

Application description • 01/2014

Speed control of a SINAMICS S120 with S7-300/400 (STEP 7 V5) via PROFINET IRT (isochronous) SINAMICS S

http://support.automation.siemens.com/WW/view/en/53477498

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1 Task

1.1 Overview

A drive shall be moved speed-controlled.

For this purpose the drive is operated as IO device on an IO controller. In addition there is the demand of having special control-related duties. This is the reason, why a communication via PROFINET IRT (isochronous) is configured between controller and drive.

This makes it possible to exchange equidistant data between the devices. With this equidistant cycle the devices can be synchronized and their application can be operated isochronously.

2 Solution

2.1 Overview

Schema

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



In this application description it is shown, how a SINAMICS S120 can be moved speed-controlled by means of a SIMATIC S7-300/400 (STEP 7 V5). For this purpose a communication via PROFINET IRT (isochronous) is configured between controller and drive.

The SIMATIC CPU sets the required releases in order to move the two motors of the SINAMICS drive speed-controlled. By means of the OB61 isochronous execution level, the control word ("STW1") as well as the speed setpoint ("NSOLL B") is sent from the CPU to the drive.

The status word ("ZSW1") as well as the actual speed value (" $NIST_B"$) is returned by the drive. Upcoming drive errors are acknowledged by the SIMATIC controller via application.

A sign-of-life monitoring is also implemented in the OB61 by application. For this purpose the bits 12 to 15 ("master sign-of-life") in control word 2 ("STW2") are incremented and sent to the drive. If the drive has received the master sign-of-life once completely, the generation of its own sign-of-life ("slave sign-of-life") is started and is returned to the controller in the status word 2 ("ZSW2").

Advantages

This application offers you the following advantages:

- Equidistant data exchange between SIMATIC controller and SINAMICS drive based on the isochronous communication (PROFINET IRT).
- Easy control of the SINAMICS drive.
- Easy composition because of standardized technology.
- The existing system can be expanded quick and easy.

Delimitation

This application does not include a description of:

- the general drive functions of the SINAMICS S120
- the SIMATIC S7-300/400

Knowledge required

Basic knowledge of the configuring of SIMATIC controllers with the STEP 7 engineering system and the configuring of SINAMICS drives with STARTER respectively SIMOTION SCOUT is assumed.

Supplementary conditions

SIMATIC F-CPU: clock-synchronized mode (OB6x) and safety mode

In the document "IO-Controller_PROFINET_functions_en.pdf" of the article <u>http://support.automation.siemens.com/WW/view/en/44383954</u> is written that when using a SIMATIC F-CPU the "clock-synchronized mode" (OB6x) is only supported in standard mode (without safety program).

However under certain conditions it is possible to activate the clock-synchronized mode (standard program in OB6x) and the safety mode ("F-CALL") at the same time.

It is absolutely necessary to avoid the updating of the process image partition while the safety program is executed (see program example in chapter 4.6).

NOTE If the process image partition is not updated in each OB6x cycle, the S7 application (standard program in OB6x) is <u>not</u> really clock-synchronized!

2.2 Hardware and software components used

2.2 Hardware and software components used

The sample project was created with the following components.

Hardware components

Table 2-1

Component	Qty	MLFB / order number	Note
SIMATIC CPU 317-2 PN/DP	1	6ES7317-2EK14-0AB0	V3.2.6
SINAMICS S120 CU320-2 PN	1	6SL3040-1MA01-0AA0	V4.4.2
SIMOTION D435 training case	1	6ZB2470-0AE00	

Note

The sample project 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

	Tab	le	2-2	
--	-----	----	-----	--

Component	MLFB / order number	Note
STEP7	6ES7810-4CC10-0YA5	V5.5 HF4
STARTER	6SL3072-0AA00-0AG0	V4.2
Drive ES Basic	6SW1700-5JA00-4AA0	V5.4 SP5
Alternatively SIMOTION SCOUT	6AU1810-1BA42-1XE0	V4.2 SP1

Sample files and projects

Table 2-3

Component	Note
53477498_PN_IRT_SIMATIC_SINAMICS_V1_2.zip	STEP7 project
53477498_SIMATIC_SINAMICS_PROFINET_IRT_V2_0_en.pdf	This document

Supplementary conditions

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

Table 2-4

Component	Version	Note
STEP7	As from V5.5 HF4	
STARTER	As from V4.2	
Drive ES Basic	As from V5.4 + SP5	
SIMOTION SCOUT	As from V4.2.1.0	Alternative to STARTER and Drive ES BASIC
Firmware for S7-300 CPU	As from V3.2	
Firmware for S7-400 CPU	As from V6.0	
Firmware for SINAMICS	As from V4.4	

2.3 Alternative solution

Drive connection via PROFINET RT

Because no isochronous communication is required in many applications, a drive connection via PROFINET RT may suffice. An isochronous communication is normally required when the controller performs closed-loop control tasks (e.g. with a SIMOTION controller).

NOTE Further information concerning the drive connection via PROFINET RT can be obtained from the following article.

http://support.automation.siemens.com/WW/view/en/38844967

3 Basic information

3.1 **PROFINET** communication

In addition to the MAC address and IP address, PROFINET uses additionally a device name to identify the PROFINET devices. This device name must be unique within the PROFINET network.

3.1.1 Device name

During the commissioning phase a device name is assigned to each PROFINET device by the engineering system (HW Config, NetPro, STARTER, SCOUT, Primary Setup Tool). The device name can be assigned by different ways:

- IO-Controller
 - Engineering Software (HW Config, NetPro, STARTER, SCOUT, Primary Setup Tool)
 - By downloading the HW Config
 - By user program (system function _setNameOfStation() for SIMOTION)
- IO-Device
 - Engineering Software (HW Config, NetPro, STARTER, SCOUT, Primary Setup Tool)
 - From IO-Controller via topology-based initialization

The device name will be stored in the device (on MMC or CF card). When replacing this device (e.g. in case of malfunction), this device must be initiated using the device name of the replaced device. For this step more possibilities are available:

- By plugging the MMC or CF card (if available)
- Engineering software (HW Config, NetPro, STARTER, SCOUT, Primary Setup Tool)
- Topology-based initialization by the IO-Controller itself. For this the PROFINET interface must be in factory settings.

It means the new device can assume the function of the replaced device without changing the configuration.

3.1.2 Assign device name via HW Config

Open HW Config and select the PROFINET IO-System. Click in menu under "PLC > Ethernet" onto "Assign Device Name...". The dialog assign device name will appear. All configured device names are in dropdown box listed. All recognized PROFINET devices via Network interface are shown under available devices. IO-Controllers are not shown here, because they will get the device name by downloading the HW Config explicit.

Station Edit	Insert	PLC View Options Window	Help		_15
) 🚅 🔓 🖬	F 01 6	Download Upload	Ctrl+L		
🚺 (0) SIMOTIO 2	N D435	Download Module Identificatio Upload Module Identification to	n) PG	egrated: DP master system (1)	-
X126 X126	DP1	Faulty Modules			
РСІ X130 X130 Р1 X1400 X1400 Р1	DP In IE2-N Port i CBE3 Port i	Module Information Operating Mode Clear/Reset Set Time of Day Monitor/Modify	Ctrl+D Ctrl+I	Mark (1)	
X1400 P2 X1400 P3	Port 2 - Port 3	Update Firmware		PN IO-Syste	3111 •
X1400 P4	Port 4	Save Device Name to Memory	Card		
X120 P1	Port i	Ethernet	•	Edit Ethernet Node	Ł
1		PROFIBUS		Verify Device Name	•
		Save Service Data		Assign Device Name	
				2 (2) UBE 30K	
🗲 📄 Ether	net(1): PB(EINET-IO-Sustem (100)			
	1 B		10.1		10
Device Number		IP addres Device Name	Urde	ernumber Fi D In S	U

Figure 3-2

Assign device	name				X
<u>D</u> evice name:	S120xCU320x2xDPxC	BE2 Device type:	120xCU320x2x	DPxCBE20	
Avajlable devic	es:	(A)			(C)
IP address	MAC address [Device type Device nan	ie	<u>A</u> ssign name	
192.168.0.3	00-0E-8C-92-55 (SINAMIUS S s120xcu32	Jx2xdpxcb	Node flashing test —	
(В)			Duration (seconds):	3 🔹
				Flashing <u>o</u> n	Elashing off
I					
Show only (devices of the same type	e 🔲 Display only devices	without names		
[pdate	<u>Expor</u>	t			
<u>C</u> lose					Help

Select the configured device name (A) and select the corresponding device (B) and click on "Assign name" (C). The device name will be transferred to the device.

If the device identification is not clear you can activate the flashing of a specified LED. Select the device and click on "Flashing on" to activate the function. Depending on the device type following LED will start flashing:

Table 3-1

Device	LED
SIMATIC	LINK-LEDs
SIMOTION	SF-LED
SINAMICS S120	RDY-LED
SINAMICS G120	RDY-LED

3.1.3 SINAMICS: Assign device name via parameters

The device name of a SINAMICS drive can also be specified offline via parameters in the expert list of the CU. By using the STARTER / SCOUT functionality "Load to file system" afterwards the configuration can be transferred directly to the CF card via card reader or to the drive via download of the offline configuration. The device name will be activated in the drive and stored non-volatile after the next run-up (Power OFF/ON required!).

NOTE Beside the device name, also the IP address and the subnet mask of the drive have to be specified correctly in the expert list of the CU, because these will also be activated in the drive and stored non-volatile after the next run-up.

For the assignment of the device name, the IP address and the subnet mask, proceed as follows:

- 1. Open the expert list of the CU in the STARTER / SCOUT project.
- 2. Depending on which PROFINET interface of the drive you are using (onboard PROFINET interface or CBE20), proceed as follows:
 - Settings for the onboard PROFINET interface
 - Enter the drives' device name from HW Config into parameter p8920.
 - Enter the drives' IP address from HW Config into parameter p8921.
 - Enter the drives' subnet mask from HW Config into parameter p8923.
 - Set parameter p8925 to the value "[2] Save and activate configuration".
 - Settings for the CBE20
 - Enter the drives' device name from HW Config into parameter p8940.
 - Enter the drives' IP address from HW Config into parameter p8941.
 - Enter the drives' subnet mask from HW Config into parameter p8943.
 - Set parameter p8945 to the value "[2] Save and activate configuration".
- **3.** Save the changes carried out in the project. Afterwards mark the drive in the project tree and open its context menu via right clicking. Choose the option "Load to file system".
- **4.** Choose the option "Save normally" as type of saving and click on the button "Select target...". Choose the path of the card reader and start the transmission of the configuration via the button "OK".
- 5. After the successful transmission of the configuration and subsequent run-up of the drive the device name, the IP address as well as the subnet mask is taken over from the parameters and stored non-volatile.

3.1.4 Topology-based initialization

The device name can be assigned by the PROFINET IO-Controller itself. With the checkbox "Support device replacement without exchangeable medium" the PROFINET feature topology-based initialization is activated. This feature is activated by default.

General Addresses	PROFINET Sender Receiver I-Devic	ce Synchronization
Short description:	CBE30xPNxI0	
Device name:	CBE 30xPNxIOxSlave	
Use different me	hod to obtain device name	
Support device	placement without exchangeable medium	
I ■ <u>Support device</u>	placement without exchangeable medium	J
- Interface		
Type:	Ethernet	
Device number:	0	
Address:	192.168.0.2	
Networked:	Yes Properties	
<u>C</u> omment:		
		2

This properties window will open by double clicking on the PN interface of the IO-Controller in HW Config.

Please observe that **the PN interface of IO-Device must be in factory settings** to support this function (in this state the interface has the IP address = 0.0.0.0 and an empty device name = ""). To reset the PROFINET interface to factory settings open HW Config and click on "PLC > Ethernet > Edit Ethernet Node > Reset" (see following figure).

Figure 3-4

Edit Ethernet Node	X
Ethernet node	
Nodes accessible online	
MAC address: 00-0E-8C-92-55-F3 Browse	
Set IP configuration	
• Use IP parameters	
Gateway	
I 192. 168.0.3 © Do not use router	
Subnet mask: 255.255.0 C Use router	
Addr <u>e</u> ss: 192.168.0.3	
Assign IP Configuration	
Assign device name	
Device name: s120xcu320x2xdpxcbe20 Assign Name	
Reset to factory settings	
Rent	
<u>C</u> lose Help	

3.1.5 Device name assignment rules

The device name has to follow the rules of DNS (Domain Name System). Following possibilities for DNS names are given:

- Letters (a..z),
- Numbers (0..9) and the signs
- Minus (-) and
- Dot (.) are allowed.

The dot divides the device name into labels. The device name can include more labels, for example:

<CPU name>.<Interface number >.<Name of IO-System>...

- <Interface number>, if the device has more than one PN interfaces available (e.g. "X150")
- <Name of IO-System>, optional and configured by HW Config (see Figure 3-5).
- Each label must start with a letter and doesn't end with minus or a dot.
- The maximum length of one label is 63 characters.

Figure 3-5

Properties - PROFINE	f IO-System		×
General Update Time			
Short designation:	PROFINET ID-System		
Name:	PROFINET-IO-System		
-	Use name in ID device / controller		
<u>1</u> 0 system no.:	100 💌		
Subnet:	Ethemet(1)		
	Properties		
Comment:			
	r F		
OK		Cancel	Help

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Observe also following additional rules:

- The maximum total length is 127 characters (incl. minus and dot)
- The device name may only include lower case. On the device upper case are replaced through lower case.
- Do not use umlauts (ä, ö, ü)
- Do not use special characters ! " § \$ % & / () = ? * '_:; > < , # + | ~ \ }] [{</p>
- Do not use blanks
- The device name does not start with "port-xyz" (x, y, z = 0..9).
- Do not use the minus sign on SIMOTION controllers. Up from SIMOTION SCOUT Version 4.3 this limitation is raised.

3.1.6 IP address

PROFINET uses IP addresses for establishing the PROFINET IO communication and for NRT (Non Real Time Communication e. g. TCP, UDP, S7 communication).

The IP address is also needed to go online to the device. It is recommenced to assign an IP address to each PROFINET IO-Device during startup of a project commissions. To do this you have more possibilities:

- IO-Controller
 - Engineering software (HW Config, NetPro, STARTER, SCOUT, Primary Setup Tool)
 - Download of HW Config, please observe the current active IP address of the device!
- IO-Device
 - Engineering software (HW Config, NetPro, STARTER, SCOUT, Primary Setup Tool)

In a PROFINET IO-System it is possible to receive the IP address from the IO-Controller. This feature is activated by default.

For this a correct working PROFINET connection between IO-Controller and IO-Device is required and the active device name must be the same as in the HW Config. Figure 3-6 shows the configuration of a SINAMICS S120. The device with device name "SINAMICS" will get the IP address 192.168.0.3 and the same subnet mask as the IO-Controller.

If the device doesn't receive the IP information from IO-Controller it is maybe not possible to go online with the engineering software (e. g. Starter or SCOUT). In this case assign a fixed IP to the device.

Figure 3-6

Properties - SINAMICS		×
General Shared Acce	\$8	
Short designation:	S120xCU320x2xPN	
	SINAMICS S120 CU320-2 PN V4.510 device with DriveES/SIMOTION interface (RT, IRT and acyclic communication, isochronous operation, PROFIsafe).	×
Order no. / firmware:	6SL3 040-1MA01-0Axx (CU320-2 PN, S120) / V4.5	
Family:	SINAMICS	
Device name:	SINAMICS	
Node / PN-10 system Device number:	PROFINE T-IO-System (100)	
IP address:	via ID controller	
<u>C</u> omment:		
		×
OK	Cancel Hel	>

The received IP address from IO-Controller is just a temporary address (till next power OFF/ON of the device). The received address is higher prior as a fixed set IP address via engineering software.

After power ON the IP address must be received from IO-Controller first. If the address will not receive, the IP address set by the engineering system or the default IP address 0.0.0.0 (default setting of the PN interface) will be active. An IP address assigned by any engineering software is permanently saved.

If you <u>disable</u> the function "Assign IP address via IO-Controller" the fixed IP address will be used. The IO-Controller will not assign the configured IP address.

The IP address in the device must be unique. Please observe that the IP addresses used by PN interfaces (e.g. X150) and the IP addresses of the standard Ethernet interfaces (e.g. X127) must be in different IP subnets. For example: If you assign an IP address 169.254.11.23 to the PN interface X150 so the device will report an error if the standard Ethernet interface X127 is still assigned to 169.254.11.22 (default IP address of X127).

Figure 3-7

Edit Ethernet Node		×
Ethernet node		
	Nodes accessible online	
MAC <u>a</u> ddress:	00-1F-F8-00-9B-55 <u>B</u> rowse	
Set IP configuration-		
Use IP parameter	15	
	Gateway	
IP address:	169.254.11.23 © Do not use router	
Subnet mas <u>k</u> :	255.255.0.0 C Use router	
	Addr <u>e</u> ss:	
C Obtain IP address	s from a DHCP server Edit Ethernet Node (4502:529)	
Client ID:	The function could not be executed.	
Assign device name		
Device name:	simotion-slave Assign Name	
- Reset to factory settin	<u>R</u> eset	
<u>C</u> lose	Help	

3.1.7 Send clock for IRT communication

- The send clock for the IRT communication can be configured to a value ranging between 250 µsec and 4.0 msec.
 - Up from firmware V4.5 of SINAMICS S120 the minimum send clock time of the onboard PN interface is 250 µsec.
 - By using the CBE20 the minimum send clock time is 500 µsec.
 - Please refer also to the SIMOTION documentation "Communication.pdf" Chapter 4.2.2.3 "Overview of the possible bus cycle clocks".
- Up from SIMOTION V4.1 SP1 the send clock of the isochronous PROFIBUS interfaces must be equal to the servo cycle clock. This also applies to PROFIBUS Integrated (SINAMICS Intergrated). Maybe the servo cycle clock or PROFIBUS send clock must be a multiple of the PROFINET IO send clock.
- Isochronous applications (e.g. ServoTask) are synchronized to the send clock or a multiple of the send clock. The cycle reduction is configured in the SIMOTION SCOUT under "Set system cycle clocks...".

3.1.8 Isochronous mode

Isochronous mode means that the application (e.g. ServoTask of SIMOTION or OB6X of SIMATIC) is synchronized with the PROFINET IRT send clock. For this PROFINET IRT (High Performance = RTC3) is absolutely needed.

With a SIMOTION controller the synchronization of the application with the communication send clock will be handled as follow:

- As Sync-Master the synchronization will be handled automatically, but if the Sync-Master is configured as IRT I-Device the synchronization must be done manually like an Sync-Slave
- A Sync-Slave must always be synchronized with the send clock. This has to be done in the StartupTask with following system function:

```
i32RetValue := _enableDpInterfaceSynchronizationMode(
    dpInterfaceSyncMode := AUTOMATIC_INTERFACE_SYNCHRONIZATION
    );
```

If a SIMOTION controller is synchronized it can be checked by the LED SY (X150) respectively by the green LED on the CBE30 or CBE30-2.

- Green flashing = not synchronized
- Green continuous = synchronized

```
A check of the system variable stateOfDpInterfaceSynchronization = DP INTERFACES SYNCHRONIZED is also possible.
```

If a SINAMCIS device is synchronized you can check the LED PN (X150) respectively by the green LED on the CBE20.

- Green flashing = not synchronized
- Green continuous = synchronized

4.1 HW configuration of the SIMATIC CPU

4 Configuration and programming

4.1 HW configuration of the SIMATIC CPU

In the application example a SIMATIC CPU 317-2 PN/DP with the following configuration is used.

No.	Action
1.	Open the STEP 7 SIMATIC Manager engineering system to create a new project. Add a new SIMATIC 300 station.
	SIMATIC Manager - [PN_IRT_SIM_SIN_V1_2 ~ D: VPN_IRT_S] Pile Edt Insett PLC View Options Window Help Station 1 SIMATIC 400 Station Program 2 SIMATIC 900 Station Program 3 SIMATIC H Station S7 Block 5 SimATIC HIN Station Symbol Table 7 SIMATIC 55 Symbol Table 7 SIMATIC 55 Symbol Table SIMATIC T station WrinCoflextier FIT * SiMATIC T station Shared Declarations + Percenter Pareneter Externel peraneters Insent SIMATIC 300 Station 1
2.	Open the HW configuration.
	SIMATIC Manager - [PN_IRT_SIM_SIN_V1_2 ~ D:VPN_IRT_S] Elle Edit Insett PLC View Options Window Help B Elle Edit Insett PLC View Options Window Help B FN_IRT_SIM_SIN_V1_2 Object name Symbolic name Station configuration Hardware Image: F1 to get Help.
3.	A SIMATIC CPU 317-2 PN/DP V3.2 is used in the sample project.
	Image: Station _ Station _ Configuration) ~ PN_IRT_SIM_SIN_V1_2 X Image: Station _ Edit _ Insert _ PLC _ View _ Options _ Window _ Help X Image: Station _ Edit _ Insert _ PLC _ View _ Options _ Window _ Help X
	Image: CPU 317-2 PN/DP X1 MRI/DP X2 PN:10 X2P1 R Poil 1 X2P2 R Poil 2 3 Image: CPU 315-2 DP Image: CPU 315-2 DP Image:
	Stort Innovate Urdet number Primwate Mrt address 1 ad U
I	Pressing the F4 key automatically arranges the modules present in the HW configuration.

4.1 HW configuration of the SIMATIC CPU

No.	Action
4.	Create a new Ethernet subnet and assign an IP address.
	Properties - Ethernet interface PN-10 (R0/S2.2)
	General Parameters
	If a subnet is selected, the next available addresses are suggested. IP address: 192.168.0.1 Subnet mask: 255.255.0 Use different method to obtain IP address Subnet: Mew Ethermet() Properties Delete
	OK Cancel Help
	Double-click the PROFINET interface (\mathbb{N}_{PN-TO}) to open the properties w
	The device name is "simatic317" in the sample project. Properties - PN-10 (R0/S2.2) Media Redundancy Time-of-Day Synchronization Options General Addresses PROFINET I-Device
	Short description: PN-IU
	□ Use different method to obtain device name ☑ Support device replacement without exchangeable medium Interface Type: Ethernet Device number: 0 Address: 192.168.0.1 Networked: Yes Comment:
	OK Cancel Help

4.2 HW configuration of the SINAMICS drive

The SINAMICS drive can be configured with the OM (ObjectManager, Drive ES BASIC, hardware catalog) or with the help of a GSD file. In the application example the drive is configured via the OM.

Table 4-2

No.	Action
1.	Drag the SINAMICS drive CU320-2 PN V4.4 to the existing PROFINET network.
	Big HW Config - [SIMATIC 317 (Configuration) PN_IRT_SIM_SIN_V1_2]
	Image: Construction of the second
	1.3 Image: Constraint of the state of the s
	Press F1 to get Help. Chg
2.	Select the existing Ethernet subnet and assign an IP address.
	OK Cancel Help

3. Double-click the added SINAMICS drive to open the properties window. Define the device name (e.g. "CU320x2xPN"). Properties - CU320x2xPN General Short designation: S120xCU320x2xPN IO Device SINAMICS S120 CU320-2 PN V4.4 PN-V2.2 with DriveES/SIMOTION interface, supports RT, IRT and isochronous operation. Order no. / firmware: 6SL3 040-1MA01-0Axx (CU320-2 PN, S120) / V4.4 Family: SINAMICS Device name: CU320x2xPN	
Properties - CU320x2xPN Image: Customatic content of the second	
General Short designation: \$120xCU320x2xPN IO Device SINAMICS \$120 CU320-2 PN V4.4 PN-V2.2 with DriveES/SIMOTION interface, supports RT, IRT and isochronous operation. Order no. / firmware: 6SL3 040-1MA01-0Axx (CU320-2 PN, S120) / V4.4 Family: SINAMICS Device name: CU320x2xPN	
Short designation: \$120xCU320x2xPN IO Device SINAMICS \$120 CU320-2 PN V4.4 PN-V2.2 with DriveES/SIMOTION order no. / firmware: 6SL3 040-1MA01-0Axx (CU320-2 PN, S120) / V4.4 Family: SINAMICS Device name: CU320x2xPN	
Order no. / firmware: 6SL3 040-1MA01-0Axx (CU320-2 PN, S120) / V4.4 Family: SINAMICS Device name: CU320x2xPN	
Device name: CU320x2xPN	
Node / PN-IO system Device gumber: 1 PROFINET-IO-System (100) IP address: 192:168:0.2 Ethernet Comment: Image: Comment: Comment: Image: Comment: C	
For this purpose mark the PROFINET IO system. Open the window for the name assignment with "PLC > Ethernet > Assign Device Name". With Configuration - PN_IRI_SIM_SIN_V1_2 Status Edd Inset FIC View Options Window Heb	
Upload Upload PROFINET-IO-System (100) Image: Device Name to Memory Card Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Diver Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device Name Image: Device	

No.	Action
5.	Mark the SINAMICS drive and click the "Assign name" button to assign the name ("CU320x2xPN") configured in the HW Config.
	Assign device name
	Device name: CU320x2xPN Device type: SINAMICS
	Available devices:
	IP address MAC address Device type Device name 192.168.0.2 00-1F-F8-04-7E-C8 SINAMICS cu320x2xpn Node flashing test Duration (seconds): 3 Flashing on Elesting off
	Show only devices of the same type Display only devices without names Update Export
	<u>Close</u>

4.3 Configuration of the isochronous communication

To communicate isochronously, PROFINET IRT must be enabled. To do this, the PN interfaces must be synchronized and the PROFINET topology configured.





Note

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

Function manual SINAMICS S120 (chapter 10.3.3)



No.	Action
7.	To operate the PROFINET network and the associated stations isochronously, they must be assigned to the isochronous OB61 execution level. For this purpose open the SIMATIC CPU properties
	properties.
	Child Station Edit Insert PLC View Options Window Help
	Ethernet(1): PROFINET-IO-System (100)
	2 CPU 317-2 PN/DP
	×2 PROFIBUS DP
	X2 P2 R Page 10 3 B
	4 5 Drives
	6 7
	8 ⊡ SINAMICS G120 3 ⊡ SINAMICS G130
	10 B C SINAMICS G150 B C SINAMICS B C
	Slot Module D Fi., M I Q Comment
	1 IPS 307 5A 6ES7 Image: Stable Costand Proceedings of the costand Proceedings of
	X1 MFV/DP 2 8191 X2 simalic317 8190 ■ \$120 CU320-2 PN CBE20
	X2/ Part 1 8789 X2/ Part 2 8786
	3 4 10 Device SINAMICS 120 CU320-2 PN (5120) 10 Device SINAMICS 5120 CU320-2 PN (4.4 PN-V2.2 with DirvES/SIMOTION interface,
	5 supports RT, IRT and isochronous operation.
8	Switch to the "Sunchronous Cuclo Interrunts" tab Select in the OB61 settings the
0.	number of the PROFINET IO system that shall be operated isochronously (here: "100", see
	previous figure).
	Properties - CPU 317-2 PN/DP - (R0/S2)
	Cycle/Clock Memory Retentive Memory Interrupts Time-of-Day Interrupts Cyclic Interrupts
	General Startup Synchronous Cycle Interrupts
	Process image partition(s)
	Priority ID system no. call is required)
	OB6 <u>1</u> : 25 100 · 1 16.000 μs
	<u>D</u> etails
	0B6 <u>2</u> : 0 ··· 📝 0.000 µs
	Details
	086 <u>3;</u> 0 0.000 µs
	Dețaiis
	086 <u>4</u> . 0 ···· y 000.0
	Details
	OK Cancel Help

No.	Action
9.	Select in the detailed properties, the process image partitions the OB61 shall have access to (here: "PIP 1"). The inputs/outputs assigned to the process image are then refreshed isochronously with the bus cycle.
	0861
	Application
	Priority: 25
	Application cycle [µs]: 1000.000 = 1 × 1000.000
	Delay time [μs]: 16.000 🖉 Automatic settings
	Process image partition(s):
	Ti/To mode:
	Time Ti (read in process values) [µs]: 0.000 Image: Timebase [µs]: 0.000 (0.0000.000) [µs] Timebase [µs]: 0.000 Image: Timebase [µs]: 0.000 Time To (output process values) [µs]: 0.000 Image: Timebase [µs]: 0.000 Image: Timebase [µs]: 0.000
	I/O IO system no.: Factor Transmit cycle [µs]
	Data cycle [µs]: 1000.000 = 1 × 1000.000
	OK Cancel Help
10.	To operate the SINAMICS drive isochronously, mark it and open the properties of the PROFINET interface ("PN_LO")
	Implementation Implementatio
	Ethernet(1) PROFINET-IO-System (100)
	1 PS 307 5A Eind: Ant Au 2 N CPU 317-2 PN/DP Standard Profile: Standard X1 MR/DP Standard Standard X2 P1 R Port 1 Profile: Standard
	X2 P2 R Prof 2 3
	7 SINAMICS DCM 8 SINAMICS G120 9 SINAMICS G130 10 SINAMICS G150
	Image: Sinamics Gutso
	Image: Site of the second s
	State Module Order number I address O address Diagnosti Comment E S120 CU320 CBE20
	X75 FW10 8783° B183° B
	X72 Fair 2 8785° 1 Drive object 8182° 1 7.7 Excern flumbat 6772°
	1.1 Of Constraint constraint Of Constraint<
	Press F1 to get Help.



No.	Action
13.	Assign the input/output addresses of the message frame to the process image partition 1 ("PIP 1") in order to save and compile the HW Config.
	Properties - Standard Telegramm 1
	General Message Frames
	Default: Standard message frame 1, PZD-2/2
	_ Inputs
	□ Notused
	Address: 256 Length: 2 Word Process image: PIP 1 081 PI PIP 1
	C Outputs
	Notused
	Address: 256 Length: 2 Word Process image: PIP 1
	OK Cancel Help
14.	Save and compile the HW Config.
15.	Download the HW Config to the SIMATIC CPU.
	Š 1

4.4 Configuration of the SINAMICS drive

The standard configuration of the SINAMICS drive with the SIMOTION SCOUT engineering system is shown below.

Table 4-4

No.	Action
1.	Open the current project in the SIMOTION SCOUT engineering system from the SIMATIC Manager.
	SIMATIC Manager - [PN_IRT_SIM_SIN_V1_2 D:\PN_IRT_S]
	Eile Edit Insert PLC View Options Window Help
	🗅 😂 🔡 🐖 X 🗈 🖻 📥 🕋 🗣 🏪 🗁 🚟 🏢 🔁 🛛 < No Filter > 💽 🍞 🎇
	E-By PN_IRT_SIM_SIN_V1_2 Object name Symbolic name Type
	E-10 SIMATIC 317 Commissioning Commissioning Commissioning
	3120_C0320_2_FN
2.	Go online.
3.	Select the SINAMICS drive in order to establish an online connection.
	Target Device Selection
	Devices that go online with "Connect to selected target devices":
	Target device Access point
	CU320x2xPN OS/ONLINE ODEVICE
	Select all Deselect all All <u>S</u> 70NLINE All <u>D</u> evice
	Establish state
	Devices not supported by SCOUT:
	OK Cancel Help

No.	Action
4.	Restore the factory setting on the SINAMICS drive.
	Project Edit Insert Target system View Options Window Help
	PN_IRT_SIM_SIN_V1_2 Insett SIMOTION device Insett single drive unit Usative integration Overview Cory Paste Compare Device Infect SiNAMICS LIBF Logd to file system Diffect SiNAMICS LIBF Logd to file system Diffect SiNAMICS LIBF Logd to file system Diffect SinAMICS LIBF Logd to file system Device Command libray Verview Communication Topology Licenses Documentation SinAMICS LIBF Logd to file system Diffect Command libray Verview Communication Topology Licenses Documentation Verview Communication Topology Licenses Documentation Properties Properties
	Alarms 🚞 Symbol browser) 🖽 Target system output 😋 Diagnostics overview
5	Restores the selected device to the delivered condition.
э.	Automatic Configuration
	Configure drive unit automatically The DRIVE-CLiQ topology is determined and the electronic type plates are read out. The data is then loaded to the PG and replaces the configuration in the project.
	Status of the drive unit: First commissioning Running operation: Waiting for START
	Configure Cancel

No.			Action				
6.	The two moto	ors at the SIMOTION	I training case are created as	servo motors.			
	Automatic Comm	issioning					
	During the automa clearly assigned to Please select the	atic commissioning, component o a drive object type. drive object type that is to be c	s have been found that cannot be created for the components.				
	Default setting for	all components:	Servo				
	Component	Drive Object Type	Identification				
	Drive 1	Servo	Identification via LED				
		Create	Help				
7.	After the auto SIMOTION tr a) Go offline Automatic	omatic configuration, aining case, becaus Configuration	, the blue drive (``SERVO_03″) se this drive does not have any	must be reconfigured at the DRIVE-CLiQ interface.			
	i	Automatic configura	ation completed	the following drives			
		or the infeed:					
	SERVU_U3 To do this, go offline and run through the relevant wizard. If there is an infeed, configure further properties (e.g. line filter).						
		Do you want to go OFFLIN	E (only with this drive unit)?				
		Go OF	FLINE Stay ONLINE				



			A	ction			
d)	Select the corre	ct motor type	9.				
	Configuration - CU320x2	xPN - Motor					
	Control structure	Drive: SERVO_03, D	IDS 0, MDS 0				
	Power unit	Configure the motor:					
	Motor	Motor name:	Motor_6				
	Encoder		C Motor with DRIVE-CLi) interface			
			Bead out motor	again			
			Select standard motor Enter motor data	from list			
		Motor type:	[237] 1FK7 synchronous	motor	•		
		Motor selection:	<u>.</u>				
		Order no.	Rated speed Rate	d torq Rated curr N∞ 0.5.0	<u> </u>		
		1FK7011-xAK7x-xxx 1FK7015-vAK2v-vvv	x 6000 U/min 0.08	Nm 0.85 A			
		1FK7015-xAK7x-xx0	x 6000 U/min 0.16	Nm 0.85 A			
		1FK7022-xAK7x-xxx	x 6000 U/min 0.6 N	lm 1.4 A			
	No.	1FK7024-xAK7x-xx	x 6000 U/min 0.60 x 6000 U/min 0.61 x 2000 U/min 1.No	Im 1A			
		1FK7032-xAK7x-xx0	(x 6000 U/min 0.8 N 	Im 1.3A			
		1FK7033-xAF2x-xxx	x 5000 07min 1.2 h x 6000 U/min 0.9 h	(m. 2A Im. 1.5A			
		1FK7034-xAF2x-xxx 1FK7034-xAK7x-xxx	x 3000 0/min 1.45 x 6000 U/min 1 Nn	niii 1.8A n 1.3A	1		
				1			
		< Bac	K Next>	Lancel H			
e)	The correct ence	oder type mu a Motor Order No	ust also be sele	cted.			
e)	The correct enc Encoder Selection vi The encoders listed be Select the relevant enc	oder type mu a Motor Order No low are available for oder via the motor o	IST AISO DE SEIE umber the selected listed moto rder number.	cted.	X		
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio	Oder type mu a Motor Order No low are available for oder via the motor o n:	ISt also be sele umber the selected listed moto rder number.	cted.	X		
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio	Oder type mu a Motor Order No low are available for oder via the motor o n: Encoder type	Ist also be sele umber the selected listed moto rder number. Besolution	cted.			
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio	Defer type mu a Motor Order No low are available for oder via the motor o n: Encoder type Encoder type Encoder type	Ist also be sele umber the selected listed moto rder number. Besolution ental C/D 2048 S/R	Cted.	x wher		
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Urder no TFN/XXX-XXXXX-XAXX TFN/XXX-XXXXX-XGXX 1FK/7XXX-XXXXX-XGXX	oder type mu a Motor Order Nu low are available for oder via the motor o n: Encoder type Sin/cos increm EnD at absolute	Ist also be sele Imber the selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 2048 S/R	cted. r. Code n 2051 2051 2052			
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Order no TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx	Dider type mu a Motor Order No low are available for oder via the motor o n: Encoder type Sin/cos increm EnD at absolute EnD at absolute EnD at absolute	Ist also be sele Imber the selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 2048 S/R 3 25/R 3 16 S/R	cted. 2001 2051 2053 2053 2054	x unber		
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selection IFK/XXX-XXXXX-XAXX IFK/XXX-XXXXX-XAXX IFK/XXX-XXXXX-XAXX IFK/XXX-XXXXX-XAXX IFK/XXX-XXXXX-XAXX IFK/XXXX-XXXXX-XAXX IFK/XXXX-XXXXX-XAXX IFK/XXXX-XXXXX-XAXX IFK/XXXX-XXXXX-XAXX	Defer type mu a Motor Order No low are available for oder via the motor of m: Encoder type Encoder type Encoder type Encoder type Encoder type Encoder absolute Encoder absolute Resolver Besolver	Ist also be sele umber the selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 205	cted.	umber		
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Order no IFK7xxxxxxxxxAxx IFK7xxxxxxxxxxAxx IFK7xxxxxxxxxxXGxx IFK7xxxxxxxxxXGxx IFK7xxxxxxxxxXGxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxxXXXXXXXXXXXXXXXXXXXXXXXX	Deder type mu a Motor Order No oware available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute Resolver Resolver	Ist also be sele umber the selected listed moto rder number. Besolution ental C/D 2048 S/R 2448 S/R 32 S/R 32 S/R 3 512 S/R 3 16 S/R n-speed	cted. r. 2051 2052 2053 2054 1003 1001	umber		
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Dider no IFK7xxx+xxxxx+Exx IFK7xxx+xxxxx+Exx IFK7xxx+xxxxx+Exx IFK7xxx+xxxxx+Xxx IFK7xxx+xxxxx+Xxx IFK7xxx+xxxxx+Xxx IFK7xxx+xxxxx+Xxx IFK7xxx+xxxxx+Xxx IFK7xxx+xxxxx+Xxxx IFK7xxx+xxxxx+Xxxxx+Xxx IFK7xxx+xxxxx+Xxxx+Xxxx IFK7xxx+xxxxx+Xxxx+Xxxxxx+Xxxxx+Xxxxx+Xxxxx+Xxxxx+Xxxxx+Xxxxxx+Xxxxx+Xxxxx+Xxxxxxx	oder type mu a Motor Order Nu low are available for oder via the motor o m: Encoder type Encoder	Ist also be sele Imber The selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 20	cted. code on 2001 2051 2053 2054 1003 1001			
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Dirder no TFK7xxx+xxxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xxx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxxx+Xxx TFK7xx+xxx+Xxx+Xxx TFK7xx+xxxx+Xxx+Xxx TFK7xx+xxxx+Xxx+Xxx TFK7xx+xxx+Xxx+Xxx TFK7xx+xxxx+Xxx+Xxx TFK7xx+xxx+Xxx+Xxx+Xxx TFK7xx+xxx+Xxx+Xxx+Xx TFK7xx+xxx+Xxx+Xx TFK7xx+xxx+Xxx+Xx+Xx TFK7xx+xxx+Xxx+Xx+Xx TFK7xx+xx+xxx+Xx+Xx TFK7xx+xx+xxx+Xx+Xx TFK7xx+xx+xxx+Xx+Xx TFK7xx+xx+xxx+Xx+Xx+Xx TFK7xx+xx+xxx+Xx+Xx+Xx TFK7xx+xx+xxx+Xx+Xx+Xx+Xx+Xx+Xx+Xx+Xx+Xx+Xx+	Defer type mu a Motor Order No low are available for oder via the motor o m: Encoder type EnDat absolute EnDat absolute EnDat absolute Resolver Resolver	Ist also be sele Index The selected listed moto rder number. Besolution ental C/D 2048 S/R 3 2048 S/R 3 2048 S/R 3 32 S/R 3 16 S/R 3 16 S/R 3 16 S/R 3 16 S/R 3 16 S/R	cted. c. 2001 2052 2053 2054 1003 1001			
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Order no IFK/Xxxx+xxxx+Xxx IFK/Xxxx+xxx+Xxx IFK/Xxxx+xxxx+Xxx IFK/Xxxx+xxx+Xxx IFK/Xxxx+Xxx+Xxx IFK/Xxxx+Xxx+Xxx IFK/XxxX+Xxx+Xxx IFK/XxxX+XxX+XxX+Xx IFK/XxxX+XxX+XxX+Xx IFK/XxxX+XxX+XxX+Xx IFK/XxxX+XxX+XXX+XXX+XXX+XXX+XXX+XXX+XXX+XX	Deder type mu a Motor Order No low are available for oder via the motor of m: EnDat absolute EnDat absolute EnDat absolute EnDat absolute EnDat absolute Resolver Resolver ancel	Ist also be sele Imber the selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 32 S/R 32 S/R 32 S/R 3512 S/R 3 16 S/R n-speed 1-speed	cted.			
e)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Order no IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxxxx+Qxx IFK/7xxx+xxx+Qxx IFK/7xxx+xxxx+Qxx IFK/7xxx+xxx+Qxx IFK/7xxx+xxx+Qxx IFK/7xxx+xxx+Qxx IFK/7xx+xxx+Qxx+Qxx IFK/7xx+xxx+Qxx+Qxx+Qxx+Qxx+Qxx+Qxx+Qxx+Qxx+	a Motor Order Nu a Motor Order Nu low are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute Resolver Resolver Resolver	Ist also be sele Interview of the selected listed moto rider number. Besolution ental C/D 2048 S/R 2048 S/R 2048 S/R 3 512 S/R 5 512 S/R 5 16 S/R n-speed 1-speed	cted. r. 2051 2052 2053 2054 1003 1001	umber		
e) f)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Drder no TFN/XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	oder type mu a Motor Order Nu low are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute EnDat absolute Resolver Resolver Resolver ancel	Ist also be sele Imber The selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 20	cted. cted. code on 2051 2053 2054 1003 1001			
e) f)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Inter no IFK7xxxxxxxxxxXxx IFK7xxxxxxxxxXxx IFK7xxxxxxxxxXxx IFK7xxxxxxxxxXxx IFK7xxxxxxxxxXxx IFK7xxxxxxxxxXxxx IFK7xxxxxxxxxXxxx IFK7xxxxxxxxxXxxx IFK7xxxxxxxxxXxxx IFK7xxxxxxxxxXxxxXxx IFK7xxxxxxxxxXxxXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXxx IFK7xxxxxxxxxXXXXXXXXXXXXXXXXXXXXXXXXXXXX	oder type mu a Motor Order No low are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute Resolver Resolver ancel	Ist also be sele Information of the selected listed moto rider number. Besolution ental C/D 2048 S/R 2048 S/R 2	cted. c. 2001 2051 2053 2053 2054 1003 1001			
e) f)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio TFK7xxxxxxxxxxxxxxxxxxxxx TFK7xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Deder type mu a Motor Order No low are available for oder via the motor o n: Encoder type EnD at absolute EnD at absolute EnD at absolute Resolver Resolver ancel	Ist also be sele Imber The selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 2058 S/R 2058 S/R 2058 S/R 2058 S/R 20	cted. cted. 2001 2052 2053 2054 1003 1001			
e) f) g)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio TFK7xxxxxxxxxxXXX TFK7xxxxxxxxxXXXX TFK7xxxxxxxxXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	a Motor Order Ne a Motor Order Ne low are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute EnDat absolute EnDat absolute EnDat absolute ancel ancel	Ist also be sele Information of the selected listed moto rider number. Besolution ental C/D 2048 S/R 2048 S/R 2048 S/R 3 32 S/R 3 32 S/R 3 16 S/R n-speed 1-speed 1-speed	cted.			
e) f) g)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Drder no IFK/7xxxxxxxxxXXXX IFK/7xxxxxxxxXXXX IFK/7xxxxxxxXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Deder type mu a Motor Order No low are available for oder via the motor of n: Encoder type EnD at absolute EnD at absolute EnD at absolute Resolver Resolver ancel	Ist also be sele Information of the selected listed moto rider number. Besolution ental C/D 2048 S/R 2048 S/R 2048 S/R 2048 S/R 3 32 S/R 3 512 S/R 512 S/R 512 S/R 512 S/R 16 S/R n-speed 1-speed	cted. code on 2051 2052 2053 2054 1003 1001 2054 1003 1001 2055 2055 2054 1003 1001 2054 1003 1001 2055 20			
e) f) g) h)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Inder no IFK7xxxxxxxxxxxxxxxxxxxx IFK7xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	a Motor Order No a Motor Order No ower available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute EnDat absolute Resolver Resolver ancel urration and s	ust also be sele umber the selected listed moto rder number. ental C/D 2048 S/R 2048 S/R 2048 S/R 32 S/R 3 32 S/R 3 512 S/R 3 16 S/R n-speed 1-speed save the setting drive.	cted. Code of 2051 2052 2053 2054 1003 1001 2054 1003 1001			
e) f) g) h)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Dider no FFX7xxxxxxxxxxXxX FFX7xxxxxxxxxXXXX FFX7xxxxxxxxXXXX FFX7xxxxxxxxXXXX FFX7xxxxxxxxXXXX FFX7xxxxxxxXXXXXX FFX7xxxxxxxXXXXXXXXXXXXXXXXXXXXXXXXXXXX	a Motor Order No a Motor Order No low are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute EnDat absolute Resolver Resolver ancel uuration and s	Ist also be sele Index Ithe selected listed moto rder number. Ental C/D 2048 S/R 3 2058 S/R 3 2058 S/R 3 2048 S/R 3 2058 S/R 3 20	cted. code no 2051 2053 2054 1003 1001 3052 2054 1003 1001 3052 2054 1003 1001 3052 3054 1003 1001 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 3052 3054 30555 30555 3055 3055 3055 3055 3055 3055 3055			
e) f) g) h)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enco Motor encoder selectio Inder no IFK/XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	a Motor Order No a Motor Order No low are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute Resolver ancel urration and a s SINAMICS	Ist also be sele Inder The selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 20	cted. cted. 2001 2051 2053 2054 1003 1001			
e) f) g) i)	The correct enco Encoder Selection vi The encoders listed be Select the relevant enc Motor encoder selectio IFK7xxxxxxxxxxxXXX IFK7xxxxxxxxxXXXX IFK7xxxxxxxxxXXXX IFK7xxxxxxxxXXXX IFK7xxxxxxxxXXXX IFK7xxxxxxxxXXXX IFK7xxxxxxxXXXXX IFK7xxxxxxxXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	a Motor Order Ne a Motor Order Ne ow are available for oder via the motor o n: EnDat absolute EnDat absolute EnDat absolute EnDat absolute Resolver Resolver ancel urration and a s SINAMICS OM.	Ist also be sele Inder The selected listed moto rder number. Besolution ental C/D 2048 S/R 2048 S/R 2058 S/R 20	cted. code no 2001 2052 2053 2054 1003 1001 2055 2054 1003 1001			

No.		Action					
10.	The following parameters of both drives ("SERVO_02" + "SERVO_03") must be checked after the automatic configuration. For this purpose open the expert list.						
	Parameter	Description	Value				
	p0340	Automatic calculation	0				
	p0210	Supply voltage	345 V				
	p0864	Infeed in operation	1				
p1244[0]Upper voltage limit for the DC link40p1248[0]Lower voltage limit for the DC link24							
							p1460[0]
	p1462[0]	Integrator time for the speed controller (in the sample project)	20 ms				
	These settings apply	only when you are working with a SIMOTION training case	!				
11.	The correct message two servo motors. Be communication, at lea "SERVO 03"!	frames must be selected for the cyclic communication to the cause the "Standard Telegram 1" does not support and ast "Standard Telegram 2" must be selected for "SER	ne CU and to the ny IRT Vo_02″ and				
	SIMOTION SCULT PN_IBT_SIM_SIN_V Project Edit Inset Target system. View Project Command library	1 2 CU320x2xPN - Message frame configuration] Dirion: Window Help Image: Custom control of the second seco	IRe> IN IN Objekt				
	Then align the selecti	on of the message frames with the hardware configuration.					
12.	A blue tick after the m	essage frames indicates the correct alignment with HW Co	onfig.				
	IF1: PROFIdrive PZD message frames IF2: PZD message frames Communication interface: PROFINET - Control Unit onboard (isochronous) The PROFIsafe communication is performed via this interface The PROFIdrive message frames of the drive objects are transferred in the following order: The input data corresponds to the send and the output data to the receive direction of the drive object						
	Input data Output data Object Drive object No. Message frame type Input data Output data SIMOTIOH object 1 OU_S 1 SIEMENS telegram 390, PZD-2/2 2 260263 2 260263 2 SERVO_02 2 Standard telegram 2, PZD-4/4 4 264271 4 264271 3 SERVO_03 3 Standard telegram 2, PZD-4/4 4 272279 4 272279 Without PZDs (no cyclic data exchange) Interconnections/degnostics Align message frame with HW Config: Set up addresses						
	2:1	Ø	Close Help				

No.	Action
13.	Save and compile the HW configuration.
	Note
	Assign the input/output addresses of the new added message frames also to the process image partition 1 ("PIP 1") in order to save and compile the HW Config (see page 29).
14.	Go online.
15.	Download to the SINAMICS drive.
16.	Copy RAM to ROM.

Note Further information about the configuration of the SINAMICS training case can be obtained from the following article:

http://support.automation.siemens.com/WW/view/en/27038754

4.5 Activation of the servo motors

In the application example, the isochronous communication between a SIMATIC controller and a SINAMICS drive is implemented in the OB61 isochronous alarm. The SFC 126 and SFC 127 system functions refresh isochronously the process image partitions of the inputs and outputs. The OB61 contains the user program, which is described below.

```
Table 4-5
```

No.	Action				
1.	Network 1: SFC 126				
	Comment:				
	CALL "SVMC DI" SFC126 PART :=B#16#1 ("FC126" FU100				
	FLADDR :="FlAddr_SFC126" MW102				
	The SFC 126 system function is called once in each communication cycle when the OB61 starts. The "PART" input parameter must specify which part of the process image of the inputs shall be refreshed isochronously (here: "PIP 1").				
2.	Network 2 : User Programm (speed calculation + move drives + reset failures)				
	Comment:				
	// speed calculation L "N_SOLL_USER" MD300 L 6.000000e+003				
	L 1.073742e+009				
	T "N_SOLL" MD200				
	U "boMove" MO.0 SPBN S005				
	The user must specify the speed setpoint used to move the servo motors ("N_SOLL_USER"). The calculation of the speed setpoint is based on the specified definitions of the PROFIdrive profile. 6000 rpm corresponds to "W#16#4000_0000".				
The VibeMarro " flag is used to may an stop the same meters with the calculated and					
	The Bonove ling is used to move of stop the serve motors with the calculated speed.				
	Note				
	The rated speed of the servo motors included in the training case is 6000 rpm. The maximum speed is 10000 rpm.				







NOTE The following addresses are used in the example project for controlling the SINAMICS drive:

SERVO_02

- EW 264 → Status word 1 ("ZSW1")
- AW 264 → Control word 1 ("STW1")
- AD 266 → Speed setpoint ("NSOLL_B")
- AW 270 → Control word 2 ("STW2")

SERVO 03

- EW 272 → Status word 1 ("ZSW1")
- AW 272 → Control word 1 ("STW1")
- AD 274 → Speed setpoint ("NSOLL B")
- AW 278 → Control word 2 ("STW2")

Slot	Module	Order number	l address	O address	Diagnostics address
0	EU320x2xPN	65L3 040-1MA01-0Axx (CU.			8184*
X75	FW ID				8183*
X75	Fort 1				8186*
X75	Fort 2				8185*
1	CU_S				8181*
1.1	Frogram Nowchart				8181*
1.2	📲 SIENENS Telegramm 3		260263	260263	
1.3					
2	SERVO_02				8182*
21	🚦 Frogram flowichart				8182**
22	🚦 Standard Telegramm 2		264271	264271	
2.3					
3	SERVO_03				8180*
31	🚦 Frogram flowichart				8180"
32	🚦 Standard Telegramm 2		272279	272279	
3.3					

N

4.6 F-CPU: clock-synchronized mode and safety mode

When using a F-CPU only under certain conditions it can be clock-synchronized (standard program in OB6x) and execute a safety program ("F-CALL") at the same time.

It is absolutely necessary to avoid the updating of the process image partition while the safety program is executed!

NOTE	If the process image partition is not updated in each OB6x cycle, the S7
	application (standard program in OB6x) is not really clock-synchronized!

Table 4-6

Nr.	Aktion
1.	Before the safety program is called ("F-CALL", here "FC1") an auxiliary flag (e.g. "M10.0") is set, as long as the safety program is executed.
	Program of OB3x:
	SET; = M10.0;
	//call safety program CALL FC1;
	CLR; = M10.0;
2.	In the clock-synchronized standard program (OB6x) the auxiliary flag (e.g. "M10.0") is the condition to jump to the end of OB6x. It means the update of the process image partition (SFC 126/127) is only done if the safety program is not executed.
	Program of OB6x:
	SET; U M10.0; SPB end;
	CALL "SYNC_PI"(//SFC126 PART := B#16#1, RET_VAL := MW20, FLADDR := MW22);
	//here is the user program
	CALL "SYNC_PO"(//SFC127 PART := B#16#1, RET_VAL := MW24, FLADDR := MW26);
	end: NOP 0; BEA;

5.1 Commissioning

5 Commissioning the sample project

The following steps must be performed to commission the sample project.

5.1 Commissioning

Table 5-1

No.	Action						
1.	All hardware components specified in Table 2-1 (page 7) are present and have been upgraded to the required firmware version.						
2.	All PROFINET components are interconnected and accessible from the engineering system.						
3.	The Ethernet interface of the engineering system is configured correctly.						
	IP address: 192.168. 0 .100						
	Subnet mask: 255.255.255.0						
4.	Start the STEP 7 SIMATIC Manager engineering system.						
5.	Unzip the sample project "53477498_PN_IRT_SIMATIC_SINAMICS_V1_2.zip".						
6.	Open the HW Config of the SIMATIC CPU.						
7.	Download the SIMATIC CPU configuration to the particular controller.						
8.	Perform the node initiation afterwards.						
	By HW Config - [SIMATIC 317 (Configuration) PN_IRT_SIM_SIN_V1_2]						
	Image: Control and Module Identification to PG Image: Control and Image: Con						
	Device Number IP addres Device Name Order n Fi D In S Comment PROFIBUS-DP slaves for SIMATIC S7, M7, and €_{≤} 1 1 1 1 1 COMPARE SCIENCE Comment C7 (distributed rack) C7 (distributed rack) C7 (distributed rack)						
	Mark the PROFINET network and open the "Assign Device Name" window.						
	Mark the Free her will open the Assign Device hance willow.						

5.1 Commissioning

No.	Action				
9.	You can select the configured device names and assign them to the particular device				
	(IO device).				
	Assign device name				
	Device name: CU320x2xPN				
	Available devices:				
	IP address MAC address Device type Device name Assign name 192.168.0.2 00-1F-F8-04-7E-C8 SINAMICS cu320x2xpn				
	Node flashing test				
	Hashing on Hashing off				
	Show only devices of the same type. Display only devices without names				
	Close				
	Note				
	Only IO devices are listed here.				
10.	As an alternative, the Primary Setup Tool (PST) can also be used to perform the node initiation				
	The PST can be downloaded from the following link.				
	http://support.automation.siemens.com/WW/view/en/19440762				
11.	Start the SIMOTION SCOUT engineering system from the project in the SIMATIC Manager.				
	B) File Edit Insert PLC View Options Window Help B) X				
	🗋 🗅 🥔 🔡 🐖 3, 📭 💼 🖆 🔍 🐾 🕒 🗁 🏥 🏢 💼 < No Filter > 💽 🏹 😪				
	PN_IRT_SIM_SIN_V1_2 Direct name Symbolic name Type				
	Image: Commissioning Image: Commissioning Image: Commissioning Image: Commissioning				
	E CU320X2HN S120_CU320_2_PN				
	Press F1 to get Help.				
12.	Go online.				
13.	Download the configuration of the SINAMICS drive to the particular device.				
14.	Copy RAM to ROM.				
	5°				
15.	The sample project is now ready for operation.				
13. 14. 15.	Download the configuration of the SINAMICS drive to the particular device.				

6.1 Overview

6 Operating the sample project

6.1 Overview

The sample project is operated from the SIMATIC Manager by modifying the flags that specify the speed setpoint.

6.2 Distributed SINAMICS drive

Table 6-1

No.	Action							
1.	Open the OB61 in the SIMATIC CPU.							
	SIMATIC Manager - [PN_IRT_SIM_SIN]	LOX LOX						
	🗅 😅 🔡 🐖 👗 🛍 😰		💼 🛛 < No Filter >	- 🏹 🔡				
	PN_IRT_SIM_SIN_V1_2	Object name	Symbolic name	Created in language				
	SIMATIC 317	🚵 System data						
	⊡ [1] CPU 317-2 PN/DP	🖬 OB1		STL				
	Sources	💶 OB61	SYNC_1	STL				
		🕀 OB80	CYCL_FLT	STL				
	⊟	🖬 0B82	I/O_FLT1	STL				
	5120 CU320 2 PN	🖬 OB83	I/O_FLT2	STL				
		🖬 0885	OBNL_FLT	STL				
		🕀 OB86	RACK_FLT	STL				
		SFC126	SYNC_PI	STL				
		5 SFC127	SYNC_PO	STL				
		•		F				
	Press F1 to get Help.							

6.2 Distributed SINAMICS drive

No.	Action					
2.	Select the "Modify" tab in the details window and go online.					
	First specify the required speed setpoint in the MD300 doubleword flag ("N_SOLL_USER") (unit: rom).					
	You can then move both servo motors by controlling the M0.0 flag ("boMove") to the value "1" respectively "TRUE"					
	Both serve motors are new turning with the specified speed setpoint					
	File Edit Insert PLC Debug View Option	ns Window Help		X		
	0B61 : "Synchronous Interrupt"					
	Comment:					
	Network 1: SFC 126					
	Comment:					
	CALL "SYNC_PI"					
	RET_VAL:="RetVal_SFC126	н				
	FLADDR :="FlAddr_SFC126	11				
	Network 2: User Programm (speed cal	.culation + move di	✓ Monitor			
	Comment:	Letter Le				
	// speed calculation		Activate Modify Value			
	L "N_SOLL_USER" L 6.000000e+003	// rotat // 6000	Trigger			
	/R	(1	Modify Address to 1			
	*R	// Corre				
	TRUNC T "N_SOLL"	// real ·	Redo			
	U "boMove"	// move	Cut			
	SPEN SOOS		Сору			
	//blue motor		Paste	-		
	I. 10#16#478	77= 2#00	Delete			
	Path: PN_IRT_SIM_SIN_V1_2\SIMATIC 317\CPU	J 317-2 PN/DP	Insert Range of Variables			
	Address Symbol Display	format @Status value	Display Columns (on/off)			
	1 M 0.0 "boMove" BOOL	false false	Save Automatically			
	3 MD 300 "N SOLL USER" FLOATI	NG POINT 120.0	120.0			
	4 MD 200 "N_SOLL" HEX	DVV#16#014	47AE16			
	5 AD 266 "N_SOLL_Red_Drive" HEX	DV/#16#000	000000			
	6 AD 274 "N_SOLL_Blue_Drive" HEX	DV/#16#000	000000			
	7 EVV 272 "ZSV/1_Blue_Drive" HEX	VV#16#EB40	-			
	8 AW 272 "STW1_Blue_Drive" HEX	VV#16#0400	0			
	9 AVV 278 "STVV2_Blue_Drive" HEX	VV#16#1000	0			
	11 AW 264 "STAM Red Drive" HEX	VV#10#ED40	0			
	12 AW 270 "STW2 Red Drive" HEX	V/#16#100(0			
	13					
	Induction In Front 2 June 22 Procession		Modifu R: Disgnostics) 7: Comparison /			
	Dense Et la part Lata	Jegy 4. Address Into. A D) I				
	Fress FI to get Help.		Abs -	< //i		

6.2 Distributed SINAMICS drive

No.	Action			
3.	In network 1, calling the SFC 126 system function isochronously refreshes the process image partition of the inputs specified in the "PART" input parameter.			
4.	In network 2, the speed setpoint "N_SOLL_USER" specified by the user is converted in accordance with the definitions of the PROFIdrive profile and allowed for both servo motors. The required releases are also set in order to move the servo motors.			
	Note			
	The speed setpoint can also be changed while both servo motors are in operation, i.e. the M0.0 flag ("boMove") is set.			
5.	By setting the M0.2 flag ("boReset") upcoming errors at the servo motors can be acknowledged.			
	Note			
	Upcoming errors can be acknowledged only when no servo motor is in operation, i.e. the M0.0 flag ("boMove") must not be set!			
	In addition, the M0.2 flag ("boReset") is not reset automatically to the value "0" respectively "FALSE". This must be done manually after the acknowledgement of the errors!			
6.	In network 3, the application forms the sign-of-life for the SIMATIC CPU and sends it to both servo motors. They are generating their own sign-of-life and return it to the CPU.			
7.	In network 4, the call of the SFC 127 system function isochronously refreshes the process image partition of the outputs specified in the "PART" input parameter.			

7 Related literature

Table 7-1

	Торіс	Title
/1/	Siemens Industry Online Support	http://support.automation.siemens.com
/2/	Download page of this entry	http://support.automation.siemens.com/WW/view/en/53477498
/3/	SINAMICS S120/S150	http://support.automation.siemens.com/WW/view/en/68041075 (List Manual 2013)

8 Contact

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

9 History

Table 9-1

Version	Date	Change
1.1	03/2012	First Edition
1.2	04/2012	Revised Edition, Change to CPU 317-2 PN/DP and CU320-2 PN, Chapter 4.6: "F-CPU clock-synchronized mode and safety mode" added
V2.0	01/2014	Revised Edition, New layout, Chapter 1-3 revised