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Connecting a distributed I/O to SIMATIC TDC with PROFINET RT and IRT

SIMATIC TDC

https://support.industry.siemens.com/cs/ww/en/109480071

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Table of Contents

1 Task

Introduction

SIMATIC TDC is a multi-processor automation system, which is used especially for large plants in process, energy and drive technology.

SIMATIC TDC solves complex drive, control and technology tasks with highest quantity frameworks and shortest cycle times on a single platform. In the current version, SIMATIC TDC can now also communicate with the distributed I/O via PROFINET RT and IRT.

Description of the automation task

A distributed I/O station ET 200SP shall be connected to a SIMATIC TDC station commissioned with PROFINET RT as well as PROFINET IRT.

The ET 200SP station is operated here as IO device at the SIMATIC TDC station as IO controller. Since SIMATIC TDC is used especially in control engineering applications, a PROFINET RT connection as well as an isochronous communication via PROFINET IRT is configured between controller and I/O station including data transmission of defined time.

This enables exchanging data synchronized between the devices. This equidistant cycle enables synchronizing the devices as well as isochronous operation of their applications.

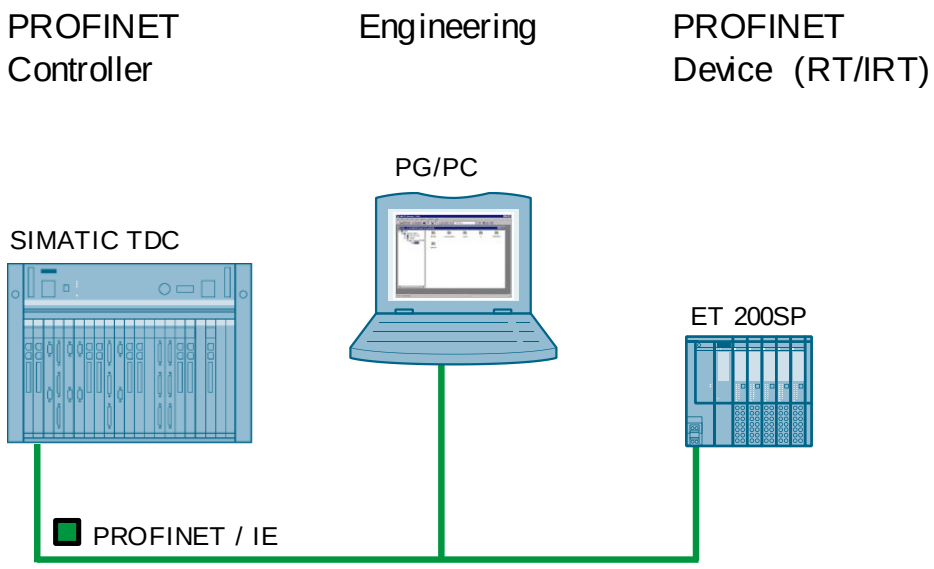
2 Solution

2.1 Overview

Schematic layout

The figure below shows a schematic overview of the most important components of the solution:

Figure 2-1



Description of the process

The SIMATIC TDC controller as PN-IO controller reads the inputs of a digital input card of the ET 200SP station and prepares it for further use in the user program. This is realized on the one hand, via PROFINET RT, and on the other hand, equidistant with PROFINET IRT using an isochronous task of the TDC controller.

Advantages

The solution presented here, offers you the following advantages

- Synchronized data exchange between SIMATIC TDC controller and distributed I/O due to isochronous communication (PROFINET IRT)
- Simple setup due to standardized technology
- Existing system quickly and easily extendible

Delimitation

This application does not include a description of:

- SIMATIC TDC system in general
- D7-SYS software package and its handling

Basic knowledge of these topics is assumed.

Assumed knowledge

Basic knowledge of the configuration of SIMATIC TDC controllers with the STEP 7 V5.5 engineering system and creating user programs in form of CFC charts with D7-SYS is assumed.

2.2 Hardware and software components

2.2.1 Validity

This application is valid for

- STEP 7 5.5 SP4
- SIMATIC TDC
- D7-SYS 8.1

2.2.2 Components used

The application was created with the following components:

Hardware components

Table 2-1

Component	Qty	MLFB / article number
Module rack UR6021	1	6DD1682-0CH3
TDC CPU555	1	6DD1600-0BB0
ET 200SP interface module IM155-6PN HF	1	6ES7155-6AU00-0CN0
Digital input module DI8 x 24VDC HS CNT	1	6ES7131-6BF00-0DA0
Server module ET 200SP	1	6ES7193-6PA00-0AA0

Note The example project was created and tested with the following hardware components: alternatively, other functionally equal components can also be used. If may require a different configuration and different wiring of the components.

Software components

Table 2-2

Component	Qty	Article number	Note
STEP 7	1	6ES7810-4CC10-0YA7	V5.5 + SP4 + HF6
D7-SYS	1	6ES7852-0CC04-0YA5	V8.1

Example files and projects

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

Table 2-3

Component	Note
109480071_TDC_TO_PROFINET_CODE_v10.zip	This zip file contains the STEP 7 project for RT and IRT.
109480071_TDC_TO_PROFINET_DOC_v10_e.pdf	This document.

3 Basics on PROFINET Communication

What will you learn here?

This chapter explains some basic terms on PROFINET communication as required for configuring this TDC example. Further information on this topic is available at Siemens Industry Online Support at the following link:
https://support.industry.siemens.com/cs/ww/en/view/19292127/40650672139

Introduction

Apart from MAC address and IP address, PROFINET uses an additional device name for identification of the PROFINET devices. This device name must be unique in the PROFINET network.

3.1 Device name

During commissioning, a device name is assigned to each PROFINET device using the engineering system (during the so-called node initiation). PROFINET IO controller and IO devices can be initiated in different ways.

- IO controller
  - Engineering software (STEP 7, HW Config, NetPro, Primary Setup Tool, PRONETA)
  - Downloads of the HW Config
- IO device
  - Engineering software (STEP 7, HW Config, NetPro, Primary Setup Tool, PRONETA)
  - From the IO controller based on the configured PROFINET topology

The device name is stored retentively in the device or on the MMC card. If a device is exchanged (e.g. due to a defect), the new device must be initiated with the configured device name. The following options are available for this:

- Replugging the MMC card (if existing)
- Engineering software (STEP 7, HW Config, NetPro, Primary Setup Tool)
- Topology-based initiation through the IO controller; the PN interface of the new device must be set to factory settings!

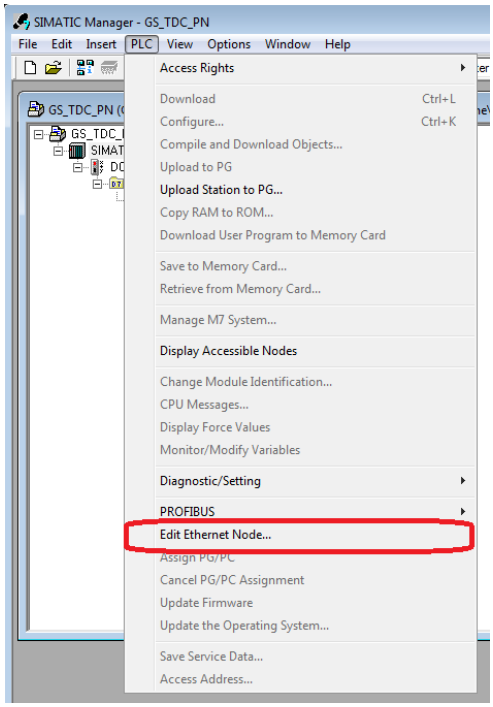
That is, without changing the configuration, the new PROFINET device can adopt the function of the exchanged device!

3.2 Node initiation with STEP 7

Searching the PROFINET devices

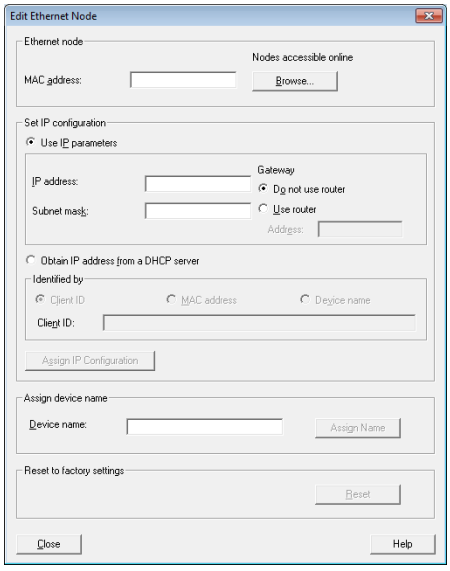
Open the SIMATIC Manager and select “PLC” > “Edit Ethernet Node” from the menu. The dialog for initiation of PROFINET devices opens.

Figure 3-1



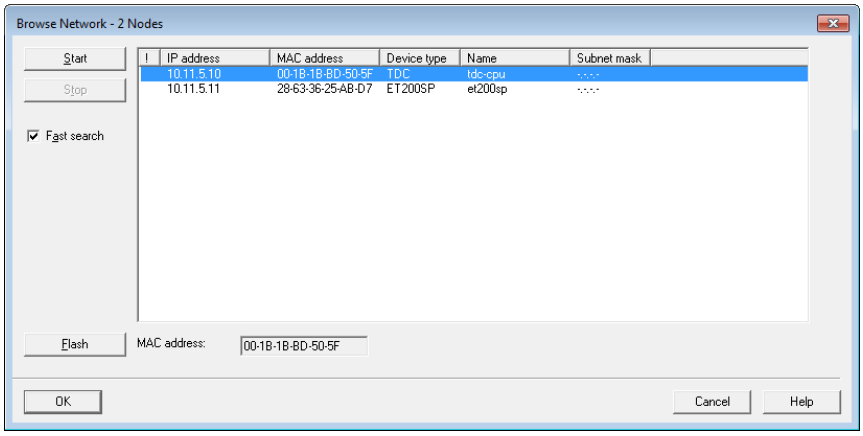
This is where a configuration can be directly assigned using the MAC address of a device. This requires that die MAC address of the device must be entered. As an alternative, there is the option to search all nodes existing in the connected PLC with “Browse”.

Figure 3-2



All devices connected at the bus are displayed with IP address and device name. In the delivery state, SIMATIC devices have the IP address 0.0.0.0 and no device name. The module type (e.g. CPU, HMI Panel etc.) is recognized during the search and displayed.

Figure 3-3

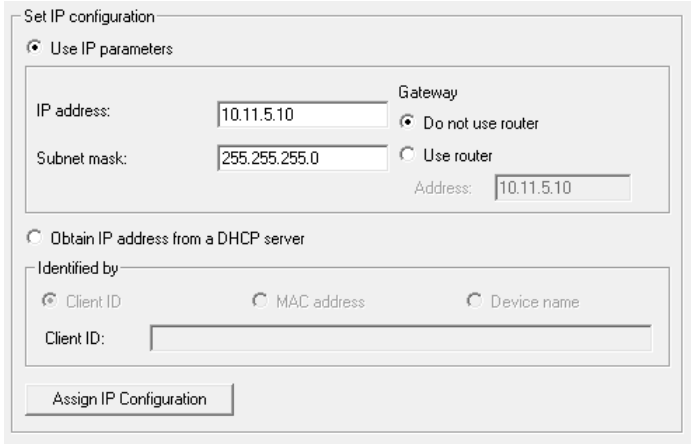


The detected nodes can be selected from the list; with “OK” they can be adopted in the dialog for assigning parameters.

Assigning the IP address

In the second section, an IP address can be assigned to the PROFINET node. There is the option for a default address assignment, or configuring it for operation at a DHCP server. For assigning an IP address, the address itself as well as the subnet mask must be entered.
When acknowledging with the “Assign IP Configuration” button, the parameters are transferred to the module. The parameters of the PROFINET node of the target system must be assigned here in the same way as they are set in the hardware configuration of the project.

Figure 3-4



Assigning the device name

The third section is used for assigning a device name to the respective module. The setup and the restrictions that apply when selecting the device name are available in chapter 3.1.4. When acknowledging “Assign Name”, the entered device name is assigned to the selected node.

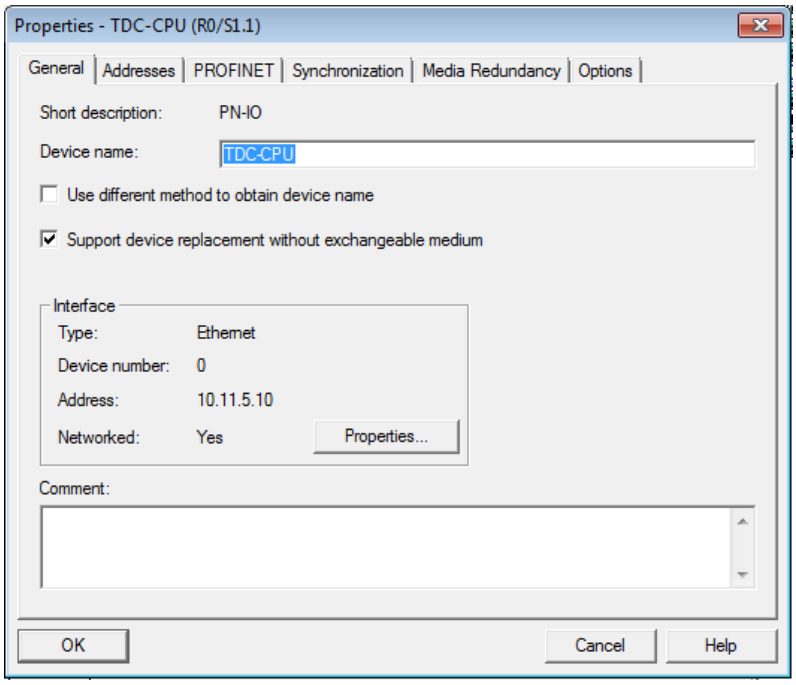
Figure 3-5

In the last section of the dialog, the factory settings of each PROFINET device can be restored. The IP address is reset to 0.0.0.0 and the device name to “”.

3.3 Topology-based initiation

The device name of a PROFINET IO device can also be specified by the IO controller. The **“topology-based initiation”** function is available for this. Setting the checkmark at “Support device replacement without exchangeable medium” activates this function (see picture below). This function is activated by default.

Figure 3-6



This Properties window opens in HW Config by double clicking on the PN interface of the IO controller.

Note To be able to use this function, IO device **must not yet have been initiated**. That is, the PN interface must be in factory setting (IP address = 0.0.0.0 and device name = “”).

The PN interface, for example, can be reset with the SIMATIC Manager via “PLC > Edit Ethernet Node” (see chapter 1.3.2).

3.4 Rules for assigning device names

Device names for PROFINET nodes are subject to certain syntax rules and need to comply with the IEC 61158-6-10 standard. This requires abiding by the following rules:

- A device name must have a maximum length of 254 characters (letters, numbers, hyphen or dot).
- A device name must consist of at least one character.
- In a device name, a character string between two dots forms a label. Such a label could be “.Machine-A.”, for example.
- The maximum length of a label can be 63 characters.
- The minimum length of a label is one character, for example ".A.".
- A device name contains one or several labels.
- In a label, only the letters a to z are permitted (no umlauts), the numbers 0 to 9, as well as the hyphen.
- In a label, special characters, such as brackets, underscore, stroke, blank, are not permitted.
- Umlauts (e.g. "Ä" or "Ü") must not be used.
- The hyphen ("-") is the only permitted special character.
- However, a label must not start with a hyphen.
- A label also must not end with the hyphen.
- A device name must not take the form n.n.n.n (n = 0...999).
- A device name must not start with the character sequence "port-xyz-" (x,y,z = 0...9).
- A device name must not start or end with a dot. The character sequence “.Machine-A.”, for example, is not permitted as device name (only as a component of a device name, as label).

Device names are assigned to the PROFINET IO devices in the commissioning phase.

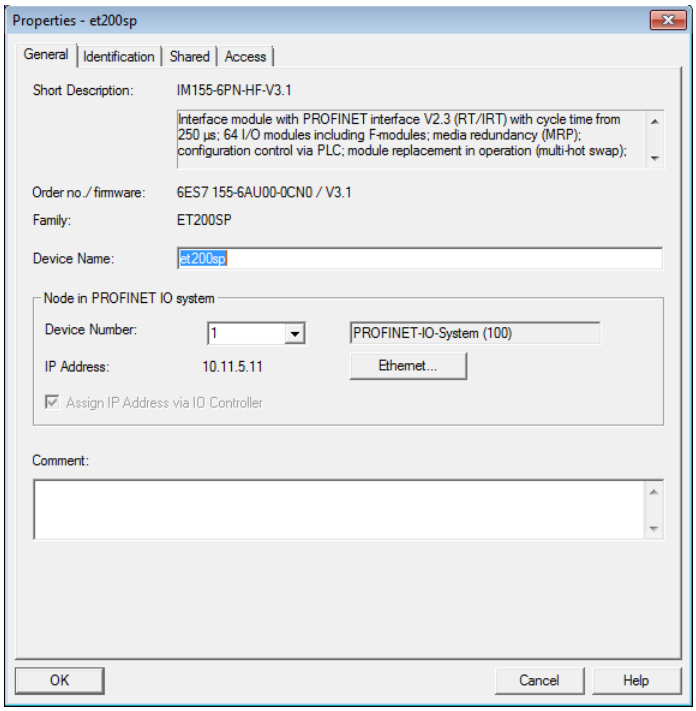
3.5 Assigning the IP address

Apart from a device name, PROFINET devices also require an IP address for connecting/disconnecting, as well as for NRT (Non Real Time communication, TCP, UDP, S7 communication, etc.). It is recommended to assign an IP address to each PROFINET device at the start of commissioning, to ensure that the online access is directed to the correct device. The following options are available for this:

- Via the IO controller
  - Engineering Software (HW Config, NetPro, Primary Setup Tool, PRONETA)
- Via the IO device
  - Engineering Software (HW Config, NetPro, Primary Setup Tool, PRONETA)

At an IO device (or I device representative) there is the option to have the IP address assigned by the IO controller (see the following picture).
This function is activated by default. A PROFINET connection between IO device and IO controller is required for this! The device name of the IO device must match that of the configured device name. That is, the IO controller in the figure below assigns IP address “10.11.5.11” to the IO device with the device name “et200sp”. The subnet mask is adopted by the IO controller. When using this function, the following situation may occur. Without a communication connection with the IO controller, the engineering system (e.g. PG/PC with STEP 7) cannot access the IO device (ET 200SP) online, since the IO device has no or a wrong IP address. In this case, an IP address must be assigned manually to the IO device.

Figure 3-7



The IP address assigned by the IO controller is only valid temporarily (until the next power OFF). However, it takes priority over the permanently stored IP address via engineering software. That is, the IP address assigned by the IO controller is not stored permanently on the MMC or the CF card and will be lost after power OFF!

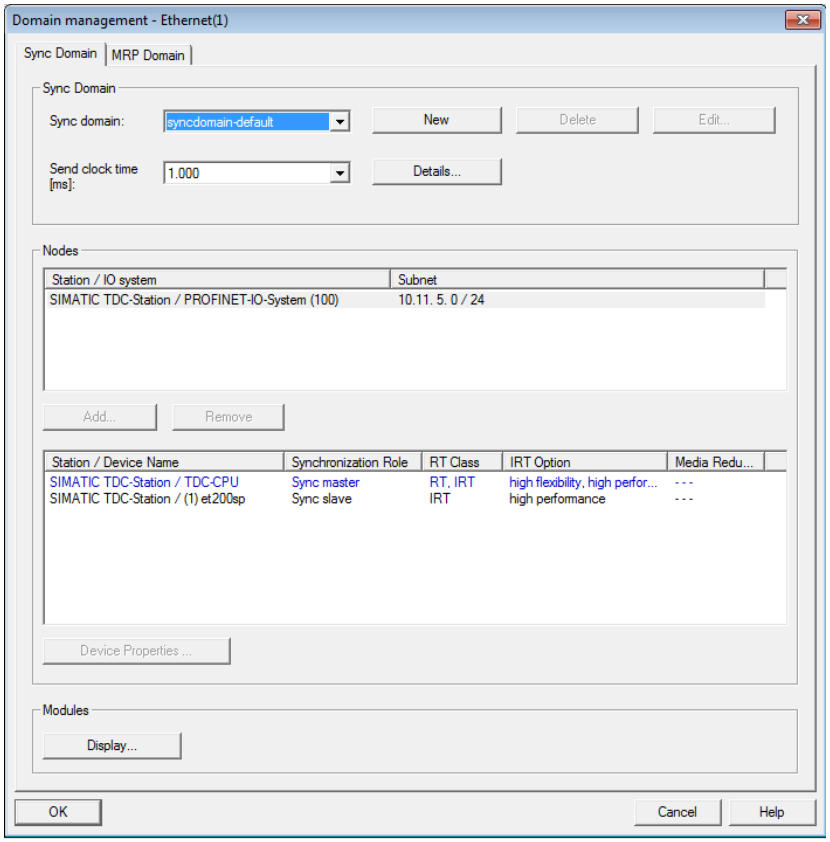
After renewed power ON, the IP address must be reassigned by the IO controller. If there is no connection between IO controller and IO device, the IP address previously assigned via engineering software, or the PROFINET default IP address 0.0.0.0 (factory setting of the PN interface) is active after POWER OFF/ON.

The manually assigned IP address is power fail-safe! If checkmark “Assign IP address via IO controller” is not checked, the retentively stored IP address is not overwritten by the IO controller.

3.6 Send cycle for IRT communication

The send cycle for IRT communication can be set between 250 µs and 4.0 ms. The setting for the send cycle is made in HW Config by right clicking on PROFINET IO-System > “PROFINET IO-Domain Management”. This is where the cycle time is selected in the “Send clock time” field in a 125 µs grid rising up to 4 ms.

Figure 3-8



3.7 Isochronous mode

Isochronous mode means the application (e.g. cyclic task T1) is synchronized to the PROFINET IRT send cycle. That is, for isochronous processing, all modules set to isochronous mode supply their process data at the exact same time for processing in the user program.

4 Function Principle of the Example

4.1 General overview

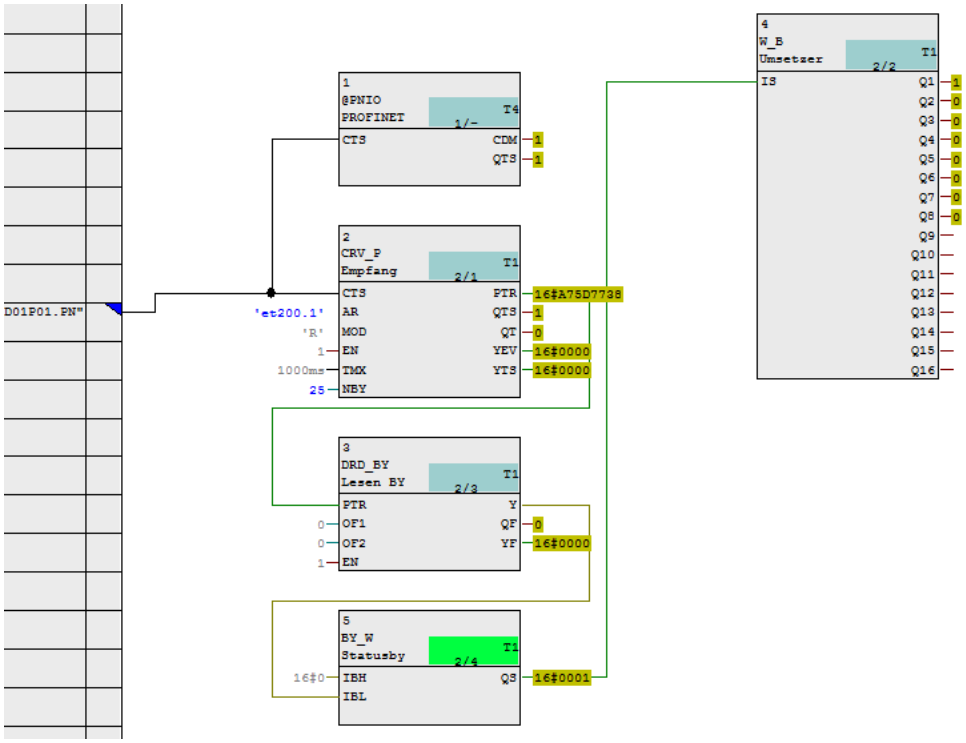
Description

User data exchange of SMATIC TDC with distributed I/O can be configured via the PROFINET standard (PROFINET RT), as well as in the form of isochronous data exchange (PROFINET IRT).

To implement the isochronous configuration, a task of the TDC controller is synchronized to the isochronous PROFINET bus. This document contains a detailed description on configuring and programming all of the required steps. The utilized bocks of the user program are identical for all solutions; the differences in communication type are due to the configuration and the connection of the blocks.

Structure of the CFC program

Figure 4-1



In the example code displayed here, a PROFINET connection with the PROFINET network is established using the “@PNIO” block. The pointer-based block “CRV_P” is used for receiving the message frames from the distributed I/O. From the received message frame, the received data is supplied to the user program with write block “DRD_BY”. Write blocks “BY_W” and “W_B” are necessary for converting the received byte with the input states of the 8DI card into eight individual bits.

4.2 Functions of the user program

Introduction

The functions of the utilized blocks are explained in detail below. The program only displays the rudimentarily required functions for setting up a PROFINET connection as well as the processing of signals from a distributed I/O via PROFINET. Only the connections of the blocks relevant for PROFINET are described here. All other information on the function principle of the inputs and outputs are described in detail in the online help and in the TDC documentation.

4.2.1 Block @PNIO

Function of this block

This block is used for initializing and monitoring the PROFINET connection of the CPU. For each CPU555, the block can only be configured once, since there is only one PROFINET interface per CPU. Multiple configuration is detected during initialization and prompts an entry in the communication error field. The block must only be called in scan intervals between 32 and 256 ms, otherwise, this will prompt an entry into the communication error field.

Parameter interface

Figure 4-2

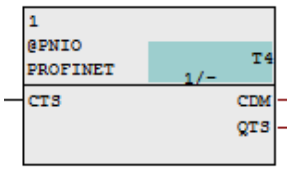


Table 4-1

Parameter	Description
CTS	The block must be supplied with the name of the PROFINET interface at the “CTS” input. In the example on hand, it consists of the name of the CPU and the PROFINET interface, separated with a dot.
CDM	During runtime, at the “CDM” output, the block continuously supplies information on the state of the connection with the PROFINET system. This enables you to react to unexpected failures of the PROFINET communication within the user program when necessary.

4.2.2 Block CRV_P

Function of this block

This block is used for receiving message frames via the configured PROFINET interface of the CPU. The received data is supplied at the pointer interface “PTR”. In the same way as the @PNIO block, the “CTS” input must be supplied with the information on which interface shall receive the message frame.

Parameter interface

Figure 4-3

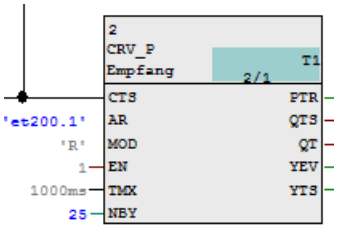


Table 4-2

Parameter	Description
AR	Input “AR” of the block must be supplied with the information by which PROFINET device or, during isochronous mode respectively, by which process image the frame shall be received. • For non-isochronous operation, the input must be supplied with a user-selected name of up to six characters and the device number in the PROFINET system, both separated by a dot. In this example, the ET 200SP module has the device number 1 (configurable in HW Config). Input “AR” is therefore supplied with the name ‘et200.1’. • For isochronous operation, the device number is not relevant since the entire process image partition configured as isochronous must be read. In this case, input “AR” is supplied with a random name of up to six digits, and the expansion “PIP”, both separated by a dot. ‘et200.PIP’ in the project for isochronous operation on hand
NBY	At input “NBY”, the buffer size of the data to be read must be specified in bytes. • In non-isochronous operation, the length of the number of process data results from the addressed PROFINET nodes in the process image. In the example on hand, an 8DI HS input card was used in the ET 200SP station. This module can also be configured as count module. The input area in the process image therefore occupies 25 bytes of input data. For three standard 8DI cards in the ET 200SP station, for example, a process data length of 3 bytes would result. The length to be configured in this case depends directly on the type and number of the connected devices or modules and can be seen in HW Config. • In isochronous operation, the size of the buffer results from the largest address configured as isochronous in the process image + 1, since the process image address starts at zero. Example: If the start address of an 8DI card of an ET 200SP station is addressed as 100, and if it is the largest address configured as isochronous, the

Parameter	Description
	resulting length of the buffer to be provided is 101 (largest isochronous address + 1). For the modules to be operated isochronously, it is recommended to select addresses in the bottom address rage of the process image since this keeps the isochronous process image accordingly small and can hence be read faster.
PTR	At output “PTR”, the received data are supplied in the form of a pointer to a buffer for processing with other blocks. The output is used for connecting to pointer-based communication blocks that read the received data.

4.2.3 Block DRD_BY

Function of this block

Using the DRD_BY block, a byte of the data supplied by the CRV_P block is read.

Parameter interface

Figure 4-4

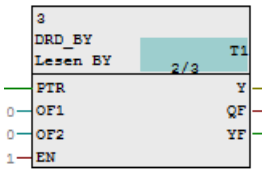


Table 4-3

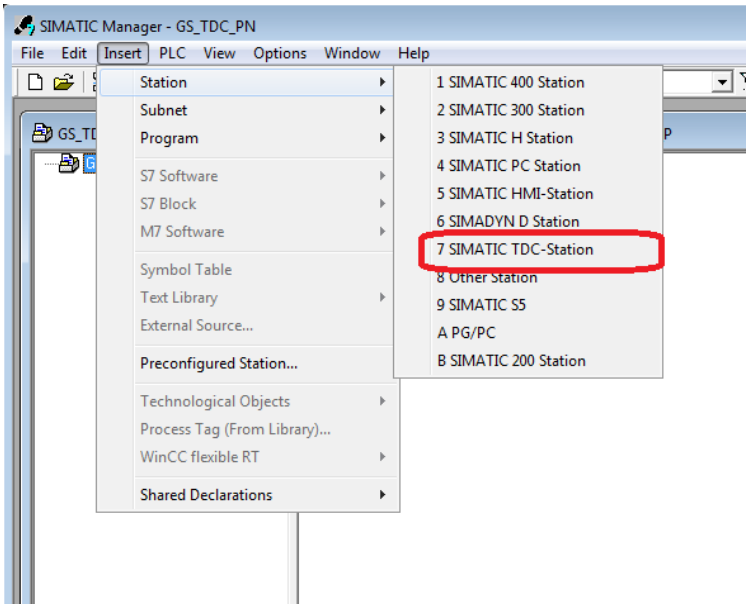
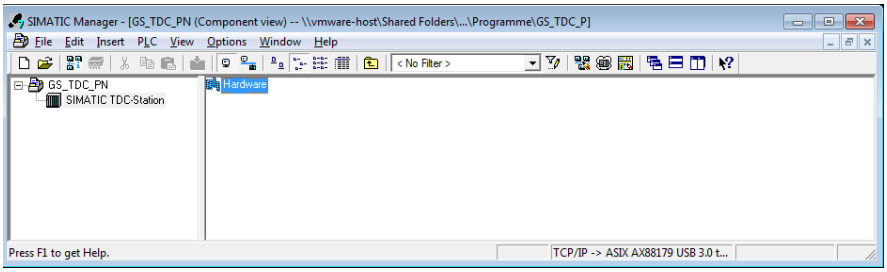
Parameter	Description
PTR	Input “PTR” is connected to output “PTR” of the CRV_P block.
OF1	Offset 1 specified with the length in bytes to define the byte to be read within the overall data area of the “CRV_P”.
OF2	2nd offset with length in bytes

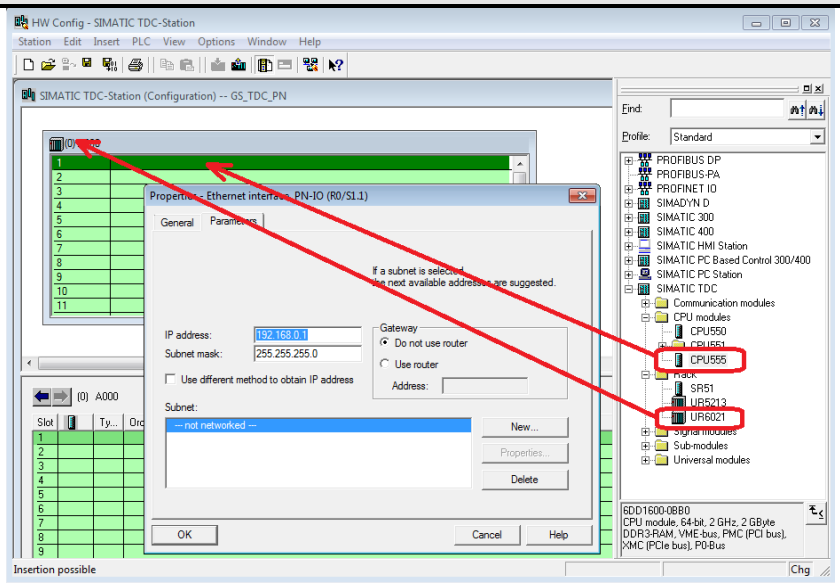
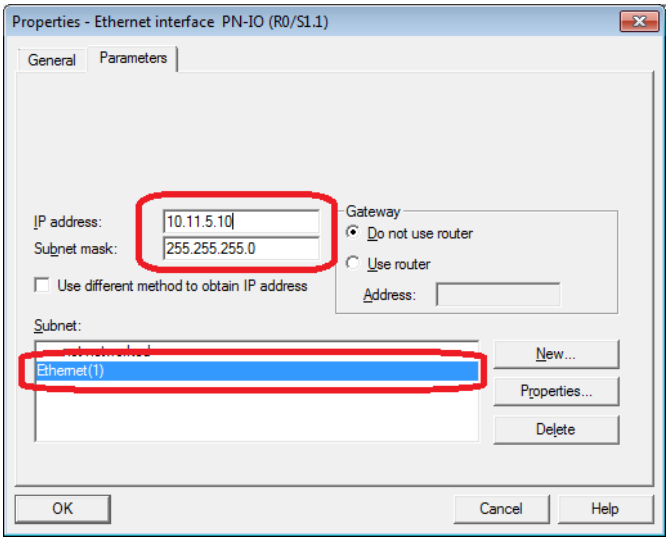
5 Configuration and Settings

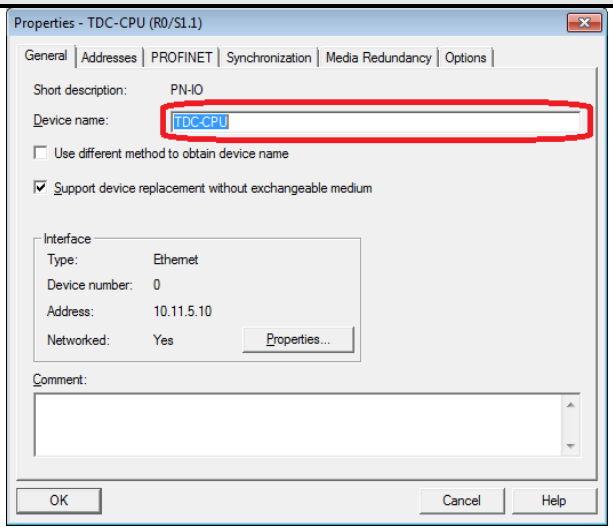
5.1 HW configuration of the TDC CPU

In the example project, a SIMATIC TDC CPU555 is used and configured as follows.

Table 5-1

No.	Action
1.	Open the engineering system STEP 7 SIMATIC Manager to create a new project. Add a new TDC station. 
2.	Open the hardware configuration 
3.	From the Hardware Catalog > SIMATIC TDC you drag a UR6021 module rack into the Configuration editor. From the Hardware Catalog you then drag a CPU555 to slot 1 of the just added module rack.

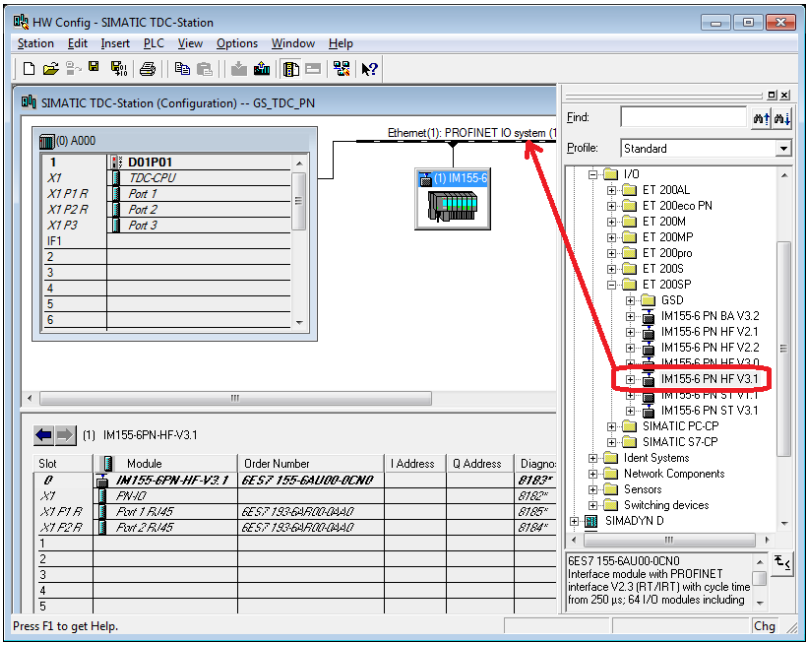
No.	Action
	
4.	After adding the CPU, the dialog for configuring the PROFINET interface opens. Click on “New..” to create a new Ethernet subnet, and assign an IP address. 
5.	A double click on the PROFINET interface (“PN-IO”) opens the Properties window. Define the device name. In the example project, this is the device name “TDC-CPU”

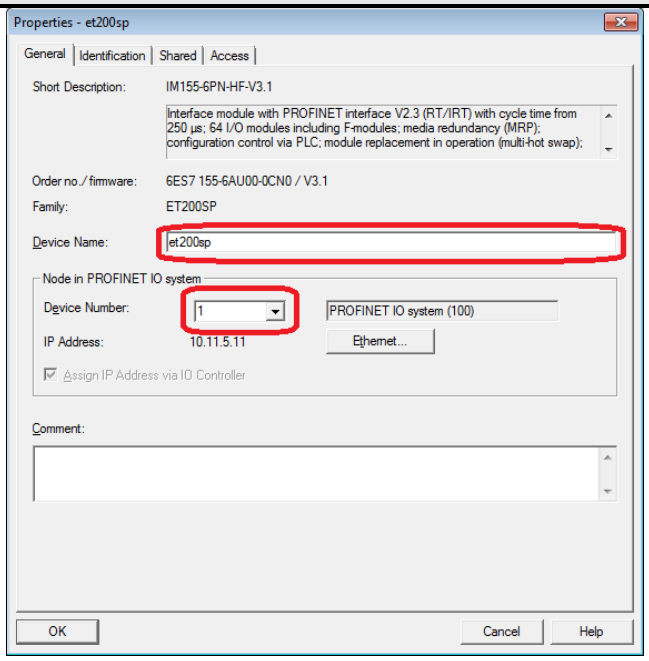
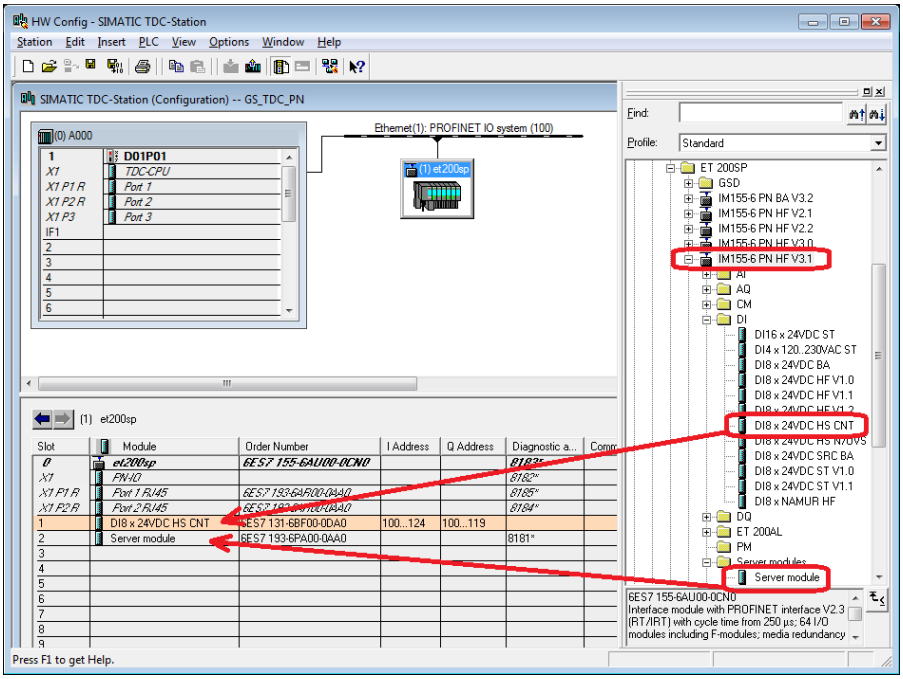
No.	Action
	

5.2 HW configuration of the ET 200SP station

In the example project, an ET 200SP with interface module IM155-6PN HF is used. The digital input module is an 8DI HS card that can also be configured for counting. In this example, only the 8 digital inputs are used. Principally, any PROFINET device can be added here and used. Configuration with isochronous mode must be supported by the devices.

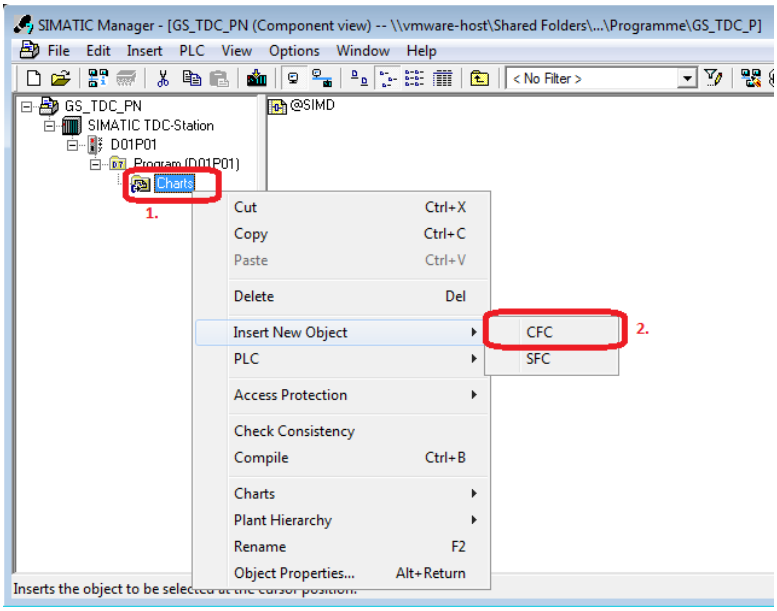
Table 5-2

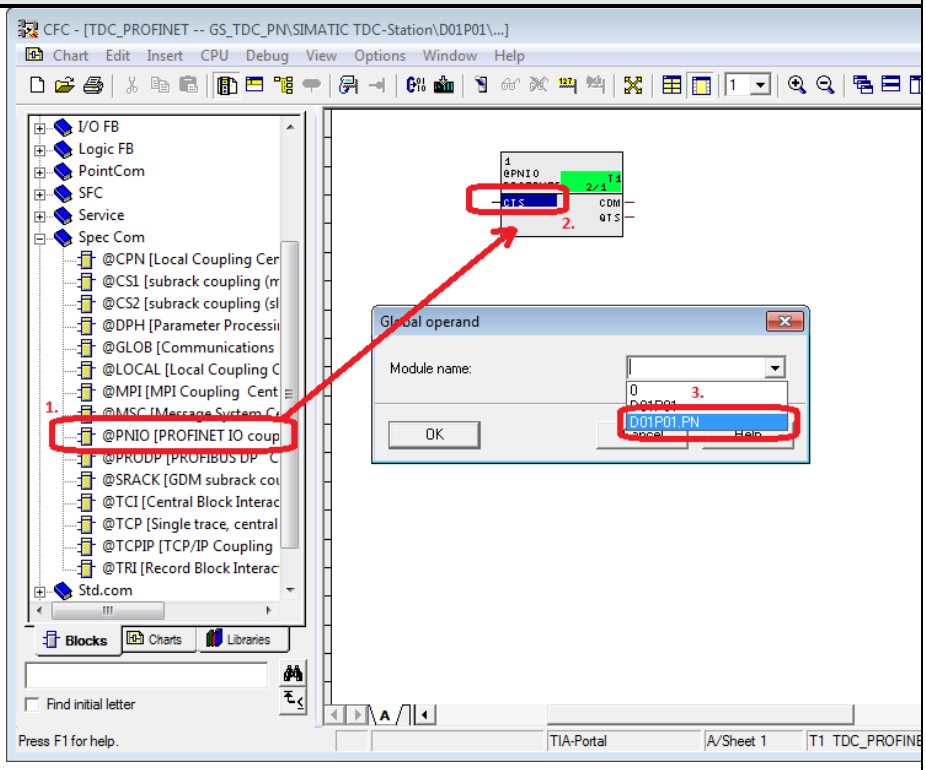
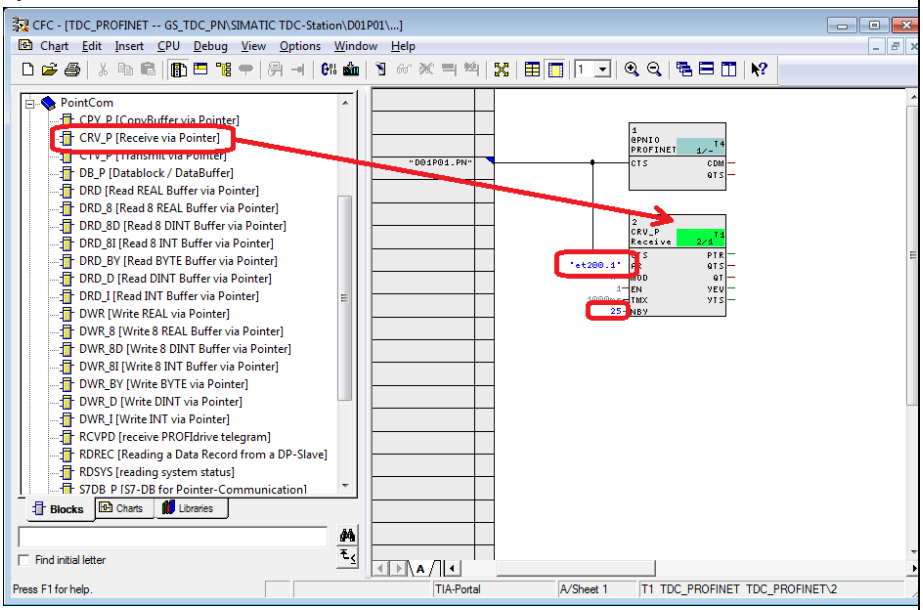
No.	Action
1.	From the Hardware Catalog > PROFINET IO > I/O > ET 200SP you drag an IM155-6PN HF V3.1 interface module to the existing PROFINET network 
2.	A double click on the ET 200SP station opens the Properties dialog. Here you enter the device name and the device number for the station. (In the example project, this is the device name “`et200sp`” and the device number “`1`“) IP addresses are assigned automatically in rising order by Step 7. You can assign your own IP address at any time by clicking on the “Ethernet” button behind the IP address. Click on “OK” to confirm the settings.

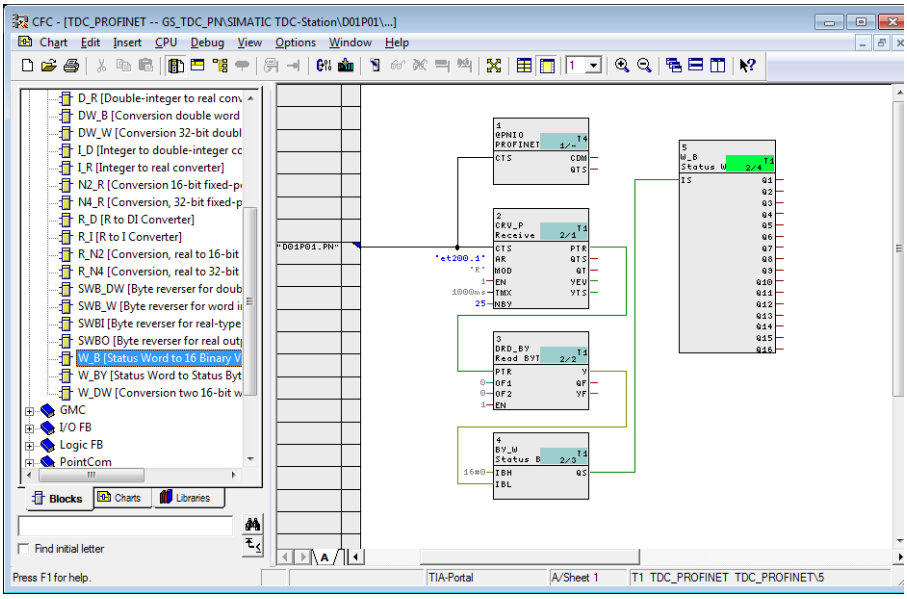
No.	Action
	
3.	In the hardware catalog you expand the subfolder for the pluggable modules of the ET 200SP interface module. Expand the “DI” folder. Drag the digital module onto slot 1 of the ET 200SP station, open the folder “Server modules” and drag a server module into the ET 200SP station as the last module. Double click on Modules > “Addresses” to adjust the address area of the digital module to any still available address area. 
4.	Save and compile the hardware configuration and close HW Config.

5.3 Creating the user program for PROFINET communication

Table 5-3

No.	Action
1.	In the SIMATIC Manager you expand the sub-structures of the CPU up to submenu “Charts”. Create a new CFC chart by right clicking on the Charts folder > “Insert New Object” > “CFC”. Assign a meaningful name to the chart and open it with a double click. The CFC chart editor opens. 
2.	1. From the block catalog you drag the @PNIO block for PROFINET communication to a free location in the CFC chart. 2. Mark the “CTS” input parameter of the block and right click on it to select > “Interconnection to address…”, or press F3. 3. Select the PROFINET interface of the CPU from the drop-down list. It ends in the drop-down list with the CPU name and the ending “PN” Click “OK” to confirm your settings. The interconnection of PROFINET communication and interface is then created. 4. Configure the call of the block in a task that ensures a scan time of between 32 and 256 ms since otherwise, communication cannot be established.

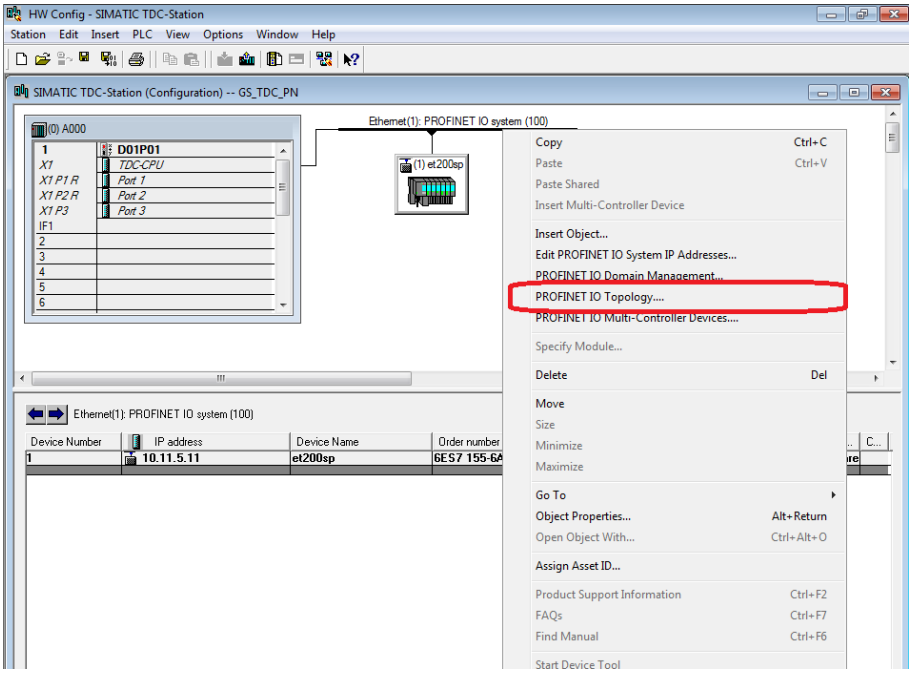
No.	Action
	
3.	From the block folder, you drag block “CRV_P” to a free location in the CFC chart. Interconnect the “CTS” input of the block with the PROFINET interface as shown in step 2. At input parameter “AR” you assign any name with up to 6 characters (restrictions in the name assignment are given in the online help), with the extension “.PROFINET device number”. In this example, the device number is “1”. The parameter connection in this example is therefore “et200.1”. At input parameter “NBY” you assign the length of the data to be read in bytes. The input card used in the example has a length of 25 bytes. The signals of the digital inputs are in the first byte. 

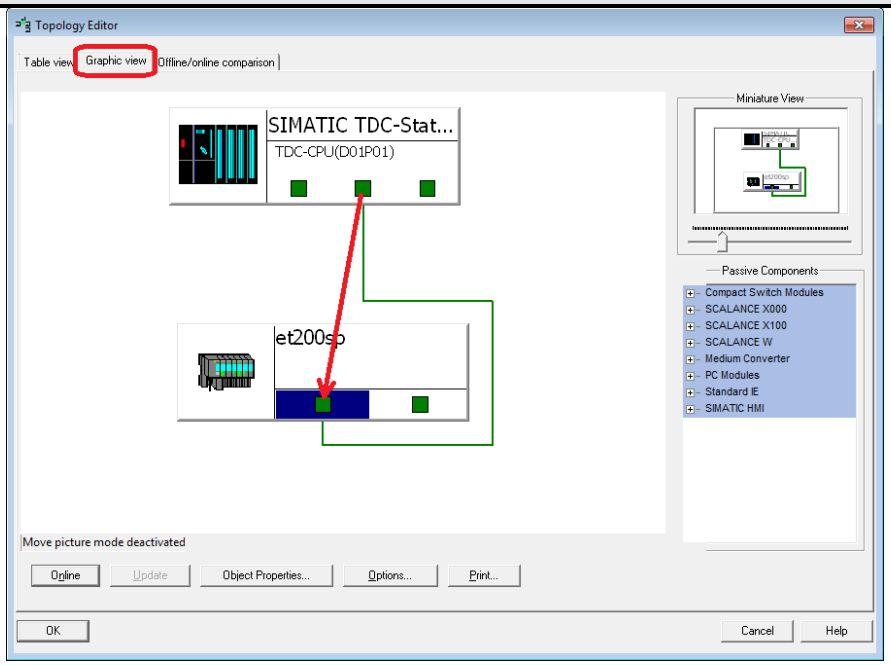
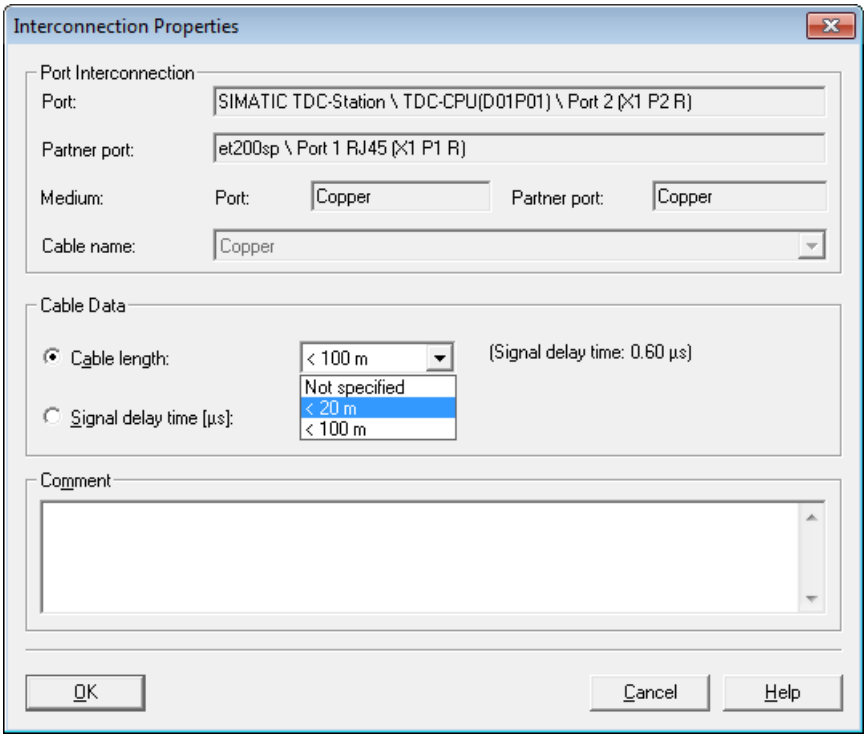
No.	Action
4.	Drag byte “DRD_BY”, “BY_W” and “W_B” into the CFC chart and interconnect as in the figure below. Compile and load the CFC chart into the CPU. Note: the offset details at block DRD_BY need to be adjusted respectively to the used modules. In the example on hand, the default setting is “0”, since the digital inputs are depicted in the first byte of the input data. Note: at the first download into the CPU, you need to select “System and user program” during compilation and “Compile all” in the download dialog. Then, if no further changes to the hardware configuration are made, you can also only compile and download changes. 
5.	The configuration of the communication via PROFINET connection to the ET 200SP station is now complete. In the test mode of the CFC editor you can monitor changes at the states of the digital signals of the module.

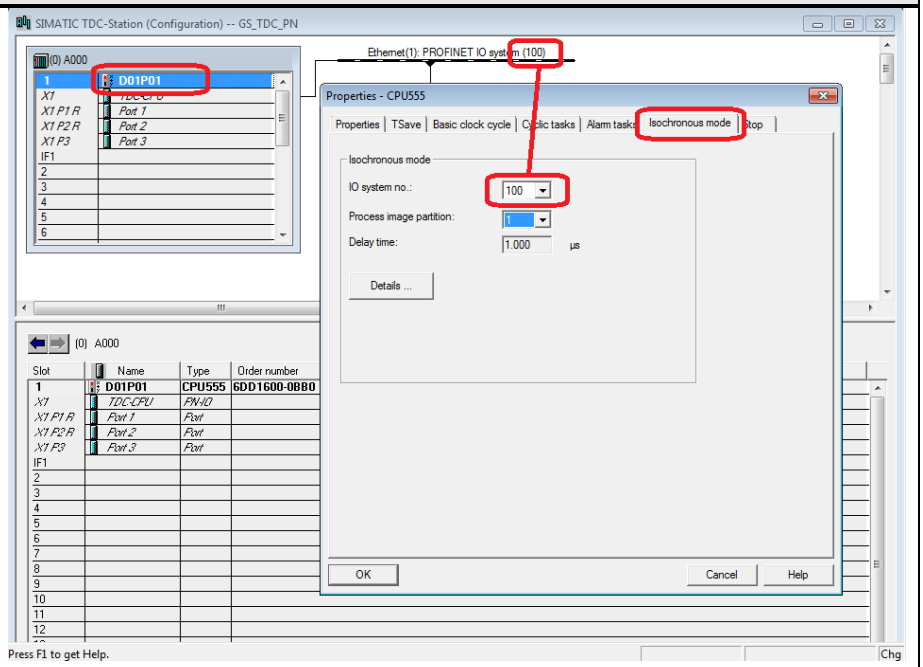
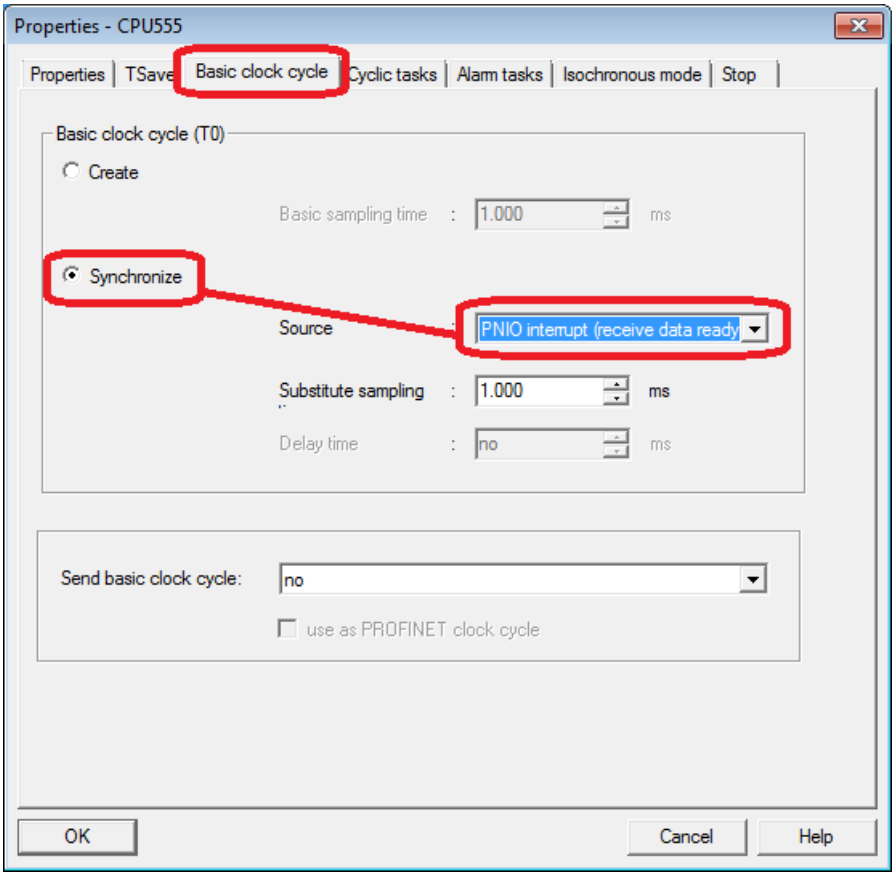
5.4 Configuring isochronous communication via PROFINET

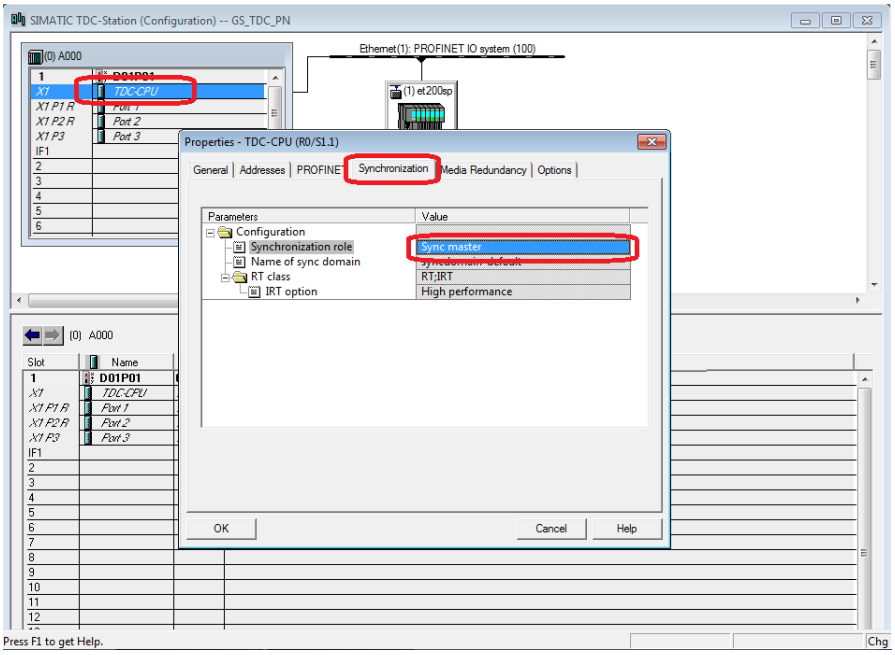
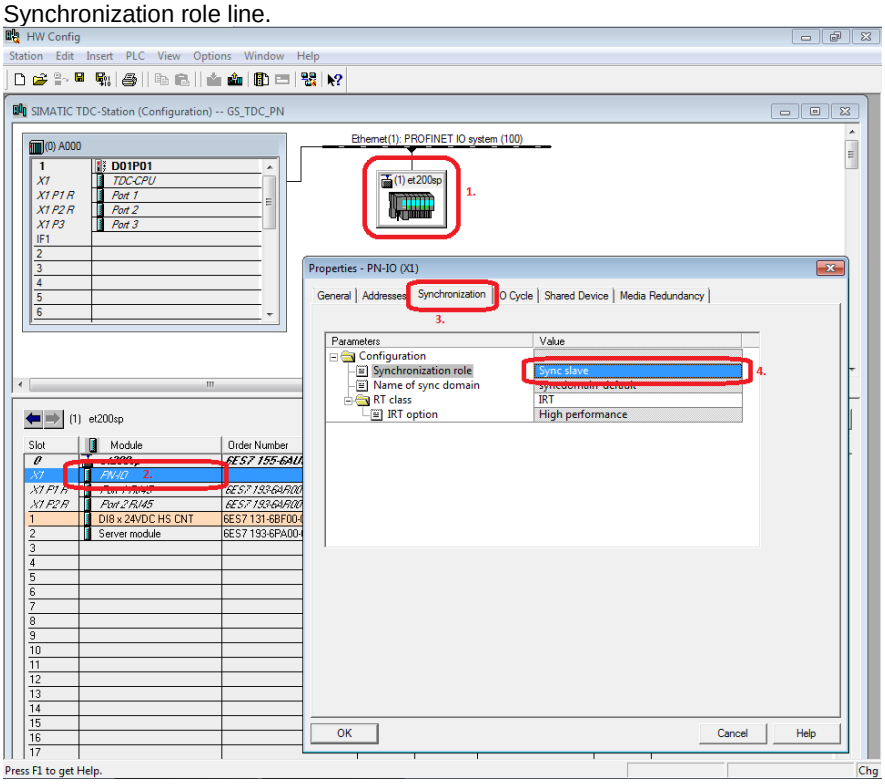
The following section only describes the special characteristics of the configuration of isochronous communication via PROFINET. The settings described in chapter 5.1 and 5.2 also need to be set for isochronous operation. The user program is principally the same. The necessary steps for modifying the program are also described.

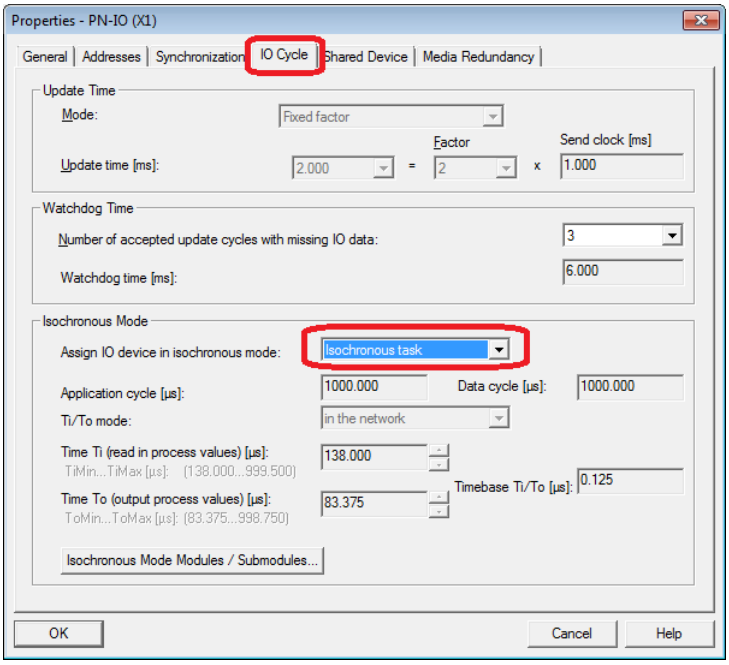
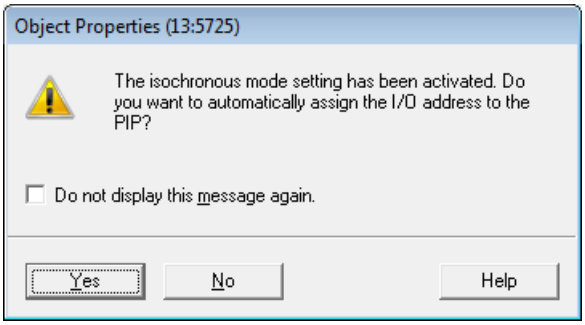
Table 5-4

No.	Action
1.	Open the HW configuration of the SIMATIC TDC CPU
2.	Open die topology settings of the PROFINET IO system with a right click on the PROFINET string > “PROFINET IO Topology…”. 
3.	The Topology editor opens. Go to the “Graphic View” tab of the editor and connect one of the PROFINET ports of the CPU with one of the POFINET ports of the ET 200SP. In the example, a connection between port 2 of the CPU and port 1 of the ET 200SP station is configured. Note: the interconnection of the PROFINET ports in the topology editor must match the wiring of the ports at the hardware. If this is not the case, the PROFINET string cannot be operated isochronously and a communication error results with an entry in the diagnostic buffer of the CPU.

No.	Action
	 When connecting the ports, the following dialog opens which enables setting the cable length between the ports. This way, signal runtimes are also included in the calculation of the isochronous transmission.  Confirm and adopt the changed settings by clicking on OK in the Interconnection Properties and in the topology editor.
4.	Open the properties dialog of the TDC CPU. Go to the Isochronous mode tab and select the PROFINET string to be operated isochronously in the “IO System no.” field. For TDC CPU555, the TPA1 is available isochronously as process image partition.

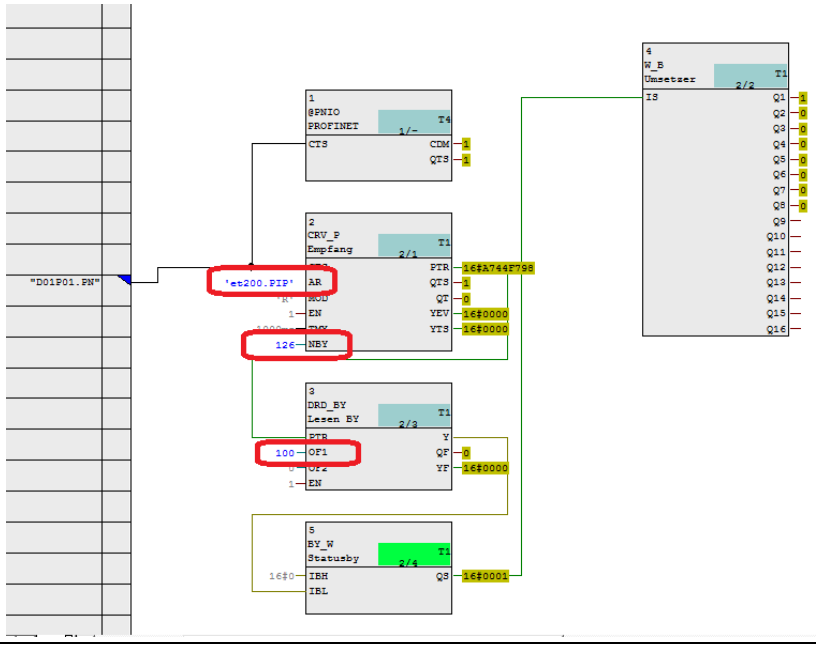
No.	Action
	
5.	Go to the “Basic clock cycle” tab. Change the setting for “Basic clock cycle (T0)” to “Synchronize” and select the source “PNIO interrupt (receive data ready)” from the drop-down list. Keep the substitute sampling time at 1 ms and confirm the settings with “OK”. 

No.	Action
6.	A prompt appears that no device has been assigned to the isochronous task. Confirm the prompt with “Cancel”.
7.	Open the properties dialog of the PROFINET interface of the CPU. Go to the “Synchronization” tab and select “Sync-Master” in the Synchronization role line. Click on “OK” to confirm the settings. 
8.	Select the ET 200SP station. Open the properties dialog of the PROFINET interface. Go to the “Synchronization” tab and select “Sync-Slave” in the Synchronization role line.  Go to the “IO Cycle” tab. In sub-item Isochronous Mode > “Assign IO device in

No.	Action
	isochronous mode” you select “Isochronous task”.  Then confirm the prompt that the I/O addresses shall be assigned automatically to the isochronous process image with Yes.  Confirm the settings for the ET 200SP station with “OK”. Save and compile the HW configuration with HW Config.

5.5 Adjusting the user program to isochronous mode

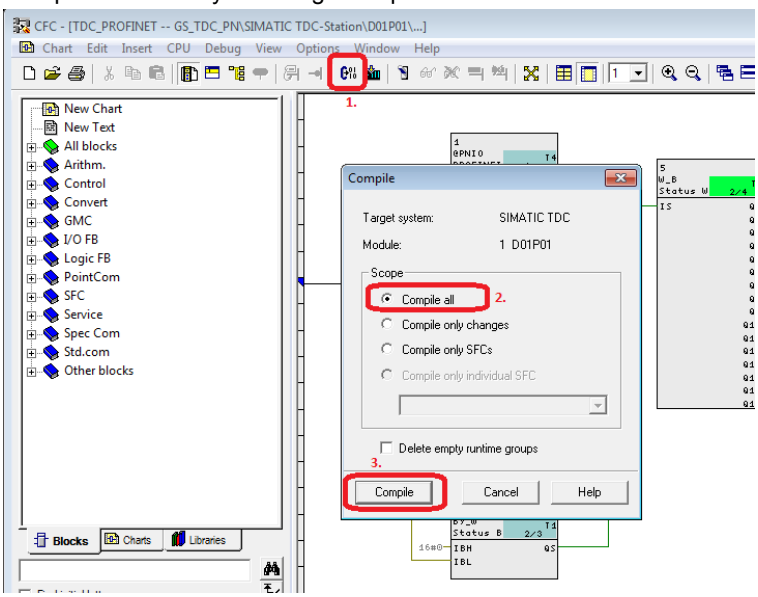
Table 5-5

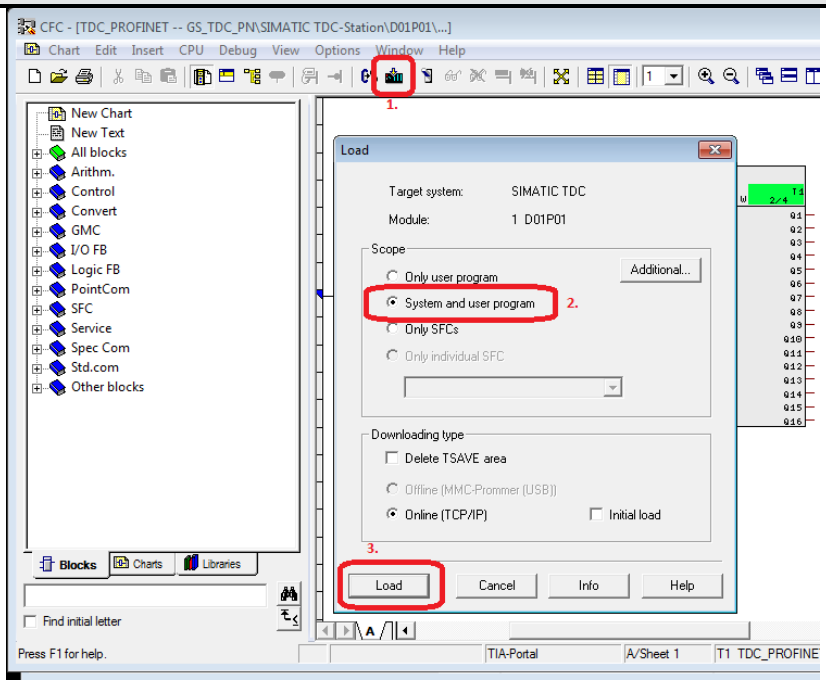
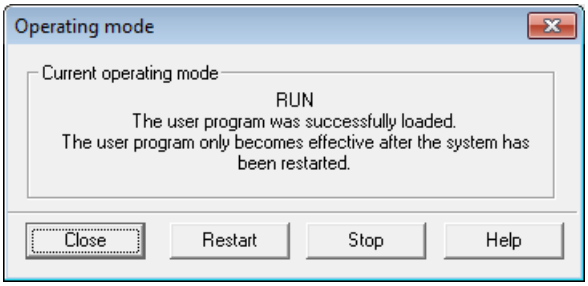
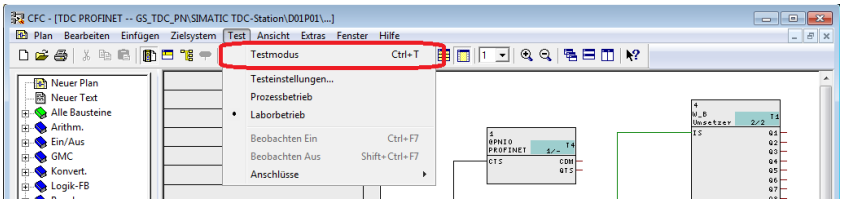
No.	Action
1.	For setting the basic structure of the user program for isochronous communication via PROFINET you need to proceed as described in chapter 5.3. The differences regarding isochronous mode are explained below.
2.	For isochronous communication, any name with up to 6 characters, followed by a ".PIP", can be specified at block "CRV_P" at input parameter "AR" (restrictions for name assignment available in the online help).
3.	In this example, the name is "et200.PIP". At input parameter "NBY" you assign the length of the data to be read in bytes. Note: For isochronous communication, the entire isochronous process image is read; therefore, the specified length results from the largest address configured as isochronous +1 (see chapter 4.2.2) In the example program, the buffer is 126 bytes.
4.	At block "DRD_BY", the offset of the read data must be specified in the process image according to the address area of the module. In the example, the offset must be specified as 100 since the address of the module whose data shall be evaluated starts at 100, and the information for the states of the digital inputs lies in the first byte.
5.	After adjusting the described parameters, the communication with the ET 200SP station is handled isochronously. 

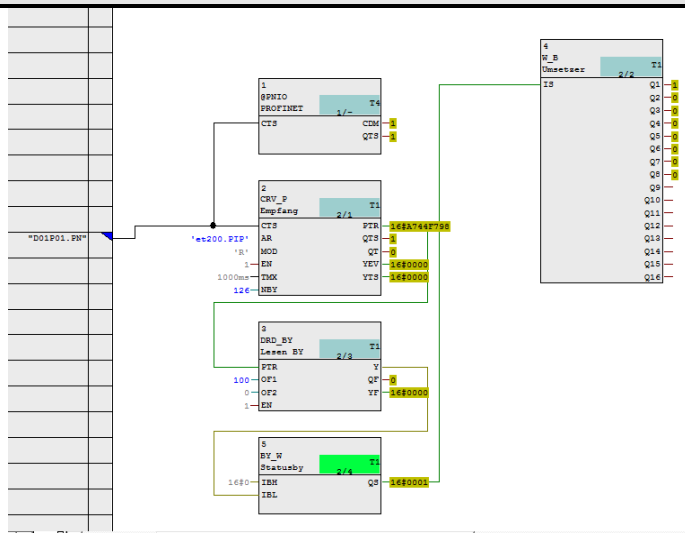
6 Commissioning the Example Project

For commissioning the example project, the following steps are necessary.

Table 6-1

No.	Action
1.	All hardware components exist according to Table 2-1.
1.	All PROFINET components are networked and accessible via the engineering system.
2.	The Ethernet interface of the engineering system is configured correctly, and the PG/PC interface set to the respective Ethernet interface.
3.	Start the engineering system STEP 7 SIMATIC Manager.
4.	Extract the file “109480071_TDC_TO_PROFINET_CODE_v10.zip” to any folder on your hard drive. The zip-file contains the two STEP 7 projects for the RT case, or the IRT case respectively.
5.	Retrieve the sample project “TDC_PN_Standard.zip” for the PROFINET communication in general, or the “TDC_PN_IRT.zip” project for isochronous PROFINET communication.
6.	Perform the node initiation as described in chapter 3.2. The TDC CPU must have the IP address 10.11.5.10 and the device name “tdc-cpu” assigned here. The ET 200SP station must obtain IP address 10.11.5.11, as well as the device name “et200sp”.
7.	As an alternative, the Primary Setup Tool (PST) can be used to perform the node initiation. The PST can be downloaded at the following link. http://support.automation.siemens.com/WW/view/en/19440762
8.	In the SIMATIC Manager you open the chart folder of the CPU.
9.	Open the CFC chart “TDC PROFINET”.
10.	Compile the chart by selecting “Compile all” 
11.	Download the CFC chart into the controller. At the first download you select “System and user program”.

No.	Action
	
12.	In the window that opens you select “Restart”  The CPU then reboots and system data and user program are adopted.
13.	In the CFC editor you start the test mode via Test > Test mode 
14.	The digital inputs of the module can be observed at block “W_B”.

No.	Action
	

7 Links & Literature

Table 10/2015-1

	Topic	Title
\1\	Siemens Industry Online Support	http://support.automation.siemens.com
\2\	Download page of the entry	https://support.industry.siemens.com/cs/ww/en/109480071
\3\	SIMATIC TDC	https://support.industry.siemens.com/cs/de/en/view/8776697/70009847179 (System manual 08/2014)

8 History

Table 8-1

Version	Date	Modifications
V1.0	10/2015	First version