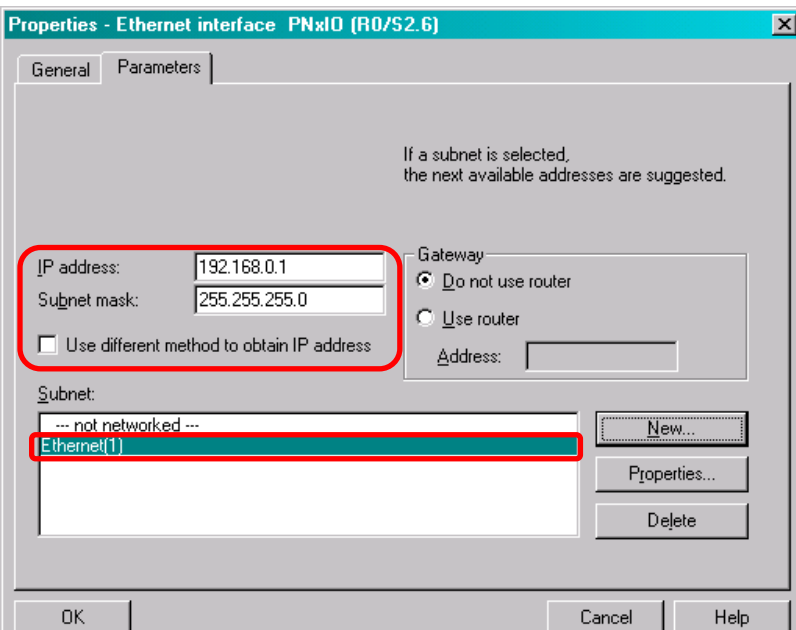
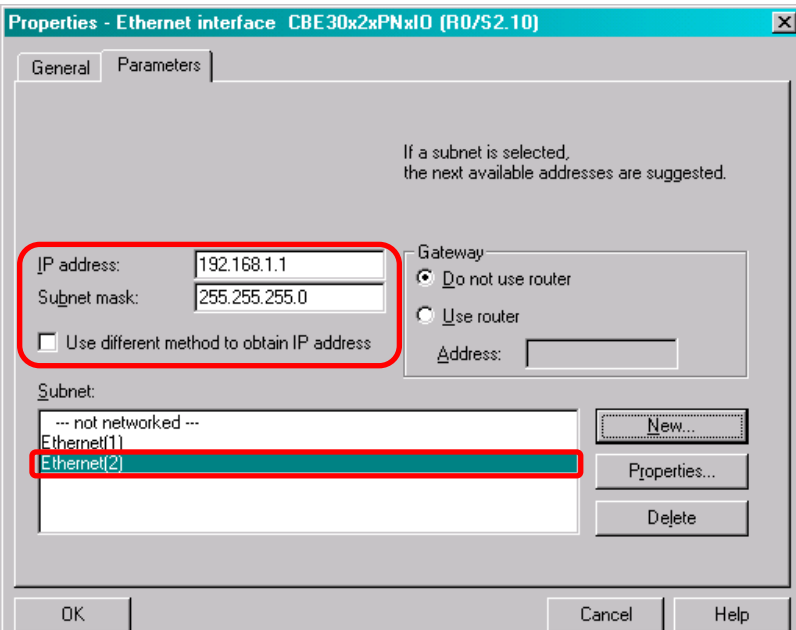
The following shows an example of the configuration of two PROFINET interfaces on a SIMOTION D455-2 DP/PN with the SIMOTION SCOUT engineering system.

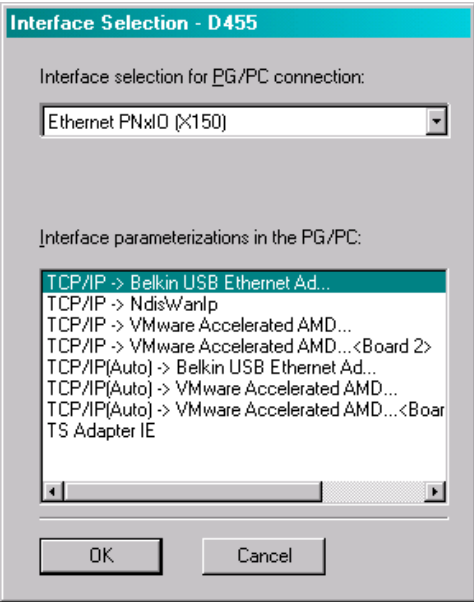
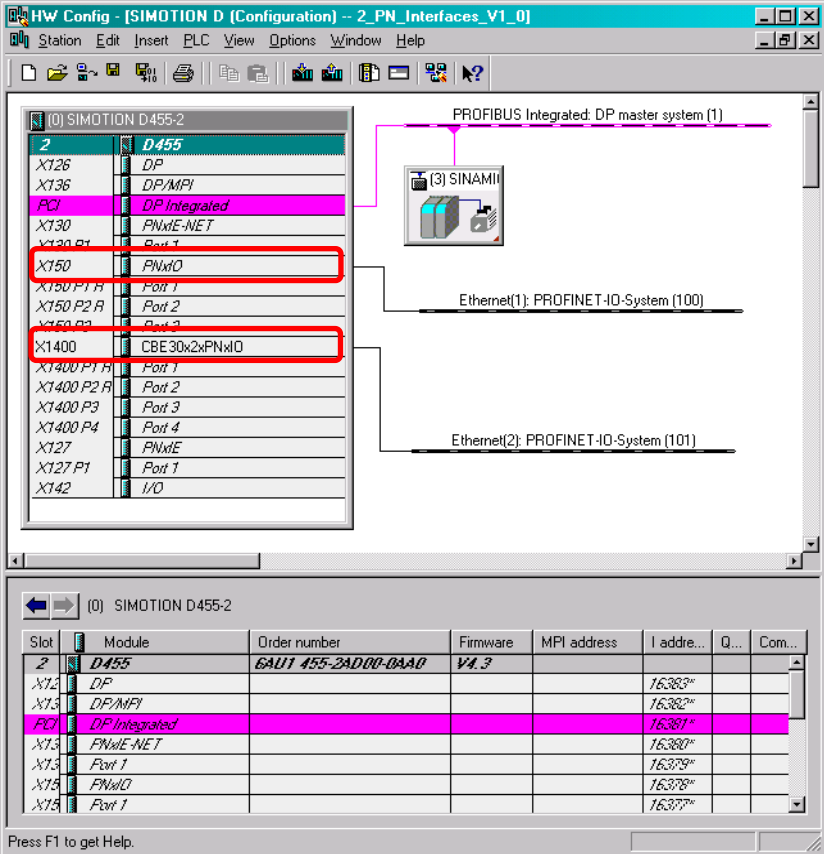
Table 4-1

No.	Action
1.	<p>To create a new project, open the SIMOTION SCOUT engineering system. Insert a new SIMOTION device.</p> 
2.	<p>Select the appropriate SIMOTION hardware platform and version.</p>  <p>The SIMOTION controller communicates with the SINAMICS drive via the CBE30-2 (Communication Board Ethernet) option module.</p>

## 4 Configuration

### 4.1 HW Config of the SIMOTION controller

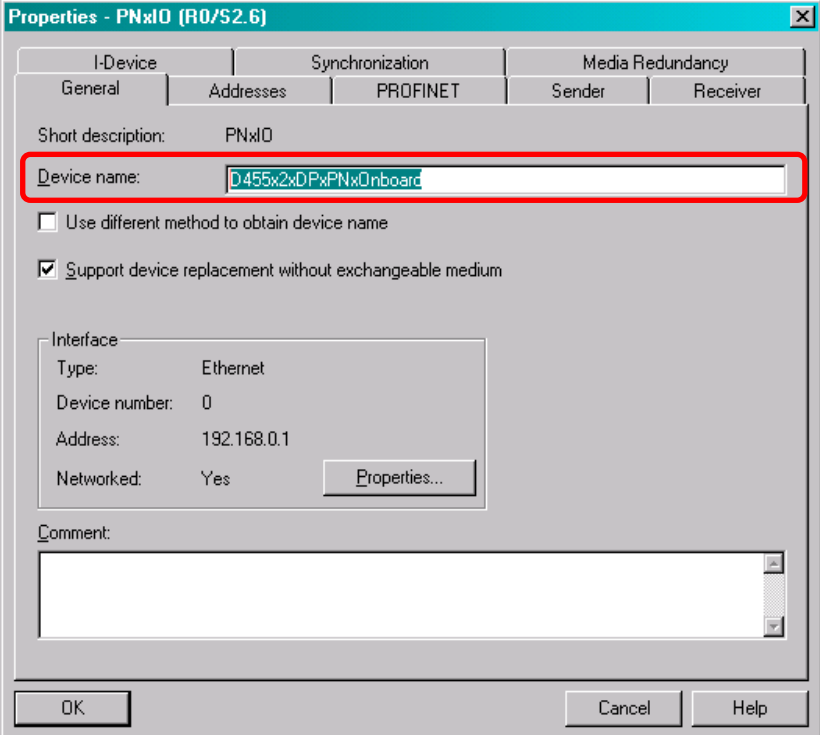
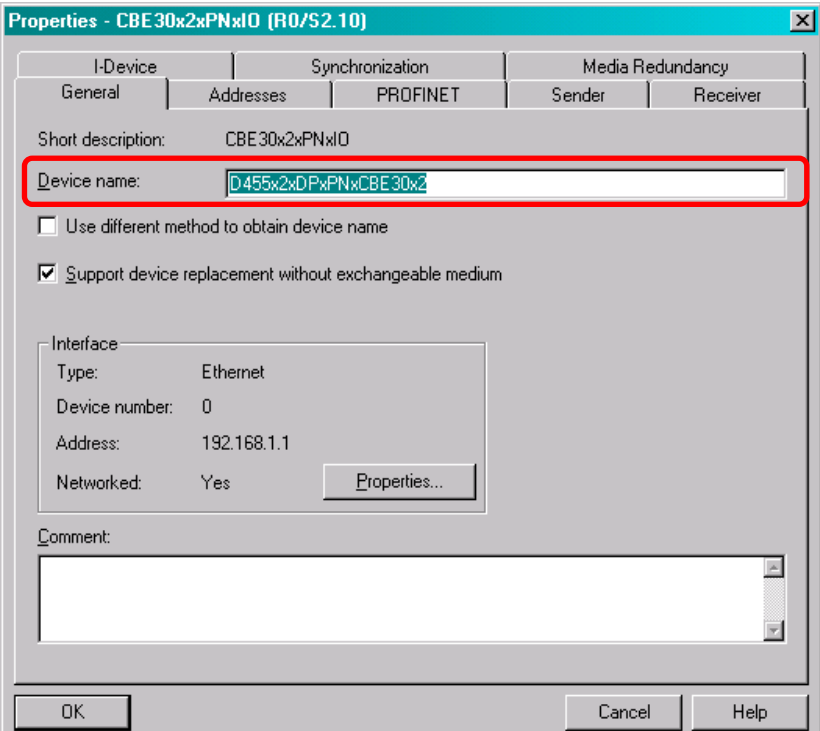
No.	Action
3.	<p>Create a new Ethernet subnet for the onboard PROFINET interface and assign an IP address.</p>  <p><b>Properties - Ethernet interface PNxIO (R0/S2.6)</b></p> <p>General Parameters</p> <p>If a subnet is selected, the next available addresses are suggested.</p> <p>IP address: 192.168.0.1 Subnet mask: 255.255.255.0 <input type="checkbox"/> Use different method to obtain IP address</p> <p>Gateway <input checked="" type="radio"/> Do not use router <input type="radio"/> Use router Address: _____</p> <p>Subnet: --- not networked --- Ethernet(1) New... Properties... Delete</p> <p>OK Cancel Help</p>
4.	<p>Also create a new Ethernet subnet for the second optional PROFINET interface (CBE30-2) and assign an IP address.</p>  <p><b>Properties - Ethernet interface CBE30x2xPNxIO (R0/S2.10)</b></p> <p>General Parameters</p> <p>If a subnet is selected, the next available addresses are suggested.</p> <p>IP address: 192.168.1.1 Subnet mask: 255.255.255.0 <input type="checkbox"/> Use different method to obtain IP address</p> <p>Gateway <input checked="" type="radio"/> Do not use router <input type="radio"/> Use router Address: _____</p> <p>Subnet: --- not networked --- Ethernet(1) Ethernet(2) New... Properties... Delete</p> <p>OK Cancel Help</p> <p><b>Note</b> Make sure that the IP addresses of the PROFINET interfaces are in different subnets!</p>

No.	Action
5.	<p>Configure the connection between the SIMOTION controller and the engineering system.</p> 
6.	<p>The device name can be adapted by double-clicking the respective PROFINET interface.</p>  <p>Pressing key F4 automatically arranges the available modules in HW Config.</p>

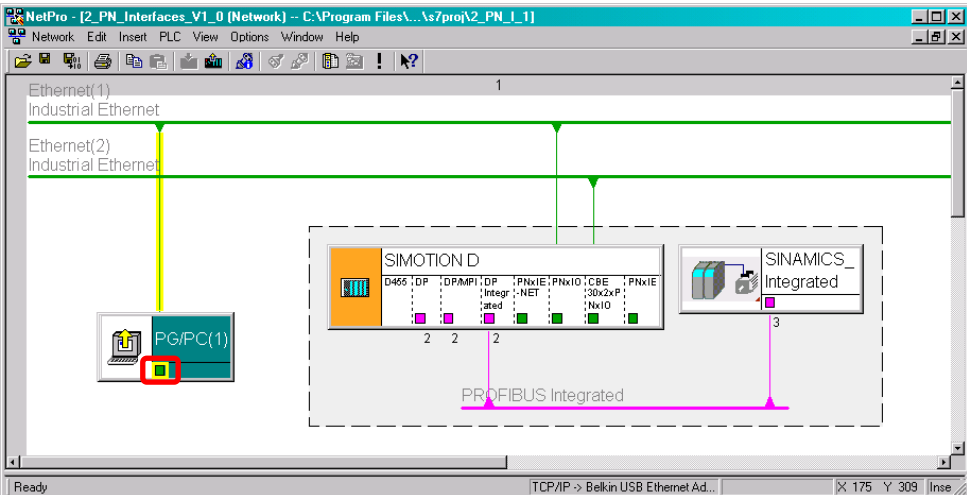
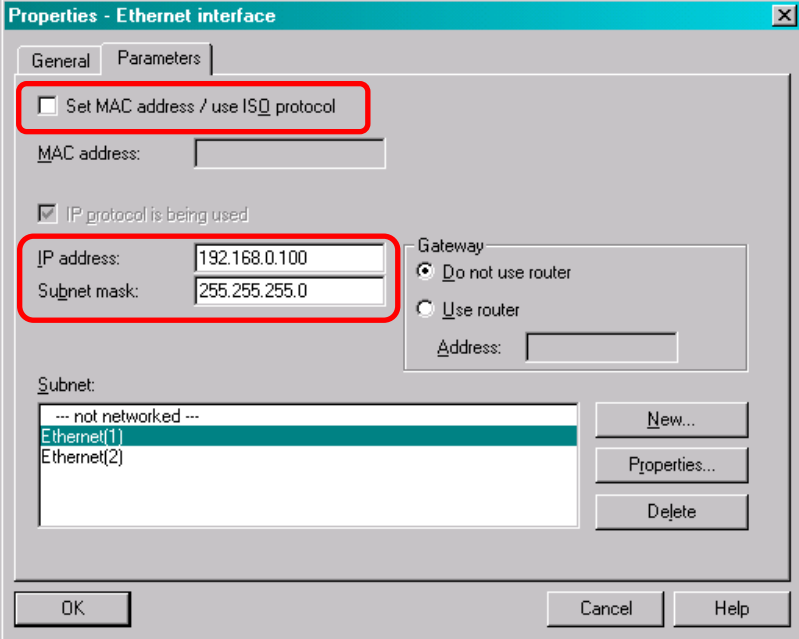

Copyright © Siemens AG 2012 All rights reserved

## 4 Configuration

### 4.1 HW Config of the SIMOTION controller

No.	Action
7.	<p>The device name of the onboard PROFINET interface (PnxIO) is <i>D455x2xDPxPNxOnboard</i>.</p> 
8.	<p>The device name of the optional PROFINET interface (CBE30x2xPNxIO) is <i>D455x2xDPxPNxCBE30x2</i>.</p> 



No.	Action
9.	<p>Open NetPro in order to set the interface of the engineering system.</p> <p>The yellow connection at the PG/PC station indicates that the engineering system can access SINAMICS Integrated via S7 routing. Routing tables are automatically generated when saving and compiling; these must then be saved in the device with a HW Config download.</p>  <p>Double-clicking the PG/PC interface opens their properties.</p>
10.	<p>Deactivate the <i>Set MAC address / use ISO protocol</i> check box because the SIMOTION controller does not support any ISO protocol.</p>  <p>Assign a free IP address for the engineering system, e.g.:</p> <p>IP address: 192.168.0.100 Subnet mask: 255.255.255.0</p>
11.	<p>Save and compile the HW Config.</p> 

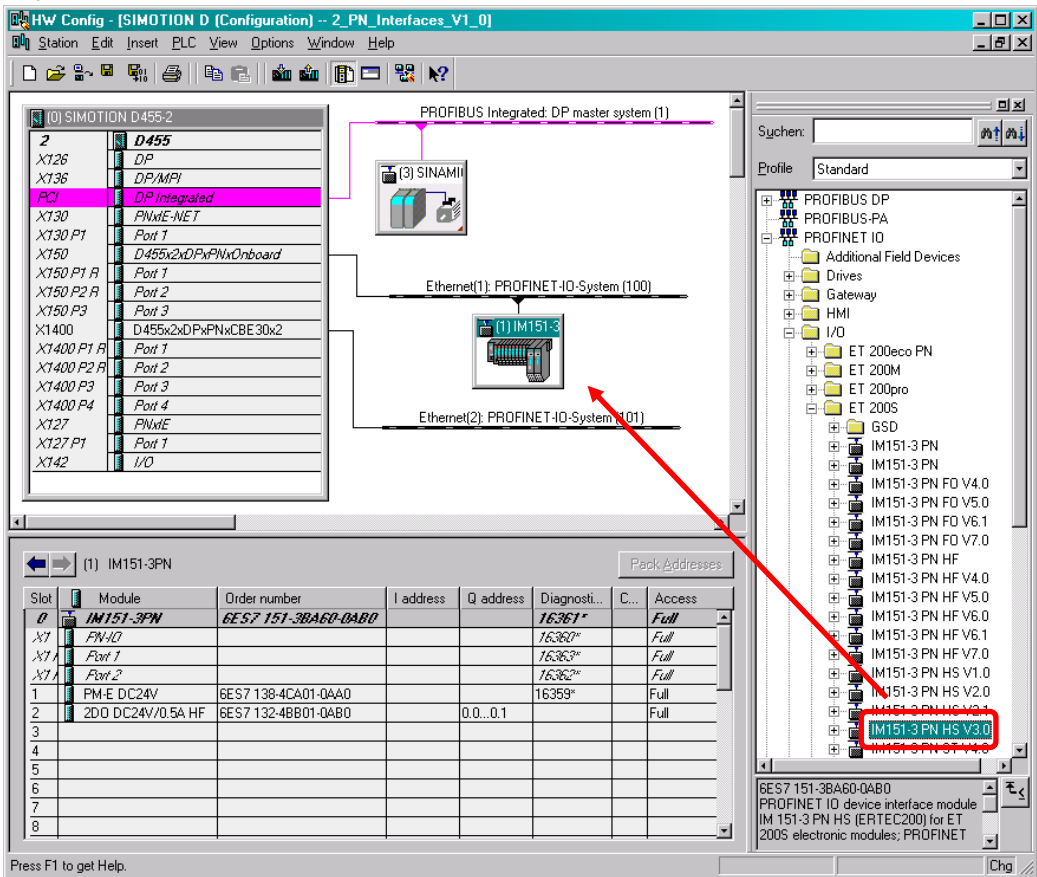
## 4 Configuration

### 4.2 HW Config of the distributed SIMATIC ET200 station

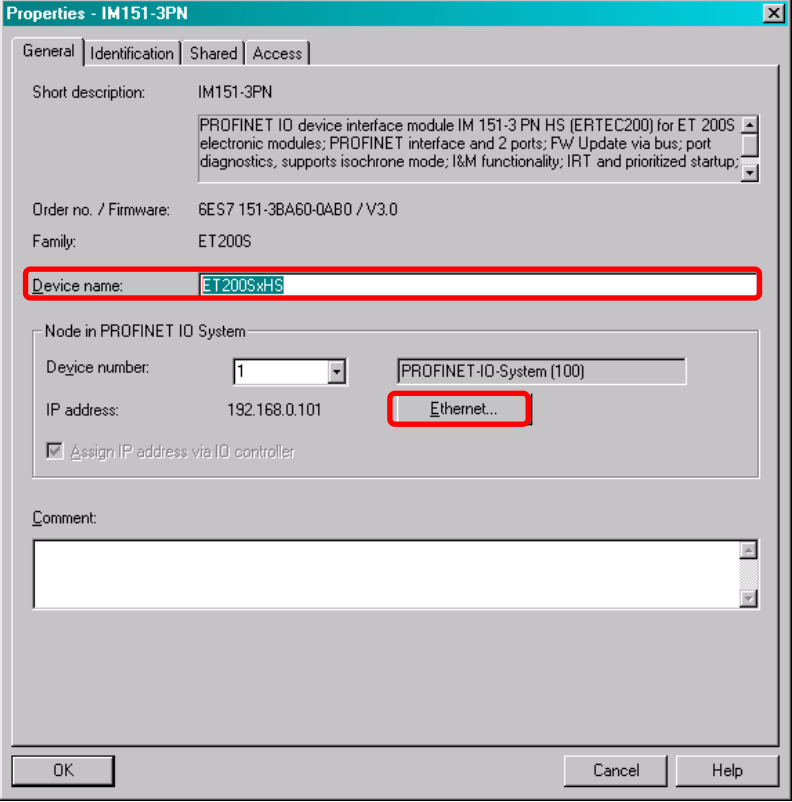
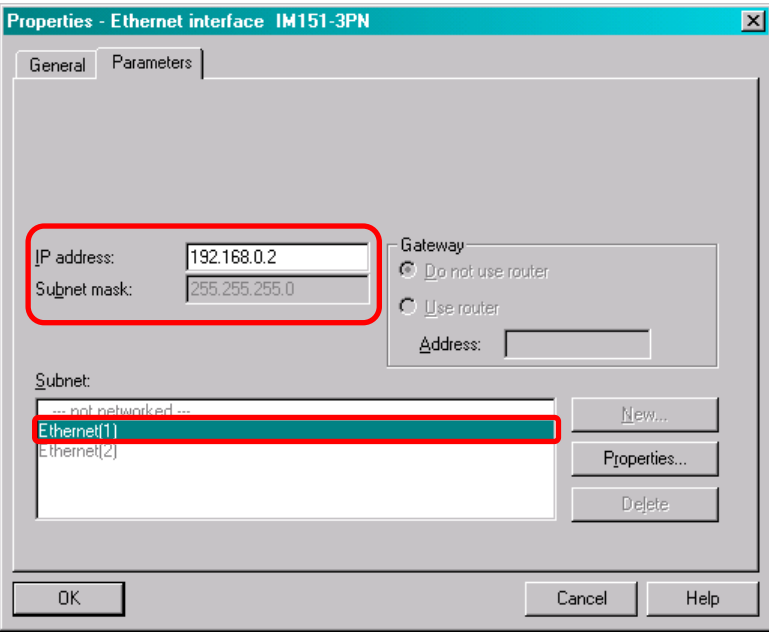
## 4.2 HW Config of the distributed SIMATIC ET200 station

The SIMOTION controller communicates via the onboard PROFINET interface with a SIMATIC ET200S High Speed that is configured as follows.

Table 4-2

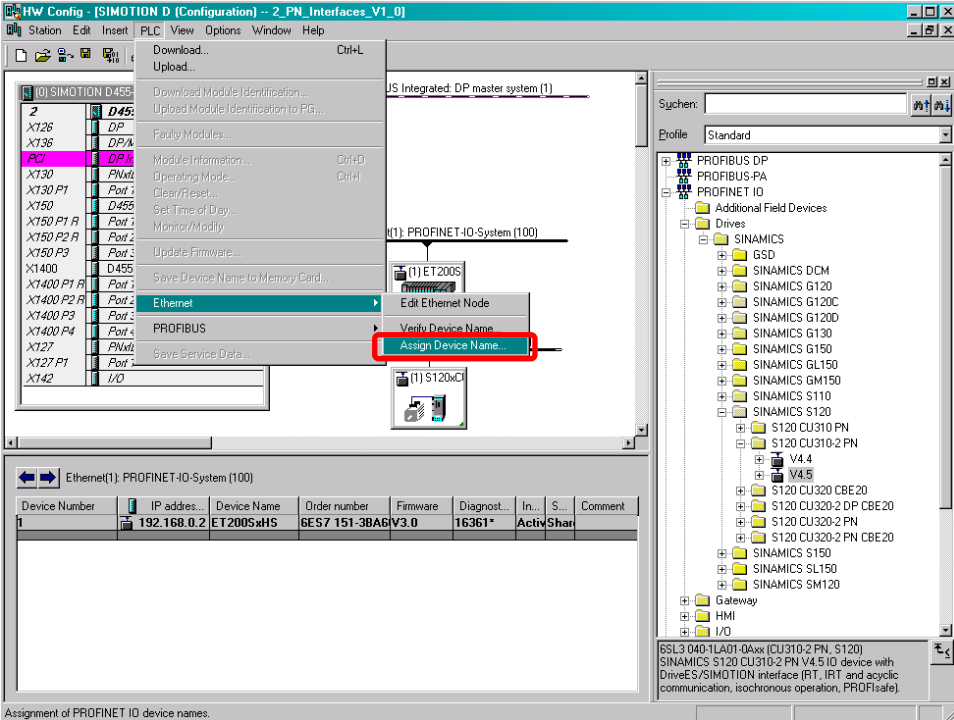
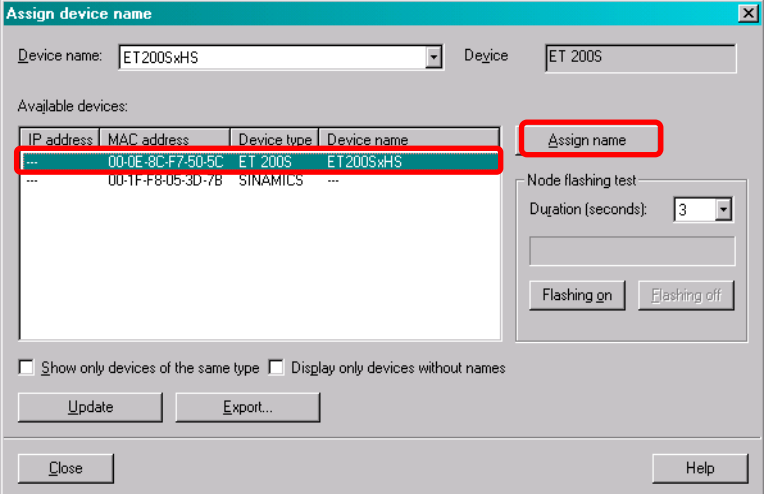

No.	Action																																																																																																								
1.	<p>Drag the required SIMATIC ET200 station from the hardware catalog to the <b>PROFINET IO system (100)</b>. The required electronic modules can be inserted in the detail window.</p> <p>An ET200S HS V3.0, a power module and a digital output module are used in the example project.</p>  <p>The screenshot shows the HW Config interface for a SIMOTION D455-2. On the left, a hardware rack is shown with modules: DP, DP/MP, DP Integrated, PNxI-NET, and four ports. A SINAMIDI motor is connected to the DP Integrated module. The rack is connected to two PROFINET IO systems via Ethernet ports. A red arrow points from the hardware catalog on the right to the rack configuration.</p> <table border="1"> <thead> <tr> <th>Slot</th> <th>Module</th> <th>Order number</th> <th>I address</th> <th>Q address</th> <th>Diagnosti...</th> <th>C...</th> <th>Access</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>IM151-3PN</td> <td>6ES7 151-3BA60-0AB0</td> <td></td> <td></td> <td>16361*</td> <td></td> <td>Full</td> </tr> <tr> <td>X7</td> <td>PNxI</td> <td></td> <td></td> <td></td> <td>16360*</td> <td></td> <td>Full</td> </tr> <tr> <td>X7A</td> <td>Port 1</td> <td></td> <td></td> <td></td> <td>16363*</td> <td></td> <td>Full</td> </tr> <tr> <td>X7B</td> <td>Port 2</td> <td></td> <td></td> <td></td> <td>16362*</td> <td></td> <td>Full</td> </tr> <tr> <td>1</td> <td>PM-E DC24V</td> <td>6ES7 138-4CA01-0AA0</td> <td></td> <td></td> <td>16359*</td> <td></td> <td>Full</td> </tr> <tr> <td>2</td> <td>2DO DC24V/0.5A HF</td> <td>6ES7 132-4BB01-0AB0</td> <td></td> <td>0.0...0.1</td> <td></td> <td></td> <td>Full</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Double-click the inserted ET200S station to adapt the device name and the IP address.</p>	Slot	Module	Order number	I address	Q address	Diagnosti...	C...	Access	0	IM151-3PN	6ES7 151-3BA60-0AB0			16361*		Full	X7	PNxI				16360*		Full	X7A	Port 1				16363*		Full	X7B	Port 2				16362*		Full	1	PM-E DC24V	6ES7 138-4CA01-0AA0			16359*		Full	2	2DO DC24V/0.5A HF	6ES7 132-4BB01-0AB0		0.0...0.1			Full	3								4								5								6								7								8							
Slot	Module	Order number	I address	Q address	Diagnosti...	C...	Access																																																																																																		
0	IM151-3PN	6ES7 151-3BA60-0AB0			16361*		Full																																																																																																		
X7	PNxI				16360*		Full																																																																																																		
X7A	Port 1				16363*		Full																																																																																																		
X7B	Port 2				16362*		Full																																																																																																		
1	PM-E DC24V	6ES7 138-4CA01-0AA0			16359*		Full																																																																																																		
2	2DO DC24V/0.5A HF	6ES7 132-4BB01-0AB0		0.0...0.1			Full																																																																																																		
3																																																																																																									
4																																																																																																									
5																																																																																																									
6																																																																																																									
7																																																																																																									
8																																																																																																									

4.2 HW Config of the distributed SIMATIC ET200 station

No.	Action
2.	<p>The device name of the ET200S station is <i>ET200SxHS</i>.</p>  <p>Assign an IP address and select the appropriate Ethernet subnet.</p> 

## 4 Configuration

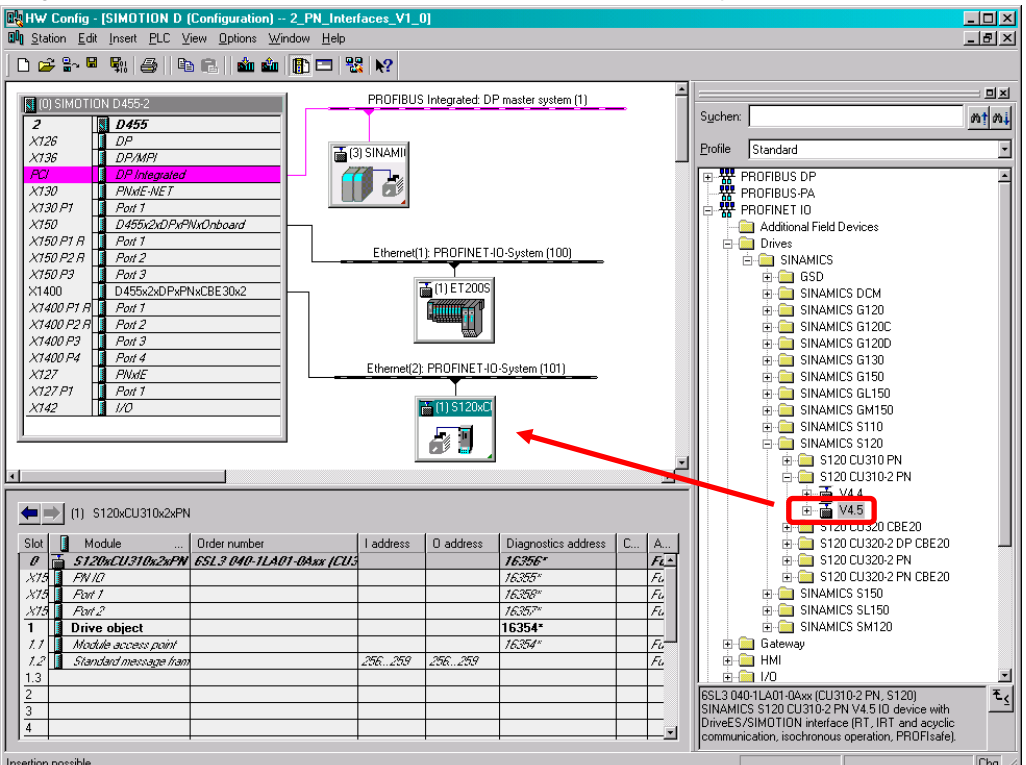
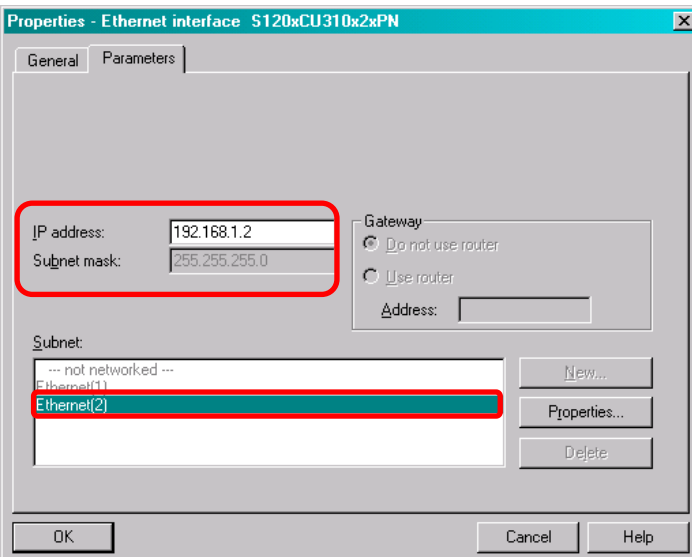
### 4.2 HW Config of the distributed SIMATIC ET200 station

No.	Action
3.	<p>The device name must then be assigned to the ET200S station. To do this, select the corresponding PROFINET IO system (100). Open the window for the name assignment via <i>PLC &gt; Ethernet &gt; Assign Device Name</i>.</p>  <p>Assignment of PROFINET IO device names.</p>
4.	<p>Select the ET200S station and click the <i>Assign name</i> button to assign the name configured in the HW Config.</p> 
5.	<p>Save and compile the HW Config.</p> 

### 4.3 HW Config of the distributed SINAMICS drive

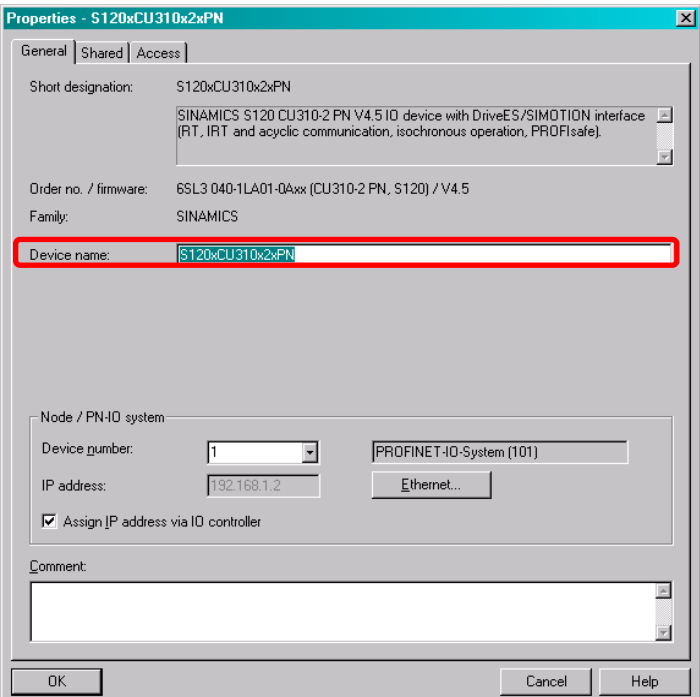
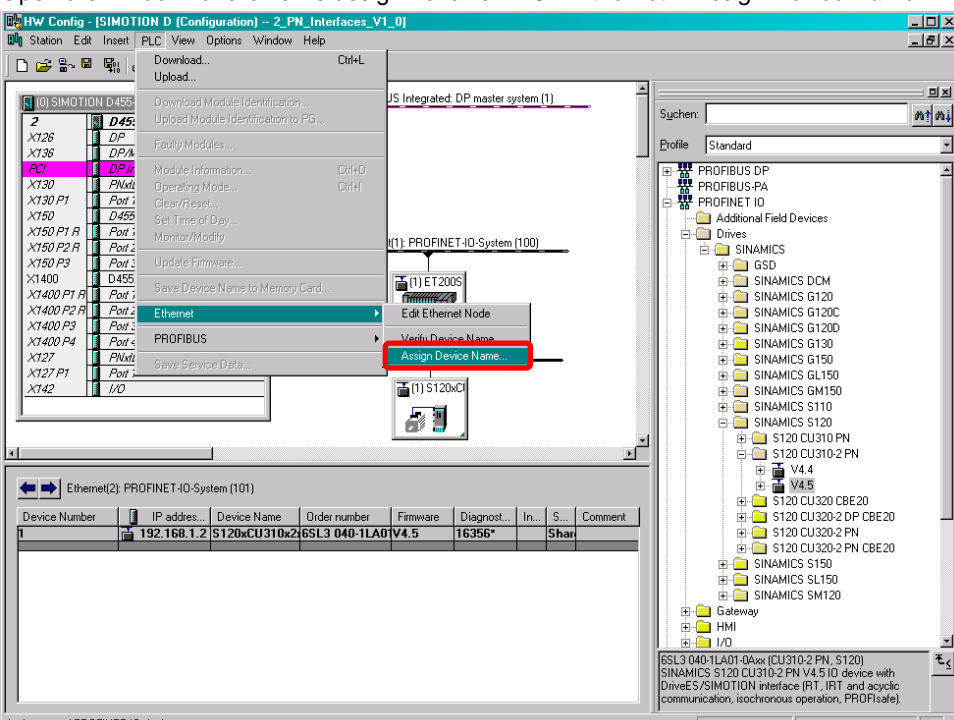
The SIMOTION controller communicates via the optional PROFINET interface CBE30-2 with a SINAMICS drive CU310-2 PN that is configured as follows.

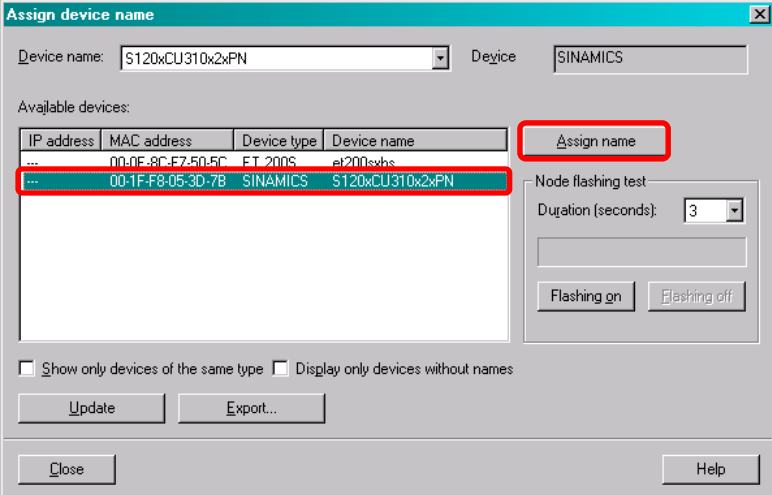

Table 4-3

No.	Action
6.	<p>Drag the SINAMICS drive CU310-2 PN V4.5 to the <b>PROFINET IO system (101)</b>.</p> 
7.	<p>Assign an IP address and select the appropriate Ethernet subnet.</p> 

## 4 Configuration

### 4.3 HW Config of the distributed SINAMICS drive

No.	Action
8.	<p>Double-click the SINAMICS drive to adapt its device name. The device name of the SINAMICS drive is <i>S120xCU310x2xPN</i>.</p> 
9.	<p>The device name must then be assigned to the SINAMICS drive. To do this, select the corresponding PROFINET IO system (101). Open the window for the name assignment via <i>PLC &gt; Ethernet &gt; Assign Device Name</i>.</p> 

No.	Action
10.	<p>Select the SINAMICS drive and click the <i>Assign name</i> button to assign the name configured in the HW Config.</p>  <p>The screenshot shows a dialog box titled "Assign device name". At the top, there is a "Device name" dropdown menu containing "S120xCU310x2xPN" and a "Device" dropdown menu containing "SINAMICS". Below this is a table of "Available devices" with columns for IP address, MAC address, Device type, and Device name. The row with MAC address "00-1F-F8-05-3D-7B", Device type "SINAMICS", and Device name "S120xCU310x2xPN" is highlighted with a red border. To the right of the table is a red-bordered button labeled "Assign name". Below the table are checkboxes for "Show only devices of the same type" and "Display only devices without names", and buttons for "Update" and "Export...". At the bottom are "Close" and "Help" buttons. On the right side of the dialog, there is a "Node flashing test" section with a "Duration (seconds)" dropdown set to "3" and "Flashing on" and "Flashing off" buttons.</p>
11.	<p>Save and compile the HW Config.</p> 

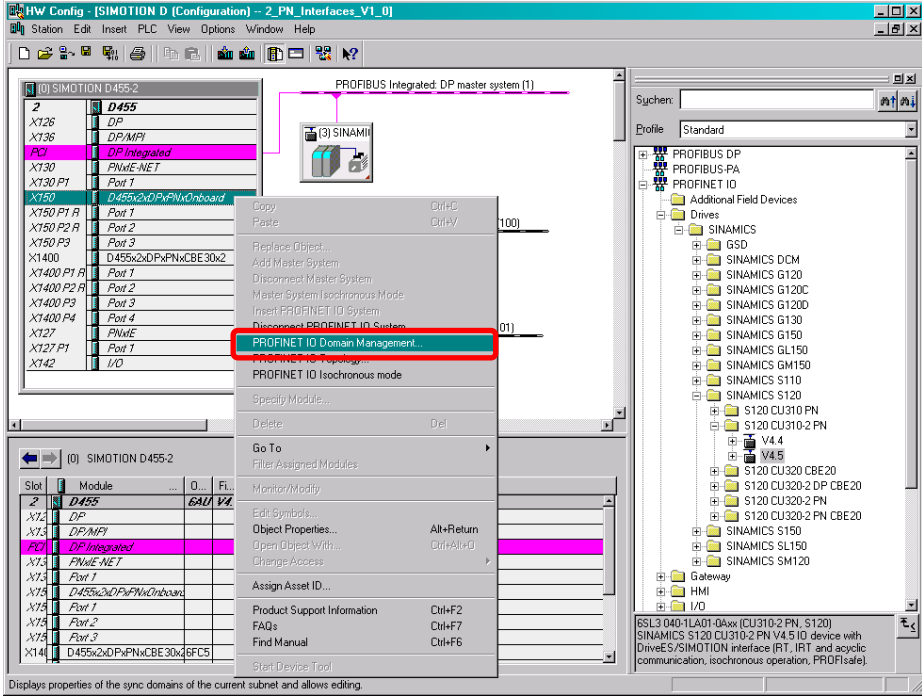
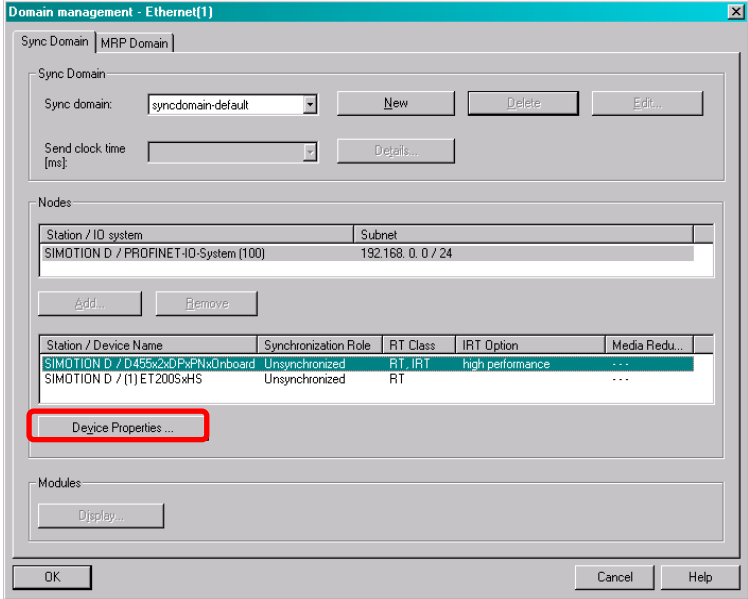
## 4 Configuration

### 4.4 Configuring the isochronous communication

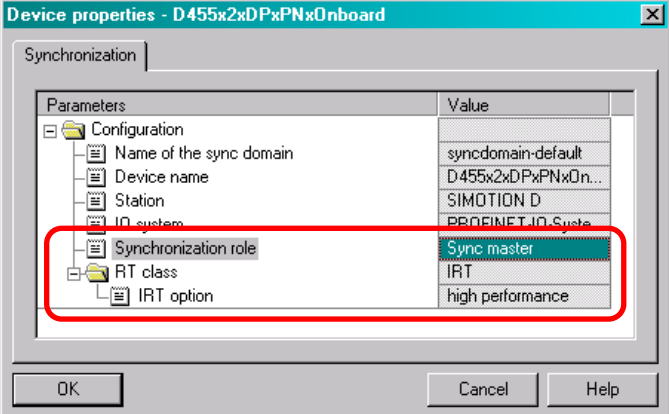
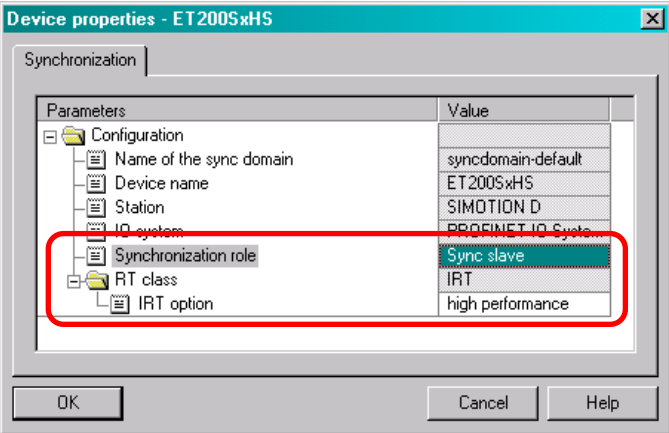
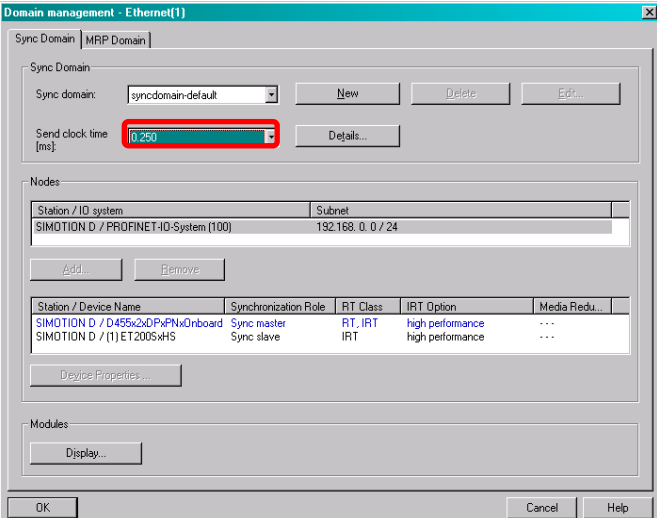
#### 4.4 Configuring the isochronous communication

To communicate isochronously, PROFINET IRT must be activated. For this purpose, the PN interfaces must be synchronized, the PROFINET topology configured and the IRT devices assigned the appropriate isochronous tasks.

Table 4-4

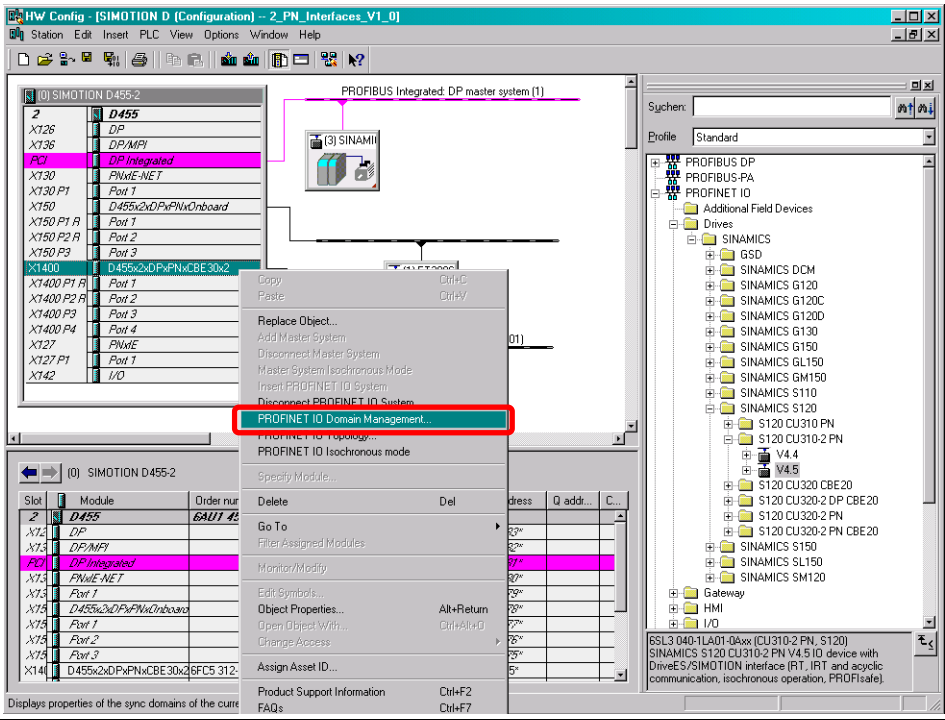
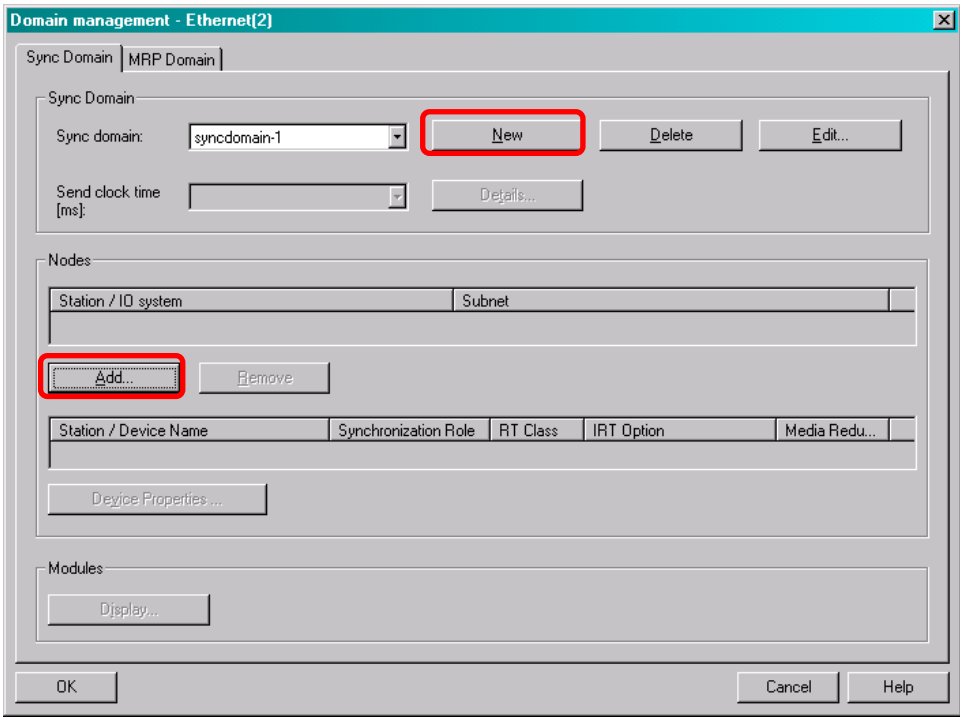
No.	Action																			
12.	<p>Open the <i>PROFINET IO Domain Management</i> in the context menu of the onboard PROFINET interface (X150) on the SIMOTION controller.</p>  <p>The screenshot shows the HW Config interface for SIMOTION D. The hardware rack is visible on the left, with the X150 module (D455x2DPxPNxOnboard) selected. A context menu is open over this module, and the 'PROFINET IO Domain Management...' option is highlighted with a red rectangular box. The background shows a network diagram with a SINAMICS drive connected to the PROFINET network.</p>																			
13.	<p>Select the SIMOTION controller respectively the ET200S station and open their properties.</p>  <p>The screenshot shows the 'Domain management - Ethernet(1)' dialog box. The 'Nodes' table contains the following data:</p> <table border="1" data-bbox="351 1668 1029 1742"> <thead> <tr> <th>Station / IO system</th> <th>Subnet</th> </tr> </thead> <tbody> <tr> <td>SIMOTION D / PROFINET-IO-System (100)</td> <td>192.168. 0. 0 / 24</td> </tr> </tbody> </table> <table border="1" data-bbox="351 1758 1029 1825"> <thead> <tr> <th>Station / Device Name</th> <th>Synchronization Role</th> <th>RT Class</th> <th>IRT Option</th> <th>Media Redu...</th> </tr> </thead> <tbody> <tr> <td>SIMOTION D / D455x2DPxPNxOnboard</td> <td>Unsynchronized</td> <td>RT_IRT</td> <td>high performance</td> <td>...</td> </tr> <tr> <td>SIMOTION D / (1) ET200SxHS</td> <td>Unsynchronized</td> <td>RT</td> <td></td> <td></td> </tr> </tbody> </table> <p>The 'Device Properties ...' button for the SIMOTION D / D455x2DPxPNxOnboard entry is highlighted with a red rectangular box.</p>	Station / IO system	Subnet	SIMOTION D / PROFINET-IO-System (100)	192.168. 0. 0 / 24	Station / Device Name	Synchronization Role	RT Class	IRT Option	Media Redu...	SIMOTION D / D455x2DPxPNxOnboard	Unsynchronized	RT_IRT	high performance	...	SIMOTION D / (1) ET200SxHS	Unsynchronized	RT		
Station / IO system	Subnet																			
SIMOTION D / PROFINET-IO-System (100)	192.168. 0. 0 / 24																			
Station / Device Name	Synchronization Role	RT Class	IRT Option	Media Redu...																
SIMOTION D / D455x2DPxPNxOnboard	Unsynchronized	RT_IRT	high performance	...																
SIMOTION D / (1) ET200SxHS	Unsynchronized	RT																		

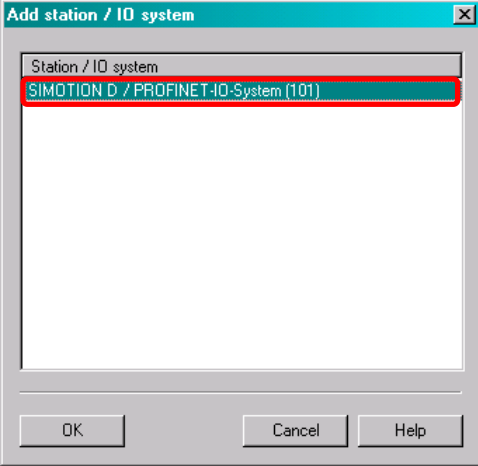
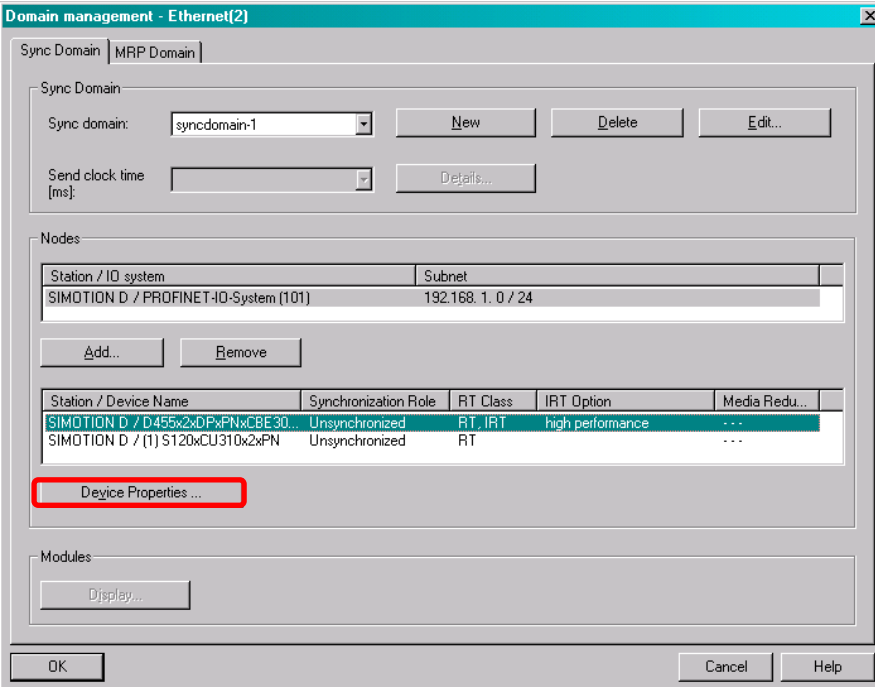


No.	Action
14.	<p>Set the <i>Sync master</i> option as synchronization role for the SIMOTION controller. Only one sync master is permitted in each PROFINET network.</p> 
15.	<p>The ET200S station is parameterized as <i>Sync slave</i>. A sync slave synchronizes itself to the associated sync master in the PROFINET network. Ensure that <i>high performance</i> is selected for the IRT options!</p> 
16.	<p>The ET200S station is to be assigned to the <i>Servo<sub>Fast</sub></i> isochronous task later. To do this, set the send cycle clock of the onboard PROFINET interface to 0.250 ms.</p> 

## 4 Configuration

### 4.4 Configuring the isochronous communication

No.	Action
17.	<p>Then open the <i>PROFINET IO Domain Management</i> in the context menu of the optional PROFINET interface CBE30-2 (X1400) on the SIMOTION controller.</p> 
18.	<p>Insert a new sync domain via the <i>New</i> button. A separate sync domain must be used for each PROFINET interface on the SIMOTION controller. The names of the domains must be unique!</p>  <p>The sync domain can be assigned a PROFINET IO system via the <i>Add</i> button.</p>

No.	Action																			
19.	<p>Assign the <i>PROFINET IO system (101)</i> to the newly created sync domain.</p> 																			
20.	<p>Then select the SIMOTION controller respectively the SINAMICS drive and open their properties.</p>  <table border="1" data-bbox="359 1131 1157 1198"> <thead> <tr> <th>Station / IO system</th> <th>Subnet</th> </tr> </thead> <tbody> <tr> <td>SIMOTION D / PROFINET-IO-System (101)</td> <td>192.168. 1. 0 / 24</td> </tr> </tbody> </table> <table border="1" data-bbox="359 1265 1157 1344"> <thead> <tr> <th>Station / Device Name</th> <th>Synchronization Role</th> <th>RT Class</th> <th>IRT Option</th> <th>Media Redu...</th> </tr> </thead> <tbody> <tr> <td>SIMOTION D / D455x2xDPxPNxCBE30...</td> <td>Unsynchronized</td> <td>RT, IRT</td> <td>high performance</td> <td>...</td> </tr> <tr> <td>SIMOTION D / (1) S120xCU310x2xPN</td> <td>Unsynchronized</td> <td>RT</td> <td></td> <td>...</td> </tr> </tbody> </table>	Station / IO system	Subnet	SIMOTION D / PROFINET-IO-System (101)	192.168. 1. 0 / 24	Station / Device Name	Synchronization Role	RT Class	IRT Option	Media Redu...	SIMOTION D / D455x2xDPxPNxCBE30...	Unsynchronized	RT, IRT	high performance	...	SIMOTION D / (1) S120xCU310x2xPN	Unsynchronized	RT		...
Station / IO system	Subnet																			
SIMOTION D / PROFINET-IO-System (101)	192.168. 1. 0 / 24																			
Station / Device Name	Synchronization Role	RT Class	IRT Option	Media Redu...																
SIMOTION D / D455x2xDPxPNxCBE30...	Unsynchronized	RT, IRT	high performance	...																
SIMOTION D / (1) S120xCU310x2xPN	Unsynchronized	RT		...																
21.	<p>Set the <i>Sync master</i> option as synchronization role for the SIMOTION controller. Only one sync master is permitted in each PROFINET network.</p> <p>The SINAMICS drive is parameterized as <i>Sync slave</i>. A sync slave synchronizes itself to the associated sync master in the PROFINET network.</p> <p>Ensure that <i>high performance</i> is selected for the IRT options!</p>																			

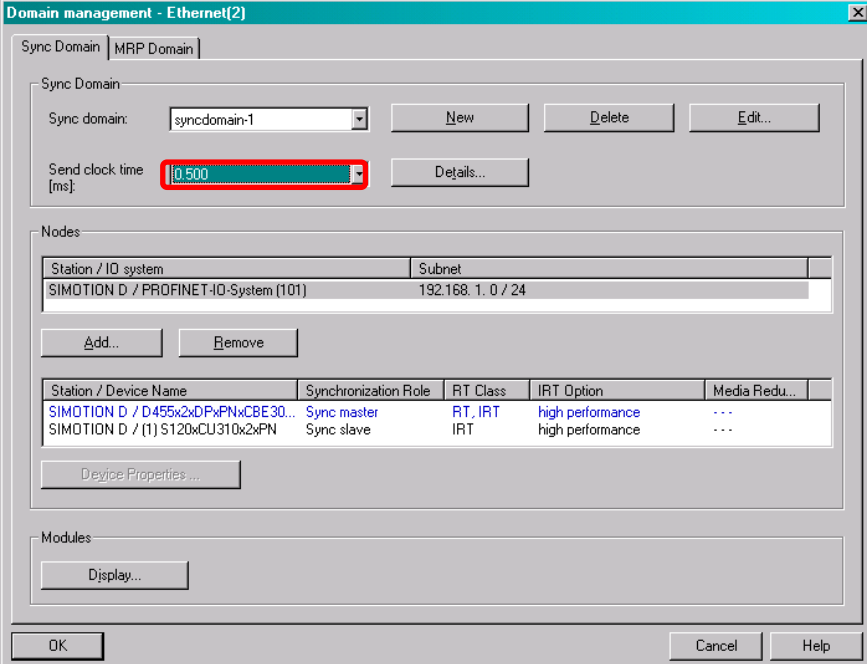
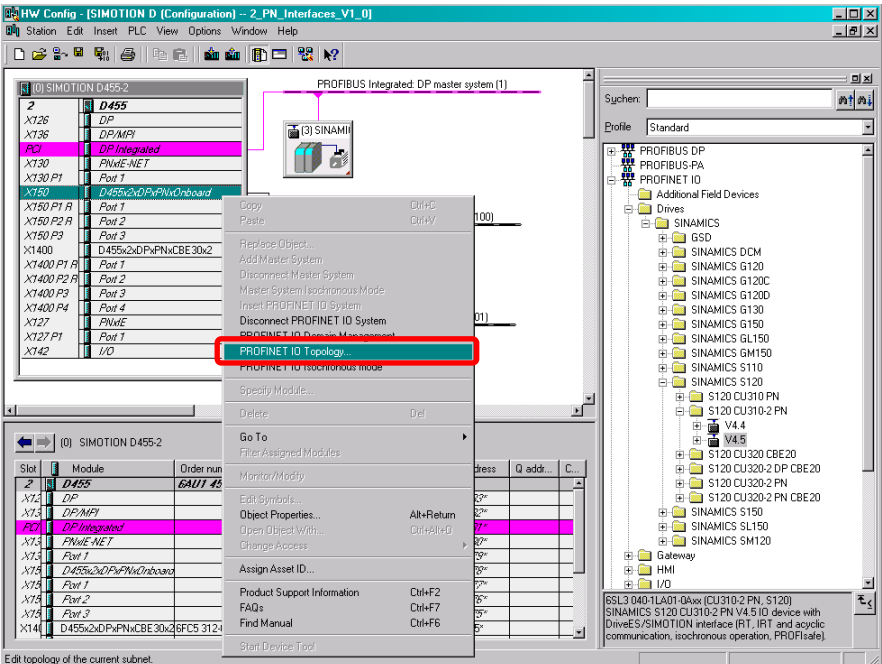
**Note**

IRT "high flexibility" cannot be used for isochronous applications. Further information can be found at the following link:

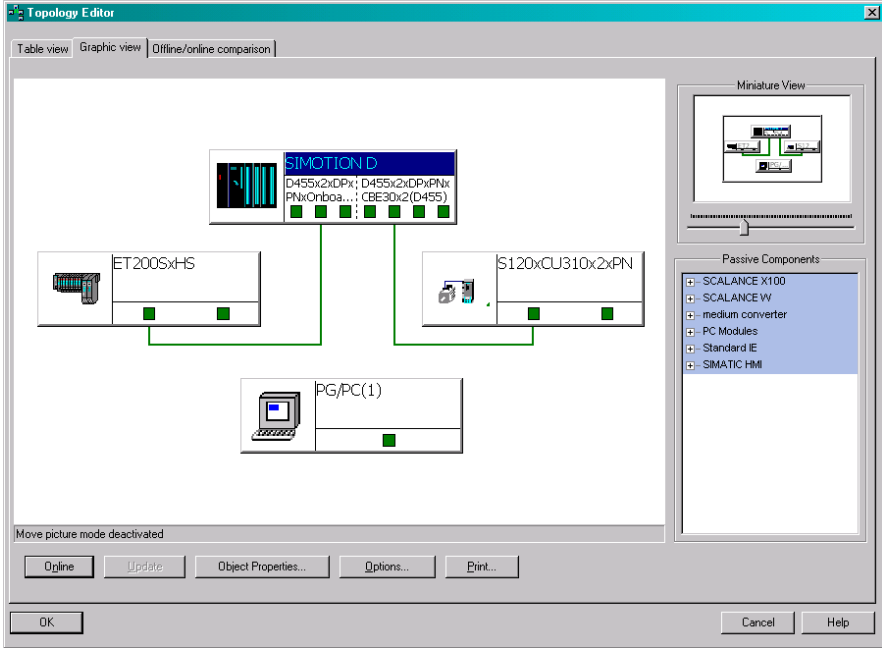
[RT classes for PROFINET IO](#)

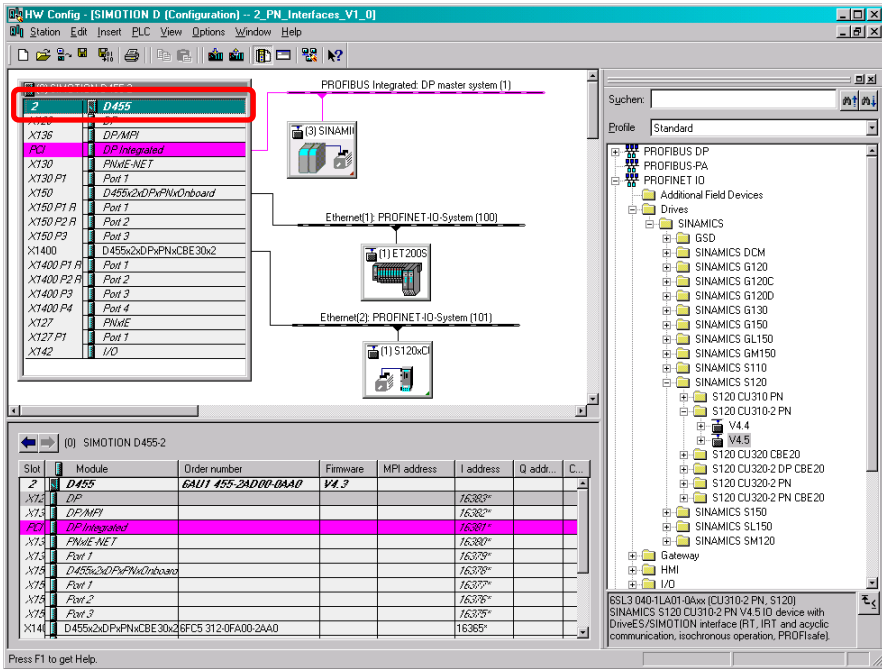
## 4 Configuration

### 4.4 Configuring the isochronous communication

No.	Action
22.	<p>The SINAMICS drive is to be assigned to the <i>ServoFast</i> isochronous task later. To do this, set the send cycle clock of the optional PROFINET interface CBE30-2 to 0.500 ms.</p>  <p><b>Note</b> The send cycle clock of the optional PROFINET interface CBE30-2 must be 2, 4, 8 or 16-times the send cycle clock of the onboard PROFINET interface. The following applies: <math>Servo \text{ send cycle clock} = 2, 4, 8 \text{ or } 16 \times Servo_{Fast} \text{ send cycle clock}</math></p>
23.	<p>The topology must be configured for PROFINET IRT. Open the <i>PROFINET IO Topology</i> in the context menu of one of the two PROFINET interfaces on the SIMOTION controller.</p> 

4.4 Configuring the isochronous communication

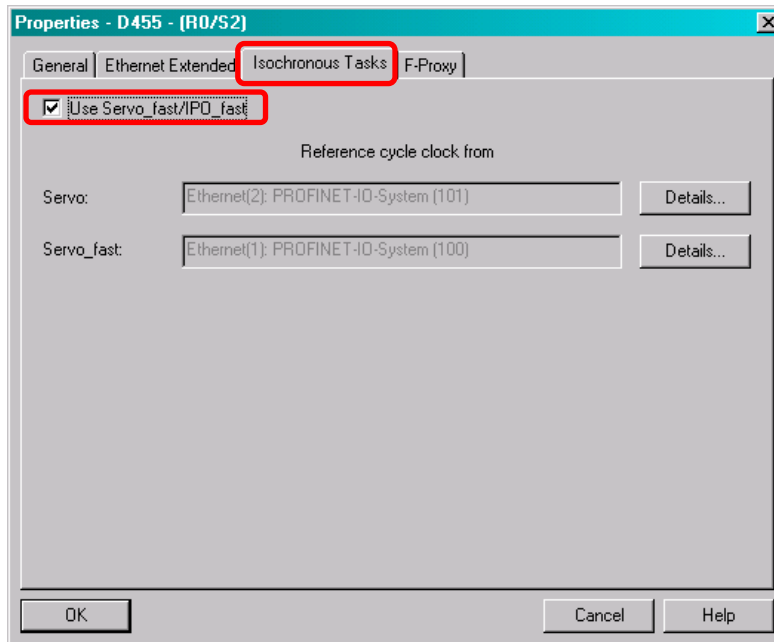
No.	Action
24.	<p>For example, Port 2 of the onboard PROFINET interface on the SIMOTION controller is connected to Port 1 of the ET200S station.</p> <p>Additionally, Port 2 of the optional PROFINET interface CBE30-2 is connected to Port 1 of the SINAMICS drive.</p> <p>Create the connections in the graphic view of the Topology Editor.</p> 

25.	<p>In order to be able to assign the <i>ServoFast</i> isochronous task to the ET200S station, the task must first be activated in the properties of the SIMOTION controller.</p>  <table border="1" data-bbox="327 1646 917 1870"> <thead> <tr> <th>Slot</th> <th>Module</th> <th>Order number</th> <th>Firmware</th> <th>MPI address</th> <th>I address</th> <th>Q addr...</th> <th>C...</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>D455</td> <td>6AUT 455-2AD00-0BA0</td> <td>V4.3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>X74</td> <td>DP</td> <td></td> <td></td> <td></td> <td>16382*</td> <td></td> <td></td> </tr> <tr> <td>X73</td> <td>DP-MPI</td> <td></td> <td></td> <td></td> <td>16382*</td> <td></td> <td></td> </tr> <tr> <td>PO</td> <td>DP-Integrated</td> <td></td> <td></td> <td></td> <td>16381*</td> <td></td> <td></td> </tr> <tr> <td>X73</td> <td>PNxI-NET</td> <td></td> <td></td> <td></td> <td>16380*</td> <td></td> <td></td> </tr> <tr> <td>X74</td> <td>Port 1</td> <td></td> <td></td> <td></td> <td>16379*</td> <td></td> <td></td> </tr> <tr> <td>X7A</td> <td>D455x2xDPxPNxOnboard</td> <td></td> <td></td> <td></td> <td>16378*</td> <td></td> <td></td> </tr> <tr> <td>X7A</td> <td>Port 1</td> <td></td> <td></td> <td></td> <td>16377*</td> <td></td> <td></td> </tr> <tr> <td>X7B</td> <td>Port 2</td> <td></td> <td></td> <td></td> <td>16376*</td> <td></td> <td></td> </tr> <tr> <td>X7C</td> <td>Port 3</td> <td></td> <td></td> <td></td> <td>16375*</td> <td></td> <td></td> </tr> <tr> <td>X14</td> <td>D455x2xDPxPNxCBE30x2FC5.312.0FA00.2AA0</td> <td></td> <td></td> <td></td> <td>16365*</td> <td></td> <td></td> </tr> </tbody> </table> <p>Double-click the SIMOTION controller to open the properties.</p>	Slot	Module	Order number	Firmware	MPI address	I address	Q addr...	C...	2	D455	6AUT 455-2AD00-0BA0	V4.3					X74	DP				16382*			X73	DP-MPI				16382*			PO	DP-Integrated				16381*			X73	PNxI-NET				16380*			X74	Port 1				16379*			X7A	D455x2xDPxPNxOnboard				16378*			X7A	Port 1				16377*			X7B	Port 2				16376*			X7C	Port 3				16375*			X14	D455x2xDPxPNxCBE30x2FC5.312.0FA00.2AA0				16365*		
Slot	Module	Order number	Firmware	MPI address	I address	Q addr...	C...																																																																																										
2	D455	6AUT 455-2AD00-0BA0	V4.3																																																																																														
X74	DP				16382*																																																																																												
X73	DP-MPI				16382*																																																																																												
PO	DP-Integrated				16381*																																																																																												
X73	PNxI-NET				16380*																																																																																												
X74	Port 1				16379*																																																																																												
X7A	D455x2xDPxPNxOnboard				16378*																																																																																												
X7A	Port 1				16377*																																																																																												
X7B	Port 2				16376*																																																																																												
X7C	Port 3				16375*																																																																																												
X14	D455x2xDPxPNxCBE30x2FC5.312.0FA00.2AA0				16365*																																																																																												

## 4 Configuration

### 4.4 Configuring the isochronous communication

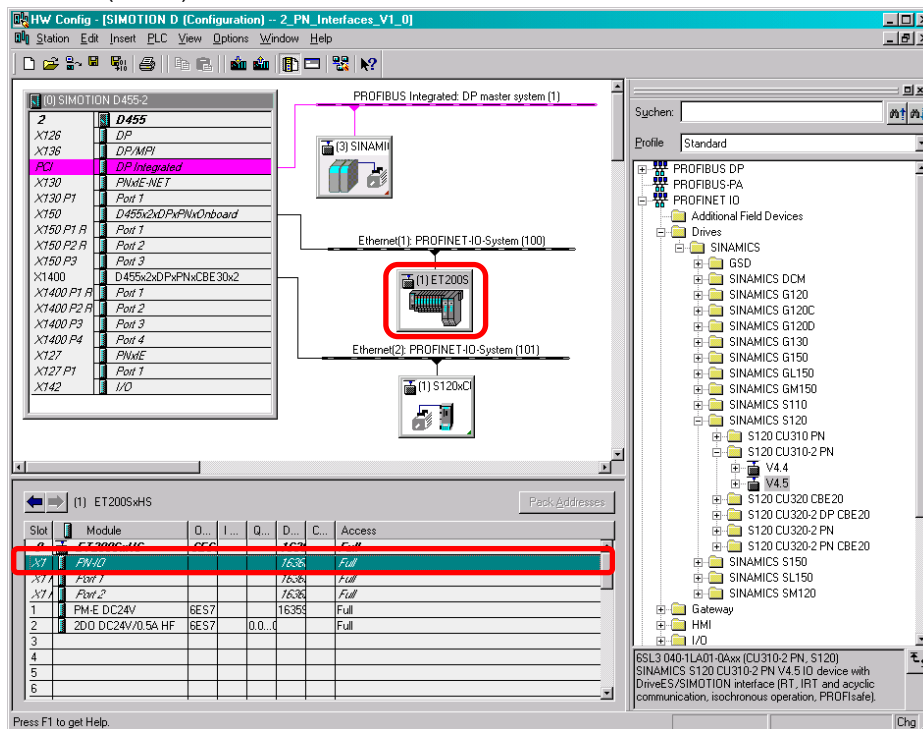
- No.** **Action**
26. Switch to the *Isochronous Tasks* tab. The Servo<sub>Fast</sub> isochronous task is activated via the *Use Servo\_fast/IPO\_fast* checkbox.



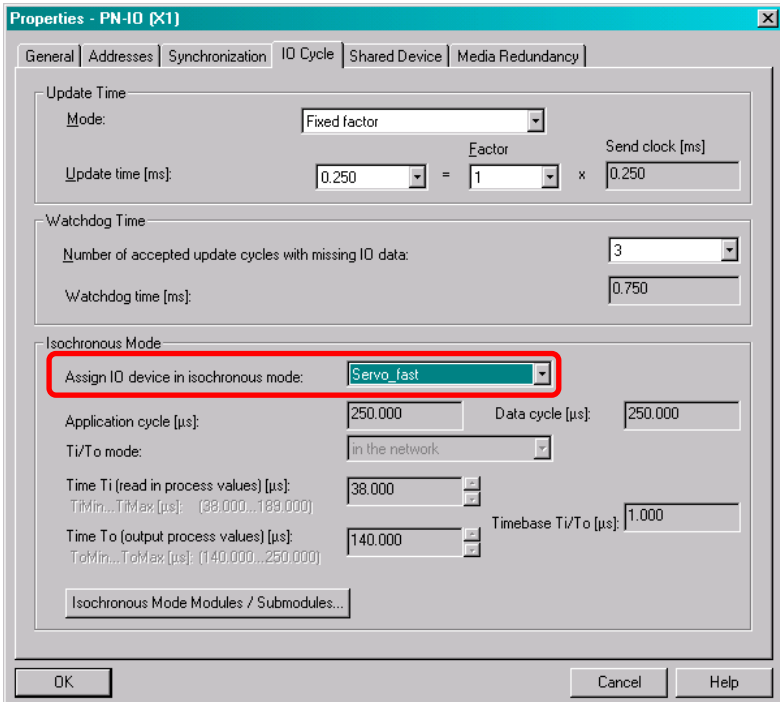
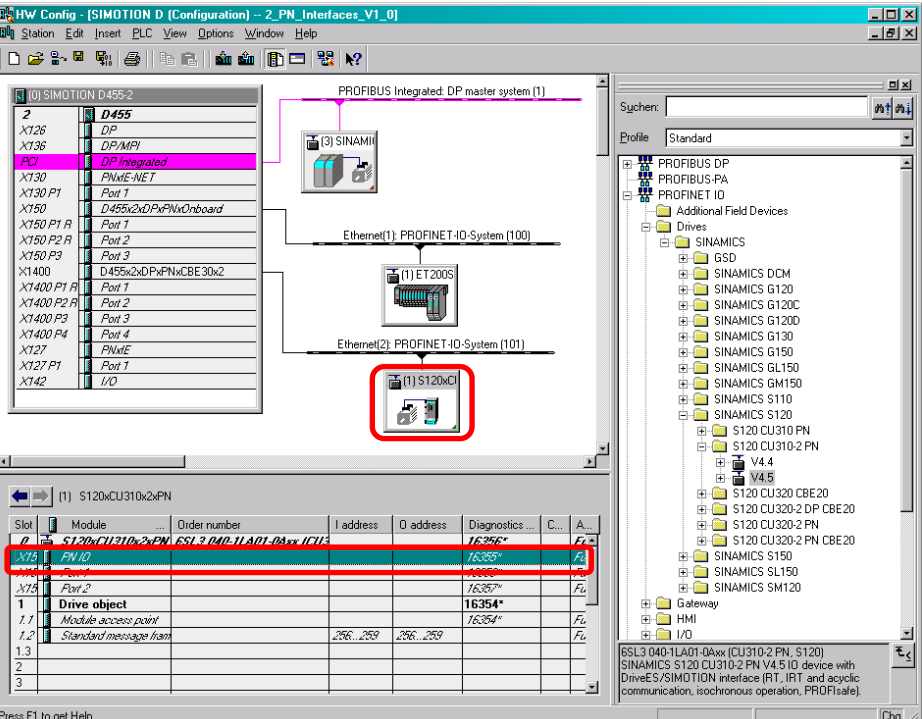
#### Note

The Servo<sub>Fast</sub> isochronous task can only be used in conjunction with the onboard PROFINET interface (X150).

27. To operate the ET200S station isochronously, select it and open the properties of the PROFINET interface (PN-IO).



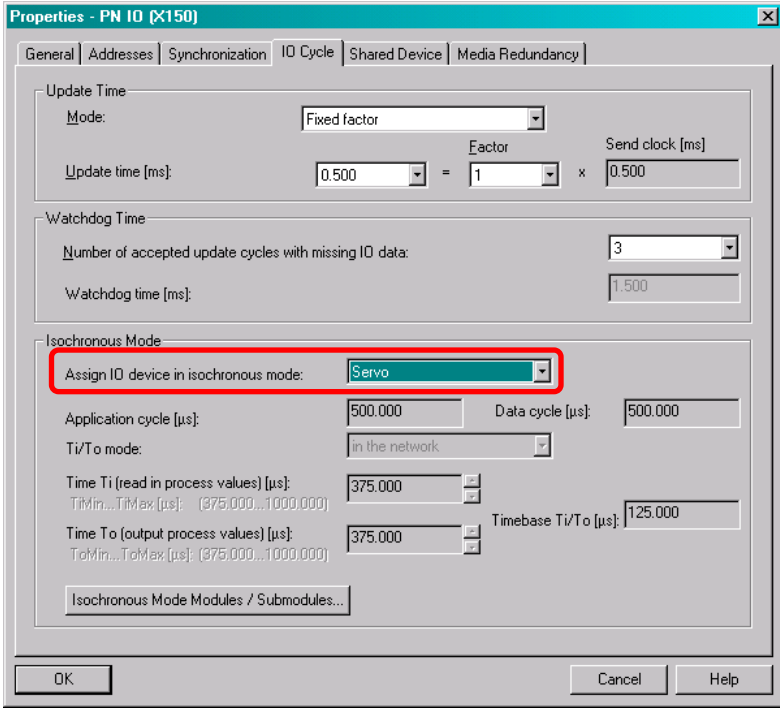
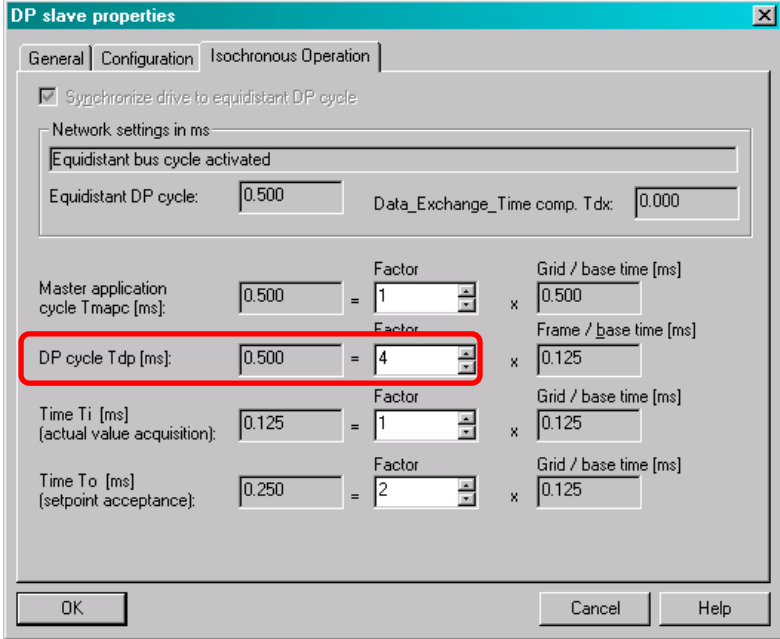
4.4 Configuring the isochronous communication

No.	Action																																																																								
28.	<p>Switch to the <i>IO Cycle</i> tab and select <i>Servo_fast</i> as isochronous execution level for the ET200S station.</p> 																																																																								
29.	<p>To operate the SINAMICS drive isochronously, select it and open the properties of the PROFINET interface (PN IO).</p>  <table border="1" data-bbox="327 1713 933 1870"> <thead> <tr> <th>Slot</th> <th>Module</th> <th>Order number</th> <th>I address</th> <th>Q address</th> <th>Diagnostics ...</th> <th>C...</th> <th>A...</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>S120x CU310-2 PN ES1-3 040-1LA01-0Axx ICIUS</td> <td></td> <td></td> <td></td> <td>16356*</td> <td>Fz</td> <td></td> </tr> <tr> <td>X75</td> <td>PN IO</td> <td></td> <td></td> <td></td> <td>16357*</td> <td>Fz</td> <td></td> </tr> <tr> <td>X75</td> <td>Port 2</td> <td></td> <td></td> <td></td> <td>16358*</td> <td>Fz</td> <td></td> </tr> <tr> <td>1</td> <td>Drive object</td> <td></td> <td></td> <td></td> <td>16354*</td> <td>Fz</td> <td></td> </tr> <tr> <td>1.1</td> <td>Module access point</td> <td></td> <td></td> <td></td> <td></td> <td>Fz</td> <td></td> </tr> <tr> <td>1.2</td> <td>Standard message frame</td> <td>286... 269</td> <td>286... 269</td> <td></td> <td></td> <td>Fz</td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Fz</td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Fz</td> <td></td> </tr> </tbody> </table>	Slot	Module	Order number	I address	Q address	Diagnostics ...	C...	A...	7	S120x CU310-2 PN ES1-3 040-1LA01-0Axx ICIUS				16356*	Fz		X75	PN IO				16357*	Fz		X75	Port 2				16358*	Fz		1	Drive object				16354*	Fz		1.1	Module access point					Fz		1.2	Standard message frame	286... 269	286... 269			Fz		2						Fz		3						Fz	
Slot	Module	Order number	I address	Q address	Diagnostics ...	C...	A...																																																																		
7	S120x CU310-2 PN ES1-3 040-1LA01-0Axx ICIUS				16356*	Fz																																																																			
X75	PN IO				16357*	Fz																																																																			
X75	Port 2				16358*	Fz																																																																			
1	Drive object				16354*	Fz																																																																			
1.1	Module access point					Fz																																																																			
1.2	Standard message frame	286... 269	286... 269			Fz																																																																			
2						Fz																																																																			
3						Fz																																																																			

Copyright © Siemens AG 2012 All rights reserved



## 4 Configuration

### 4.4 Configuring the isochronous communication

No.	Action
30.	<p>Switch to the <i>IO Cycle</i> tab and select <i>Servo</i> as isochronous execution level for the SINAMICS drive.</p> 
31.	<p>When using PROFINET IRT, the PROFIBUS send cycle clock of the SINAMICS_Integrated of the SIMOTION controller must be the same as the <i>Servo</i> send cycle clock. Double-click the SINAMICS_Integrated to open its properties and switch to the <i>Isochronous Operation</i> tab. The servo send cycle clock is 0.500 ms. Adjust the PROFIBUS send cycle clock accordingly.</p> 



## 4.4 Configuring the isochronous communication

No.	Action
32.	Save and compile the HW Config. 
33.	Download the SIMOTION controller configuration to the respective device. The SIMOTION controller is now fully configured. 

## 5 Contact

Siemens AG  
Industry Sector  
I DT MC PMA APC  
Frauenauracher Strasse 80  
D - 91056 Erlangen, Germany  
E-mail: [profinet.team.motioncontrol.i-dt@siemens.com](mailto:profinet.team.motioncontrol.i-dt@siemens.com)

## 6 History

Tabelle 6-1

Version	Date	Change
V1.0	07/2012	First edition