

# CONFIGURING SIEMENS PCS7 TO USE PLCSIM



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# 1.0 PURPOSE

The purpose of this document is to guide one through different configuration strategies and possibilities with Siemens Simatic PCS7 simulation with the use of Siemens S7-PLCSIM.

# 2.0 SCOPE

This document only applies to Siemens Simatic PCS7 and Siemens S7-PLCSIM. In addition, this document only supports PCS7 projects that are configured by Siemens Best Practice guidelines.

# **3.0 REFERENCES**

- S7-PLCSIM Testing Your S7-CPU Programs manual
- SIMATIC Process Control System PCS 7 Compendium Part A Configuration Guidelines
- PCS 7 Configuration Manual Engineering System
- PCS 7 Configuration Manual Operator Station

## 4.0 DEFINITIONS/ACRONYMS

- AS Automation Station (DCS CPU)
- CS Distributed Control System
- **ES** Engineering Station
- IO Inputs and Outputs
- ISO Industrial Ethernet Siemens Standard (MAC/Hardware address)
- MPI Message Passing Interface

Multiproject – A true use of a multiproject by Siemens PCS7 Best Practices. By default, the PCS7 project creation wizard does not initially set the project up in this manner.

- **OS** Operator Station
- PC Personal Computer
- PCS7 Reference to Siemens Simatic PCS7 (versions 6.0 and up)

PLCSIM – Reference to Siemens S7-PLCSIM simulator software only

TCP/IP – Transmission Control Protocol / Internet Protocol

S7Program – Siemens Step 7 Program within the AS

# 5.0 DETERMINING SYSTEM ARCHITECTURE

### 5.1 OVERVIEW

PLCSIM allows the Automation Station (AS) portion of your architecture to be represented through software in order to test it without the physical need of the CPU and/or IO. Your simulation station will always be an Engineering Station (ES). The system architecture is the first step in determining how to configure the PCS7 project or multiproject for usage with PLCSIM. Even though the project may change during the design stages, the same basic concepts remain as the following two architectures are described. As already mentioned, the other pieces of hardware (shown in the following examples) are not physically needed for simulation purposes; however, they are crucial for proper configuration within your project.

### **5.2 SINGLE STATION**

Figure 1 shows two examples of a single station architecture. The machines within the dotted boxes represent the single stations. In the example on the left, one machine is used as the OS Server and the ES. The example on the right represents a PCS7 Box that also includes an internal CPU for the AS.



### 5.3 MULTI-STATION

Figure 2 shows an example of a multiple station architecture. The machines within the dotted boxes represent the minimum you may see within your architecture. The dotted box on the left contains the ES machine. The dotted box on the right contains the OS Server or OS Server pair (redundant). The figure below represents an OS Server pair for redundancy. Two separate OS Servers are supported with PLCSIM; however, they cannot be placed into runtime simultaneously; this is a resulting limitation of Simatic WinCC.



Figure 2: Multiple Station Design

## 6.0 COMMUNICATION METHOD

Simulation with PCS7 can be beneficial for many reasons.

- 1. Simulation is necessary during integration of new or migration projects.
- 2. An ability to exchange the project between programmers and the customers, with constant updates, during testing or if in multiple locations.
- 3. Testing changes before deployment (making changes while production is running).
- There are several methods of establishing communication to PLCSIM for both configuration

and OS simulation; however, in this document we will be discussing the three most common methods: **MPI, TCP/IP,** and **ISO**. All three methods are supported by the PCS7 OS (WinCC) and have very similar configuration requirements.

	PROS	CONS
MPI	<ul> <li>Only partial NetPro configuration when simulating a single AS.</li> <li>No need to download NetPro to your simulation station (ES PC Station or substitute ES Station).</li> </ul>	<ul> <li>In most cases MPI is not your designed method of communication from OS to AS using PCS7,</li> <li>It adds an unnecessary MPI bus to Netpro in the project and a MPI card (CP 561x) to your PC Station Configuration.</li> <li>If Reason 3 and this MPI card does not exist within your OS servers, then MPI becomes undesireable.</li> <li>» Downloading your PC Station Configuration or Netpro with this extra hardware will give diagnostic messages (errors) for that card until it is removed.</li> <li>» If you're using a true multiproject, then you must now merge your MPI buses into one plant-wide bus.</li> </ul>
	PROS	CONS
TCP/IP and ISO	<ul> <li>In most cases (Ethernet is your designed method of communication from OS to AS),</li> <li>Configure the project as it is designed, with no significant modifications for simulation.</li> <li>Can be easily used for simulation prior to deployment in a live plant.</li> </ul>	<ul> <li>A bit more challenging to configure at the start, but once configured, it's complete.</li> </ul>
ALL	Supports multiple AS simulation and AS to AS communications.	

However, there are a few pros and cons depending on the method of choice.

Table 1: Pros/Cons of MPI, TCP/IP, and ISO

### 6.1 HOW TO DETERMINE YOUR METHOD

MPI is a quick and easy method to use if you are temporarily setting up a project for testing a single AS station. Otherwise, either ISO or TCP/IP methods can be used for simulation. TCP/ IP and ISO protocols are very similar when configuring PCS7 for communication. The method will sometimes be required depending on hardware or station configuration design (see Sections 6.1.2 - 6.1.4).

Within PCS7, MPI is not a realistic design for communications and is not recommended by Siemens. However, for simulation purposes, it is supported and can be used. If this is your method of choice, please go to Section 7.1.

If TCP/IP or ISO is determined to be your method of choice, please go to Section 7.2.

#### 6.1.1 DETERMINING TCP/IP OR ISO

Assuming that the project is already designed and created, a strong indicator is how the S7 connections are made within NetPro. A good rule of thumb is, if the S7-connections from OS to AS are using IP addresses, then TCP/IP will be the method. If the S7-connections from OS to AS are using MAC addresses, then ISO will be the method.

Open NetPro for your AS Station and select the CPU module. Find your S7-connection to your OS stations. Right-click and choose **Object Properties** for that connection.

TCP/IP example:

Local Connec	tion End Point	ock Parameters
Configurer	d dynamic connection	cal ID (Hex): W#16#1
Configure	d at one end	<u> </u>
Establish	an active connection	Default
Connection Pa	ath	
	Local	Partner
End Point:	CPU003_Pri/	OS_Pri/
Interface:	CP 443.1 PN-IO(P0/S5)	CP 1612
C 1		
Subnet:	[Sysbusuu3 [industrial Ethemet]	Juuese_os (industriai Ethemet)
Address:	192.168.2.4	192.168.2.33
		Address Details

#### ISO example:

Local Connec	tion End Point d dynamic connection	Block	: Parameters I ID (Hex): W#16#1	
🗖 Configure	d at one end	1		1
Establish	an active connection		Defea 1	5
Send ope	rating mode messages		Longer Longer	1
Connection P	sth			
	Local		Partner	
End Point:	CPU003_Pn/ CPU003/CPU 416-3 DP		OS_Prj/ OS001/WinCC Appl.	
Interface:	CP 443-1, PN-IO(R0/S5)	•	CP 1613	•
Subnet:	SysBus003 [Industrial Ethemet]		008SB_OS [Industrial Ethemet]	-
Address:	08-00-06-01-00-00	Ť	00-1B-1B-3C-9B-5E	
			Address Datate	
			Address Details.	

#### 6.1.2 AS STATION CONFIGURATION DESIGN (TCP/IP ONLY)

Some AS stations only give you the option of configuring an IP address. Shown below is an example: *CPU 416-5 H PN/DP*. If this is your case, then your method will be exclusively TCP/IP.

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UR2AL	Media Re General Shot descriptor Device name	dundancy     Address N. PN-IO  SysBusCP	Time of Day Synchro ees   PROFIN	orization	Options   model interface musical inters	(ka/535)	-
UR2AL Module 405 104	Medis Re General Shot descriptor Device name F# Support dev	dundancy     Address x PN-IO  SysBusCP ce replacement with	Time of Day Synchr ees PROFIN	orization Properties Ethe General Paran	Options   most interface PM-101 netens	(Ka/53.5)	
UR24L UR24L 40510/ PU 416	Neda Re General Shot descriptor Device name	Andency     Address x PN-IO  SysBusCP ce replacement with	Time of Day Synchr ses PROFIN PU1 tout exchangesbie medium	erization   Properties Ethe General Paran Padoress	Options   mot interface pri-to- intern	(Ro/S3.5) Gateway G Do not use	nuter
UR2AL Module 40510/ PU 416-	Meda Re General Shot descriptor Device name S Support dev Interface Type Device numb	dundancy     Address 1: PH-IO  SysBusCP  SysBu	Time of Day Synchr ses   PROFIN PU1 Yout exchangeable medium	General Parar General Parar Paddress Subret mask	Options	(R0/S3.5) Gateway G Do not use C Use router	suler
UR24L Module 40510/ PU 416	Meda Re General Shot descriptor Device name. V Support dev Interface Type Device numb Address	dundency   Address x PH-IO [5 <sub>1</sub> sBusCP ce replacement with Bhemet rr 0 1921682.1	Time of Day Synchr see PROFIN PU1	Properties Ethe General Para Padoese Subret mask	Options	(R0/5355) Getenny (* De net use (* Use muter Address	roder
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#### 6.1.3 AS STATION CONFIGURATION DESIGN (TCP/IP, ISO, OR BOTH)

Other AS stations may give you the option of configuring an IP address, MAC Address (Hardware address), or both. Shown below is an example of using an external ethernet controller: CP 443-1.

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	CP 443-1		General PROFINET			Properties - Ether	net interface PIF-10 (R0,	(\$5.1)	
	ANHO	1	Shot descaration	PNUD		General Param	etera		
PIR	Port 1					-	enantina sura sura s		
ren	CP 443-5 (PB)		Device name:	PNHO		Set MAC add	ress / use ISO protocol		
		· · · · · · · · · · · · · · · · · · ·				MAC address	08-00-06-01-00-00	1	
						-	8		
	1					P protocol is	being used		
			Interface			IP address	192 168 2.4	Gateway	
			Type: Eth	emet		Subnet mask:	255 255 255 0	<ul> <li>Do not use router</li> </ul>	
			Device number: 0					C Use router	
Service.			Address 192	168.2.4				Address.	
101	URZALU		Manual Man			Subnet:			
11,	Module	Order number	rvetwork.eg: 1es	1. <u> </u>	voperses	- not network	ed		New
PS	405 104	6ES7 405-0KA02-04	Comment:			SynBusb03			Properties
III CP	U 416-3 DP	6ES7 416-3XI 84	1						Propenses
		and the states							Dillion

Note: The above example gives the option to configure ISO only, TCP/IP only, or both. Depending on your design and configuration at this level, this will determine which protocol to use for simulation. These statements are made with the assumption that your design choices here at the AS configuration correspond with the same design choices on your OS and ES stations (see 6.1.4).

#### 6.1.4 OS AND ES STATION CONFIGURATION DESIGN

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7. <u> </u>	SIMATIC NET CP 1613 Industriell connections, N communication, Ti PC Ibus, SIMATIC NET PC perform CP 100, SIMATIC NET PC perform CP 1613           Order No./firmware:         60K1 161-3A400 / VB 1.1           Name:         CP 1613           Intended         Type:           Type:         Bhemnet           Address:         132 160 2.33           Networkset:         Yes           Popenties.	Set MAC address / use ISO protocol      MAC address:         [00-18-18-3C-58-56          [P address:         [152-163-2.33          [P address:         [155-255-255-0          ["" Do not use noter         ["" Ob not use noter         ["" Address         ["" " " " " " " " " " " " " " "	
Index         Image: Image	Connect		ew

*Note: This illustration is made with the assumption that your design choices here at the OS and ES configuration correspond with the same design choices on your AS stations (see 6.1.2 and 6.1.3).* 

# 7.0 PROJECT CONFIGURATION

The project configuration changes slightly depending on whether or not you have a single station or multi-station design. In the following instructions, multi-station design is explained with notes regarding the differences for single station design.

These instructions are made with the assumption that a multiproject has already been developed using Siemens PCS7 Best Practices.

### 7.1 MPI

#### 7.1.1 CONFIGURE YOUR PROJECT

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 Do CPU002\_Pri
 Do ENG\_Pri
 Do 05\_Pri **B**<sup>1</sup> Configuration ۲ PC stal WinCC Appl. WinCC Đ CP 1613 .... CP CP Q 05001 🖻 🚺 WinCC Appl. 0501 🗉 🦲 Shared Declarations Se MasterLib

1. Open your **Configuration** for your Master OS Server Station.

Note: For single station design, the OS Server station is also the Engineering PC Station.

2. Add a CP 561x Profibus/MPI card to your master OS server PC Station.



 Within this dialog, be sure the Type is MPI, a unique address is defined, and the interface is "networked". If no network has been created, then create one by pressing the Properties button. When finished, press OK.

Order No / firmware: Name: htterface Type: [MPI Address: 4	SIMATIC NET CP 5613 A2 PRO/ connections. DP matter: DP abus pontant bus cycle time. PG func Bus: SIMATIC NET CD 2008 SP 6GK1 561-3AA01 / V7.12 [CP 5613 A2	Properties - MPI interface: CP 5613 A2 (R0/54) General Parameters Address: Highest address: 31 Transmission rate: 187.5 Kbps Subnet: Highost: Highost: Highost: 187.5 Kbps (Part of: MPIweds New
Vetworked: Yes		ropetes.     Delete

*Note:* A unique address must be defined even if your OS and AS are in separate projects within your multiproject. This is due to a later step to merge your MPI buses into one "plant-wide" bus.

4. Open Hardware Configuration for the AS (CPU).



Note: If you are using a PCS7 Box, the AS station is also the Engineering PC Station.

5. Find the **MPI/DP interface** on the CPU card and double-click.

1	CEAN			Distance of							-		-	_	_	_	2	_			
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Within this dialog, be sure the Type is **MPI**, a unique address is defined, and the interface is **"networked"**. If no Network has been created, then create one by pressing the **Properties** button. When finished, press **OK**.

Name: MPI/DP	General     Parameters       Address:     2       Highest address:     31       Transmission rate:     187.5 Kbps	
Interface	Subnet:	
Type: MPI 💌	MPI001 187.5 Kbps (Part of: MPI-wide	***
Address: 2	Proper	ies
Networked: Yes Properties		te
Comment:	<u> </u>	

*Note:* A unique address must be defined even if your OS and AS are in separate projects within your multiproject. This is due to a later step to merge your MPI buses into one "plant-wide" bus.

6. Open NetPro for your AS (CPU).



Note: Again, if you are using a PCS7 Box, the NetPro selection will be your Engineering PC Station.

7. If this is a PCS7 Box application, you may skip this task.

Within NetPro, go to Edit > Merge/Unmerge Subnets > MPI Subnets. Move all the different MPI buses created from the individual projects within your multiproject into the "Merged" field by pressing the highlighted arrow button. The picture on the right should be the ending result. Press OK when complete.



*Note:* This step only needs to be performed once unless another MPI Subnet is added to the multi project after this step was performed.

8. If you plan to perform simulation using AS-to-AS communication with multiple instances of PLCSIM, then perform this step. Otherwise move to Step 9.

This step must be performed for every AS involved in AS-to-AS communications. Open NetPro for each AS, find your S7 connection to the partner AS, and modify the Subnet to use the MPI Interface. Use the demonstration below for help.

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ertics - S7 connection       X         neral       Status Information         Local Connection End Point       Block Parameters         Configured dynamic connection       Block Parameters         Configured dynamic connection       Block Parameters         Send operating mode messages       Block Parameters         Connection Path       Block Parameters         Logal       Partger         Connection Path       CPU001_Ph/ CPU002/CPU 4165 H PN/DP         End Point:       CPU001_Ph/ CPU002/CPU 4165 H PN/DP         CPU002/CPU 4165 H PN/DP       CPU002/CPU 4165 H PN/DP         Subnet:       CP 4435 (PB)(R0/S5)       CPU 4165 H PN/DP, MPI/DP(R0/S);         Address:       CPU 4165 H PN/DP. SysBusCPU1(R0/S)       Addgess Details	rtiss - SJ connection       X         eral       Status Information         corrigued dynamic connection       Local ID (Hex):         Cpripured at one end       D         Cpripured at one end       D         Status       Etablish an active connection         Send operating mode messages       Default         onnection Path       Default         logal       Partger         CPU0017_CPU 416-5 H PN/DP       CPU002_Ph/ CPU0027_CPU 416-5 H PN/DP.         CPU0017_CPU 416-5 H PN/DP       CPU0017_CPU 416-5 H PN/DP.         defaust       CPU416-5 H PN/DP.         MPI002 [MPI]       3         Address Details       Address Details	A305.03 A305_01 4 5 A\$05_01		OS OS CR CR	_Prj / O500 _Prj / O500 3002_Prj / C 2002_Prj / C 0_Prj / Ewo	1 WINCC App Public / CPU 4 Public / CPU 4 Public / CPU 4 In / WinCC Ap	1 (Stby.) 16-5 H P 16-5 H P pl Clent	NDP NDP		7 connection 17 conn	64 64 95 95					0 0 08 0 0		SysBus001 (8 SysBus001 (8 SysBus001 (8 SysBus001 (8	By By Syr Syr Syr	ABUSCP ABUSCP ABUSCP ABUSCP ABUSCP
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Image: Construction Construction       Image: Construction Construction         Send operating mode messages       Image: Construction Construction         Connection Path       Image: Construction Construction Construction Construction Path         Logal       Partiger         CPU001_PB// CPU001/CPU 416-5 H PN/DP       CPU002_PB/ CPU002/CPU 416-5 H PN/DP         Integrace:       CP 443-5 (PB)(R0/S5)         Subnet:       CPU416-5 H PN/DP, MPI/DP(R0/S3)         Address       CPU 416-5 H PN/DP, SysBusCPU1(R0/S)         Address       CPU 416-5 H PN/DP, SysBusCPU1(R0/S)         OK       Cancel	Cpr/gured at one end       3         Establish an active connection       Default         Send operating mode messages       Default         Ind Point:       CPU001.Pn// CPU001/CPU 416-5 H PN/DP         Ind Point:       CPU001.Pn// CPU002/CPU 416-5 H PN/DP         Inter:       CP 443-5 (PB)(R0/S5)         Inter:       CPU416-5 H PN/DP         CPU416-5 H PN/DP       CPU002/CPU 416-5 H PN/DP         MP1002 [MPI]       MP1002 [MPI]         Inter:       CPU416-5 H PN/DP. StysBusCPU1(R0/S)         Inter:       Cancel       Help	Local Connect	ion End Point I dynamic cor	nection			Block	Parame	eters x):	1	W#16#	3	_							
Expansion on active connection <u>Default</u>	Expansion an active connection	Configured	at one end	- 11-			3				2	- ID	\$							
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Connection Path         Logal         Partger           End Point:         CPU001_Pij/ CPU002/CPU 416-5 H PN/DP         CPU002_Pij/ CPU002/CPU 416-5 H PN/DP           Integrace:         CP 4435 (P8)(RO/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S3)           Subnet:         CPU 416-5 H PN/DP, MPI/DP(R0/S3)         MPI/002 (MPI)           Address:         CPU 416-5 H PN/DP, SysBusCPU1(R0/S)         3           Address:         CPU 416-5 H PN/DP, SysBusCPU1(R0/S)         Address	Connection Path Logal Partiger CPU001_Pit/ CPU002/CPU 416-5 H PN/DP terface: CP 443-5 (PB)(R0/55) ↓ CPU 416-5 H PN/DP, MPI/DP(R0/5:) ↓ iddnes: CP 443-5 (PB)(R0/55) ↓ CPU 416-5 H PN/DP, MPI/DP(R0/5:) ↓ iddness: CPU 416-5 H PN/DP, SysBusCPU1(R0/5) ↓ Addgess Details DK Cancel Help						-					U.S.	~	10						
Logal         Partner           End Point:         CPU001_Prj/ CPU007/CPU 416-5 H PN/DP         CPU002/CPU 416-5 H PN/DP           Interface:         CP 4435 (PB)(R0/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S1)           Submet:         CPU 416-5 H PN/DP, MPI/DP(R0/S3)         MPI/002 (MPI)           Address:         CPU 416-5 H PN/DP, SysBusCPU1(R0/S1)         3           Address         Cancel         Help	Logal Partiger CPU001_Pit/ CPU001/CPU4165 H PN/DP CPU002_Pit/ CPU002CPU4165 H PN/DP Tegrace: CP 4435 (PB)(R0/55) ▼ CPU4165 H PN/DP, MPI/DP(R0/5; ▼) whenet: CPU4165 H PN/DP, MPI/DP(R0/55) ▼ CPU4165 H PN/DP, SysBusCPU1(R0/5) Addgess Details OK Cancel Help	Connection Pa	th																	
End Point:         CPU001_Pij/ CPU002/CPU 416-5 H PN/DP         CPU002_Pij/ CPU002/CPU 416-5 H PN/DP           Integrace:         CP 443-5 (PB)(R0/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S: ▼)           Subnet:         CP 443-5 (PB)(R0/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S: ▼)           Address:         CPU 416-5 H PN/DP, MPI/DP(R0/S3)         MPI002 [MPI]           Address:         CPU 416-5 H PN/DP, SysButCPU1(R0/S)         3           Address Details         Address Details         End Help	ind Point:         CPU001_Pp/ CPU0017CPU 416-5 H PN/DP         CPU002_Pp/ CPU002CPU 416-5 H PN/DP           ntgrface:         CP 443-5 (PB)(R0/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S;)*           iddnet:         CP 443-6 (PB)(R0/S5)         MPI002 [MPI]           iddress:         CPU 416-5 H PN/DP. SysBusCPU1(R0/S)         MPI002 [MPI]           iddress:         CPU 416-5 H PN/DP. SysBusCPU1(R0/S)         Address Details	1000000000	Logal					Partne	r i											
Intgrace:         CP 443-5 (PB)(R0/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S; )           Submet:         CPU 415-5 H PN/DP, MPI/DP(R0/S5)         MPI/002 (MPI)           Address:         CPU 416-5 H PN/DP, SysBusCPUI(R0/3)         Address Details	Iterface:         CP 443-5 (PB)(R0/S5)         CPU 416-5 H PN/DP, MPI/DP(R0/S; )           Subnet:         CP 443-5 (PB)(R0/S5)         ImPI/DP(R0/S; )           GRUSATS-5 H PN/DP, MPI/DP(R0/S; )         ImPI/DP(R0/S; )         ImPI/DP(R0/S; )           Iddress:         CPU 416-5 H PN/DP, SysBusCPUTRD/S         ImPI/DP(R0/S; )           OK         Cancel         Help	End Point:	CPU001 CPU001	Pij/ CPU 416-	5 H PN	DP		CPU0	02_Prj/ 02/CPU	416-5 H	I PN/D	P								
Subnet:     CPU 413-5 (PB)(R0/S3)       Address:     CPU 413-5 H PN/DP, MET/OP(R0/S3)       Address:     CPU 416-5 H PN/DP, SysBusCPU 1(R0/S)       3     Address Detais	Address     CP 443-5 (FB/R0/S)       CPU 416-5 H PN/DP     MPI002 [MPI]       3	Interface:	CP 443-5	(PB)(R0/	\$5)		-	CPU	416-5 H	PN/DP.	MPI/D	P(R0/5								
Address: CPU 416-5 H PN/DP. SysBueCPU1(RO/3 3 Address Detais	Address Details	Subnet:	CP 443-5 CPU 416	(PB)(R0/) 5 H PN/L	S5) )P, MPL	DP/RO/S	53)	MPIO	02 [MPI]											
OK Cancel Help	Address Details	Address:	CPU 416	-5 H PN/D	OP. SysE	lusCPU1	(R0/9	3												
OK Cancel Help	Cancel Hep									-	ddress	Details								
												_	_							
		ок								Car	ncel		Help							
		ок			•		•	•		Car	ncel		Help							
		ок	• •	• •	•	• •	•	•		Car	ncel	<u> </u>	Help							

NetPro-	CPU001_Pri(Retwork) - 0:\ Edit Insert PLC yew Opti	TestProj\Test_H9\008 ons Window Help	(110)																									
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	CPU001	1																										
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		1																										
Local D	Partner (D	Partser	_				Ty	pé					-	Activ	e conne	ction p	Subnet 🔄		Local	nterface	2							
1	ASD5_001 ASD5_001	05_Pg/05 05_Pg/05	001 / We 002 / We	NCC App	(Stey.)		51	7 connec 7 connec	tion .					tio No			SysBus00 SysBus00	01 [E] 01 [E]	SysBu SysBu	SCPU1	_							
4	5	CPU002_Ptj CPU002_Ptj	/ CPU30.	2 / CPU 4 2 / CPU 4	16-5 H F 18-5 H F	PN/DP	51	7 connec 7 connec	tos					Yes			VPID01 (M VPID01 (M	P3 P1	MPVDP									
T	ASO5_001	ENG_PtJ/EV	VOOT / W	InCC Ap	pl Client		5	Connec	tion					110		3	SysBusDo	11 (16)	SysBu	ISCPUT								

9. Save and Compile NetPro. When prompted choose "Compile and Check Everything". Press OK.

Network E	idit 1	Insert PL	C View	Option	s Windo	w Help		
	8	<b>B C</b>	<b>É</b>	<b>1</b>	8 P	<b>B</b> 3	!	<b>h</b> ?

10. Open NetPro for the other projects as shown highlighted and repeat Step 9.

B File Edit Insert PLC View Option	s Window Help		0
🗅 🥔 🎛 🛲 🕹 🖻 🛍 📥		No Filter >	· · · · · · · · · · · · · · · · · · ·
🖃 😪 Test_MP	Object name	Symbolic name	Туре
E B CPU001_Pri	CPU001		SIMATIC 400 Station
CPU002_Pri	Shared Declarati	ons	Shared Declarations
ENG_Pr	## MP1001	Contraction of Contra	MPI
US_Pr	Profibus001		PROFIBUS
🛨 📚 MasterLib	SysBus001	( ***)	Industrial Ethernet
1	Clabel Isheling 6	-t-i	Global Jahaling Rold

11. Download the AS S7-Programs to PLCSIM. The procedures for this step depends whether or not you have a need of multiple AS(s) or additional AS-to-AS communications. Please read the instructions carefully. Downloading to Test CPU for PLCSIM applications keeps the system from booking AS RT PO process objects from your licensing.

If only one AS:

a) Open an instance of PLCSIM. Be sure the interface is set to PLCSIM(MPI) within PLCSIM as shown highlighted below.



b) Download the S7-Program (Charts) (to Test CPU for PLCSIM applications).

If more than one AS:

- a) Open an instance of PLCSIM with the proper interface selected.
- b) Open Hardware Configuration for AS#1 and download.
- c) Download the S7-Program (Charts) for AS#1.
- d) Within your open instance of PLCSIM, select File > New PLC.
- e) Open Hardware Configuration for AS#2 and download.
- f) Download the S7-Program (Charts) for AS#2 (to Test CPU for PLCSIM applications).

If AS to AS communication:

a) Open an instance of PLCSIM with the proper interface selected.

b) Open Hardware Configuration for AS#1 and download.

c) Open NetPro for AS#1, select the entire AS (below-selection in blue), and download the selected station.



d) Download the S7-Program (Charts) for AS#1 (to Test CPU for PLCSIM applications).

e) Within your open instance of PLCSIM, select File > New PLC.

f) Open Hardware Configuration for AS#2 and download.

g) Open NetPro for AS#2, select the entire AS (below-selection in blue), and download the selected station.



h) Download the S7-Program (Charts) for AS#2 (to Test CPU for PLCSIM applications).

12. Compile the OS Server over the MPI connection. Right-click on your OS project and choose **"Compile"**.



The Compile Wizard will appear. Go to the Connections dialog as shown below. The following needs to be done for each CPU S7-program. Select the S7-Program and press **"Connection"**.

Aperator stations and areas.	S7 programs and netwo	ork connections:					
E 🗹 🗚 OS01	S7 program	Connections	Subnet	Subnet t	WinCC unit	Address	St
AREA1_CPU2	CPU001_Prj\001	3	ASOS_001	Sym. conn.	Named Connections	1 	
AREAT_CPUT	ETCPU002_P6\002	3	ASOS_002	Sym. conn.	Named Connections		
	*						

Make the selection where column WinCC unit = MPI. Press OK.

Subnet 🔼	Subnet type	WinCC unit	Address	Station no.	Segment no.	Rack no.	Slot no.
ASOS_001	Sym. conn.	Named Connections					
MP1001	MPI	MPI		2	0	0	3
SysBus001	Ind. Eth.	TCP/IP	192.168.2.1			0	3

Once each S7-Program has MPI (WinCC unit) as the connection (see below), then you may continue with the OS compilation wizard.

per	ator sta	stions	and an	eas:			- 00	<u>\$</u> 7 pr	grams	s and i	netwo	rk connections	r.								
8	VA.	OS0	1	0.001				\$7p	rogran	n.	21	Connections	Subnet	Subnet	type	MinCC un	n f	Address	Static	n no,	Se
			AREA1	_CPU	ī				PU00	2_Pg\	.002	3	MPI001 MPI002	MPI		MPI				3	
								•										[	Çonn	ection.	•
	< Bac	k		<u>N</u> ext :			Bnis	×1									Cg	ncel		ection. Help	
•	< Bac	k		Next >	•	•	Enis	sh		•	•	•					Cg	ncel		ection. Help	
•	< Baci	k .		Next >		•	Enis	sh		•	•	• •	· ·				Cg	ncel		ection. Help	
•	< Bac	k		Next >	•	- -	Bnis	sh	-	•	•	· ·	· ·	· ·		•	Ce	ncel	<u>C</u> onn	ection. Help	

13. Start OS Simulation.



*Note: OS simulation is the method preferred by Siemens. If this is a single station design, your OS project will be within your Engineering PC Station.* 

### 7.2 TCP/IP OR ISO

The steps below are shown using TCP/IP; however, if the connections are ISO, then please replace all TCP/IP terms with ISO. When necessary, special instructions are given.

#### 7.2.1 CONFIGURE YOUR PROJECT

With the assumption that all of the all S7 connections are made between the OS Server(s) and the AS(s), the first step is to properly configure your ES. If there is a second machine besides your primary ES (e.g. customer's laptop using VMWare) for easy project exchange, then it can also be easily added and configured the same way as described in the following steps.

However, when you configure this second machine, you will need to get its physical ethernet addresses (IP address and/or MAC address).

 Open NetPro for the Engineering Station. If this is a single station design, then go to Step 3.



2. **Read carefully:** Create an S7-Connection to each AS with the same Name (Local ID) as the OS Server's S7-Connection to that corresponding AS (e.g. If the connection OS to AS#1 has a Name of ASOS\_001, then the ES must have an S7-Connection to AS#1 with the Name ASOS\_001. The same would be true for AS#2). See below.

NetPro - ENG_Prj				
Network Edit Insert	PLC View Options	Window Help		
	b 🖻 🏜 🏜 🚮	<i>₫ ₽</i> <b>1 1 1</b>		
ENG_Prj (Network	k) D:\TestProj\Test	_MP\008ENG_P		_101 ×
008SB ENG	(Part of: 008SYS	BUS)	1	<u>^</u>
Industrial Ethe	emet			
	1000 million (1000 million)			
	EW001 CP. WinCC 1813 Cient	EngLapTop CF WeCC 1013 Ace. Clent		
•				×
LocaLD	Partner 10	Partner	Type	Active conne +
ASOS_001	7	CPU001_Prj / CPU001 / CPU 416-5 H PMDP	S7 connection	Yes
ASOS_002	3	CPU002_Ptj/ CPU002 / CPU 416-5 H PN/DP	S7 connection	Yes
4	h			
	1 mile all street	MAN AND AND A		
Constant Constants	) - Di (Testikio) (Test	PIP (DOBOS) PF	(a)	
008SB_OS (	Part of: 008SYS8	US)	1	-
industrial Eine	emet			<u>0</u>
	OS001	Source CP Appl, 1913 (Stry)		
4				<u> </u>
Local D	Partner ID	Partner	Туре	Active connection r
ASOS 001	1	CPU001_Pr//CPU001/CPU 416-5 H PM/DP	S7 connection	Yes
	-			
1				•

*Note:* The top panel shows the new ES connections to each AS (CPU) with the same names as the OS connections to the corresponding AS (CPU) shown in the bottom pane. Red represents the connection "Name" to AS#1 and Green represents the connection "Name" to AS#2.

 Be sure that all of the Ethernet Subnets have been merged in NetPro. Within NetPro, go to Edit > Merge/Unmerge Subnets > Ethernet Subnets. Move all of the individual Ethernet buses created from the individual projects within your multiproject into the "Merged" field by pressing the highlighted arrow button.

Subnets in multiproject  Merged  Subnets in multiproject  Merged  Subnets in multiproject  Merged  Subnets in multiproject  Merged  Subnets in multiproject  Subnets in mul
Cross-project subnet:
Project-based subnet Properties

The picture on the right should be the ending result. Press **OK** when complete.

Note: This step has usually been completed during project creation. If so, you may skip this step.

4. Save and Compile NetPro for all stations. When prompted, choose the option **"Compile and check everything".** NetPro for the OS should not need compiling since there were no modifications.



5. If not already complete, Configure and Download your ES PC Station; otherwise, go to Step 6.

#### CONFIGURE





6. Since adding the new ES S7-connections in step 2, download ES Station in NetPro. Be sure to select the entire station.



7. Download the AS S7-Programs to PLCSIM. The procedures for this step depends whether or not you have a need of multiple AS(s) or additional AS-to-AS communications. Please read the instructions carefully. Downloading to Test CPU for PLCSIM applications keeps the system from booking AS RT PO process objects from your licensing.

If only one AS:

a) Open an instance of PLCSIM. Be sure the interface is set to PLCSIM(TCP/IP) within PLCSIM as shown highlighted below.

D B R R R L Vev Cotors who		No Filter >	· 7/ 80	18 E	The for person person of the former and the former
E S Test_MP	Object name	PH Assignment	Туре		
응 문화 CPU001_Pij 응 때 CPU001 응 때 CPU01 응 때 001 - 이 Sources - 한 Blocks - 한 Diats	☆ AREA1_CPU1 ☆ AREA1_CPU2 ☆ DCELL ☆ UNIT_CPU1 ☆ UNIT_CPU2	PCELLVAREA1_CPU1 PCELLVAREA1_CPU2 PCELL PCELLVAREA1_CPU1\U PCELLVAREA1_CPU2\U	Picture Picture Picture Picture Picture	168 513 114 168 168	

b) Download the S7-Program (Charts) (to Test CPU for PLCSIM applications).

If more than one AS:

- a) Open an instance of PLCSIM with the proper interface selected.
- b) Open Hardware Configuration for AS#1 and download.
- c) Download the S7-Program (Charts) for AS#1 (to Test CPU for PLCSIM applications).
- d) Within your open instance of PLCSIM, select File > New PLC.
- e) Open Hardware Configuration for AS#2 and download.
- f) Download the S7-Program (Charts) for AS#2 (to Test CPU for PLCSIM applications).

If AS to AS communication:

a) Open an instance of PLCSIM with the proper interface selected.

b) Open Hardware Configuration for AS#1 and download.

c) Open NetPro for AS#1, select the entire AS (below-selection in blue), and download the selected station.



d) Download the S7-Program (Charts) for AS#1 (to Test CPU for PLCSIM applications).

e) Within your open instance of PLCSIM, select File > New PLC.

f) Open Hardware Configuration for AS#2 and download.

g) Open NetPro for AS#2, select the entire AS (below-selection in blue), and download the selected station.



h) Download the S7-Program (Charts) for AS#2 (to Test CPU for PLCSIM applications).

8. Compile the OS Server over the TCP/IP connection. Right-click on your OS project and choose **"Compile"**.



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The Compile Wizard will appear. Go to the Connections dialog as shown below. The following needs to be done for each CPU S7-program. Select the S7-Program and press **"Connection"**.

prototori etatione anno ano an.	S7 programs and netwo	ork connections					
E 🗹 差 OS01	S7 program	Connections	Subnet	Subnet t	WinCC unit	Address	Sta
AREA1_CPU2	CPU001_Pr\001	3	ASOS_001	Sym. conn.	Named Connections		
AREA1_CPU1	EDCPU002_Pg\002	3	ASOS_002	Sym. conn.	Named Connections		
	1.1.1						

Make the selection where column WinCC unit = TCP/IP. Press OK.

Subnet 🔼	Subnet type	WinCC unit	Address	Station no.	Segment no.	Rack no.	Slot no.
ASOS_001	Sym. conn.	Named Connections	and the theory streets				
a SysBus001	Ind. Eth.	ТСРИР	192.168.2.1			0	3

*Note:* If ISO, make the selection where column WinCC unit = Industrial Ethernet.

Once each S7-Program has TCP/IP (WinCC unit) as the connection (see below), then you may continue with the OS compilation wizard.

perator stations and areas:	§7 programs and network connections:						
🖃 🗹 👗 OS01	S7 program	Connections	Subnet	Subnet type	WinCC unit	Address	Station
- M to AREA1_CPU2 - Ø to AREA1_CPU1	園CPU001_Pg\001 園CPU002_Pg\002	2 2	SysBus001 SysBus002	Ind. Bh.	ТСРЛР	192.168.2.1 192.168.2.2	
	a					Conne	rtico

*Note: If ISO, then column WinCC unit should = Industrial Ethernet.* 

- 9. Change the TCP/IP Logical Device Name within Tag Management.
  - a) Open WinCC Explorer.
  - b) Within Tag Management, Right-click on TCP/IP and choose System Parameter.



*Note:* If ISO, then Right-Click on Industrial Ethernet instead. Your S7-programs (001 and 002) should be beneath rather than beneath TCP/IP.

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- c) Go to the **Unit** tab within the dialog.
- d) Change the Logical device name to PLCSIM.TCPIP.1.

CP type/bus profile:	TCP/IP
Logical device name:	PLCSIM TCPIP 1
Set automatically	CP_H1_1: CP_L2_1: CP1613.RFC1006.1 Intel(R) 82574L Gigabit Network C Intel(R) 82574L Gigabit Network C
Write with priority	Intel(R) 82579LM Gigabit Network Intel(R) 82579LM Gigabit Network MPI PLCSIM.TCPIPA
	S7ONLINE TS Adapter IE

*Note:* This modification can be left this way if the TCP/IP interface is not used for anything else within your OS. Remember, in a PCS7 system, the OS tags are generally compiled with "Named Connections".

- e) Close and Exit WinCC Explorer.
- 10. Start OS Simulation



*Note:* OS simulation is the method preferred by Siemens. If this is a single station design, your OS project will be within your Engineering PC Station.