# **FAQ about communication via IE**

# Service & SUPPORT

# fault-tolerant S7 communication via IE



FAQ



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# Question

How do I configure a fault-tolerant S7 connection for the SIMATIC NET OPC server via Industrial Ethernet with the SIMATIC NET PC software?

# Answer

The instructions and notes listed in this document provide a detailed answer to this question

### 1 Assignment of tasks

In this example, a CP1613 will be used. The CP1613 allows the S7 communication for a user application to a S7-400 H System on Ethernet. An existing configuration of S7-400 H system with network connection is required to proceed as described below.

# NOTICE Fault-tolerant S7 connections are only available with a CP1613 (6GK1161-3AA00), CP1613 A2 (6GK1161-3AA01) or CP1623 (6GK1162-3AA00). If you use a CP1613 A2 or a CP1623 these devices will be configure as CP1613 in the STEP 7 hardware configuration.

The use of a normal network adapter is not possible.

#### 1.1 Conditions

You need an engineering station with STEP 7 for the commissioning of the PC station. You compulsory need STEP 7 to configure a fault-tolerant S7 connection between PC station and S7400-H System.

Furthermore you need the license for the SIMATIC NET PC software S7-REDCONNECT on the PC station, which communicates with the S7400-H system over fault-tolerant S7 connections.

# 2 Configuration of the PC station

After successful installation of the hardware and software of the SIMATIC NET CD and also of the configuration tool comprehending a restarting of your computer, start NCM PC or STEP 7 with Start  $\rightarrow$ (in Windows XP: All Programs $\rightarrow$ ) SIMATIC  $\rightarrow$  SIMATIC Manager or SIMATIC NCM PC Manager".

Open the STEP 7 project of the SIMATIC S7400-H controller with "File→Open".

Open Project	
User projects Libraries	Sample projects   Multiprojects
Name	Storage path
FAQprojekt_IE_S7H	1 C:\Program Files\Siemens\Step7\S7Proj\FAQpr
PC_Station	C:\Program Files\Siemens\Step7\S7Proj\PC_SI
Sele	cted
User Projects: 1 Libraries: Sample Projects:	-
Multiprojects:	Browse
ОК	Cancel Help

Figure 2-1 Opening the project

Confirm the selection of the project (in the example: "FAQproject\_IE\_S7H") with OK. The project will open.



🖉 SIMATIC Manager - [FAQpro	ojekt_IE_S7H C:\₽rogram Files	\Siemens\Step7\S7Proj\F.	🔳 🗖 🛛
Eile Edit Insert PLC View	Options Window Help		_ 8 ×
		No Filter >	· 7/ 88
EAQprojekt_IE_S7H     FAQprojekt_IE_S7H     S7H     S	SIMATIC H-Station(1)	PROFIBUS(1)	
Drage 51 ks. est blak			
Press F1 to get help.			

With the command "Insert  $\rightarrow$  Station  $\rightarrow$  SIMATIC PC Station", insert the PC station.

Hinweis Standard STEP 7 always creates a MPI network. Because the SIMATIC S7400-H CPU has a PROFIBUS interface, you have in the STEP 7 project additional two PROFIBUS networks.

Figure 2-2 Inserting the PC station



SIMATIC Manager - [FAQprojekt_IE_S7H C:\Program Files\Siemens\Step7\S7Proj\F 💽	
Elle Edit Insert PLC View Options Window Help _	8 ×
□ 😂 副冊 🔏 📾 🔍 🏝 🏝 🎬 🏥 🚺 < No Filter>	22
FAQprojekt_IE_S7H     SIMATIC H-Station(1)     PROFIBUS(1)     PROFIBUS(2)     POStation     POStation	
Press E1 to get Help	

Figure 2-3 Adapting the Name of the PC Station

Assign the PC station you have just inserted the name of your computer (in the example: "PC Station").

Now open the hardware configuration of the PC station by selecting the PC station. Select the PC station, then press the right mouse button and select "Open Project" (STEP 7: "Open Object").



STMATTC NCM PC Config - [PC S	tation (Configuration) PC	Station]			
[1] Station Edit Insert PLC View	Options Window Help				X
= (0) PC				Eind:	<u>ต</u> ุม†
2 3 4 5 6 7 9				PROFIBUS DP PROFIBUS -PA PROFIBUS -PA PROFINET IO POSIMATIC PC Stat	ion
(0) PC			<u>*</u>	1	
Index Module	Order number	Firm	M C		
2 3 4					
5					
7					

#### Figure 2-4 Hardware Configuration of the PC Station

An empty Rack is now displayed. If the hardware catalog is missing click on the button marked in red.

· · · ·	Figure 2-5 Selecting the Modules from the Hardware Catalog

R HW Config - [PC Station (Configuration) FAQprojekt_IE_S7H]	
UNI Station Edit Insert PLC View Options Window Help	- 8
(0) PC	Eind: Ant
	BY PROFIBUS DP     PROFIBUS-PA     PROFINET ID     SIMATIC 300     SIMATIC 400     SIMATIC PC Station     Ontroller
(I) PC Index Module Order num Fi M Comment	CP Industrial Ethernet     CP 1411     CP 1413     CP 1511
5 6 7 7 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7	CP 1613
8 9 10 11	6GK1 161-3AA00 SIMATIC NET CP 1613 Industrial Ethernet, ISO, TCP/IP, S7 connections, H
Press F1 to get Help.	communication, TCP connections, PG



Now place your PC modules in this rack (for example by dragging them from the catalog).

The following dialog box appears automatically after you insert the module in the PC station:

Figure 2-6 Address Assignment Dialog Box

Properties - Ethe	ernet interface CP 1	613 (R0/S9)	X
General Param	eters		
🔽 Set MAC add	ress / use IS <u>0</u> protocol		
MAC address:	08-00-06-01-00-01	If a subnet is selected, the next available address is suggested.	
IP protocol is	being used		
IP address:	192.168.0.1	Gateway	1
Su <u>b</u> net mask:	255.255.255.0	C Lise router	
Subnet:		Address: 192.168.0.1	
not network	ed	<u>N</u> ew	
Etherheu()		Properties	
		Dejete	
ОК		Cancel Hel;	p

Deselect the "IP Protocol is being used" check box and select "MAC address". Please enter the MAC address of the CP1613 and choose under subnet the already existing Ethernet network.

The CP1613 is now configured and networked. Confirm the configuration with "OK".



Elevena (		004040	منامم ما اس		Ctation
Flaure.	Z-7 Ine	CP1013	Diaced in	me PC.	Station
					•••••••

HW Config - [PC-Station (Configuration) FAQproject_IE_S7H]		
🖓 Station Edit Insert PLC Yiew Options Window Help		_ 8 ×
	^	Eind: Erofile: Standard SIMATIC PC Based Control 300/4 SIMATIC PC Station Controller Controller Controller Controller
7 8 9 3 3 1 € CP 1613 ✓	>	- + H ← SW V6.0 SP4 - + H ← CP 1411 - CP 1413 - + H ← CP 1511 - + H ← CP 1512 - + H ← CP 1512 - + H ← CP 1512 H ← CP 1512 
Index Module Order number Firmware MPI address Comment		SW V6.0 SP5      HE General      Ge
7         8         8         9         3         10         6GK1 161-3AA00         V6.0.5         10	>	GGK1 161-3A400 SIMATIC NET CP 1613 Industrial Ethernet, ISO, TCP/IP, S7 connections, H communication, TCP

The module is now plugged in a PC Station slot



Figure 2	2-8 Editing OPC	Server					
📑 нж с	Config - [PC-Station (	Configuration) FAQp	roject_IE_	\$7H]			
🗐 Statio	on Edit Insert PLC y	jew <u>O</u> ptions <u>W</u> indow <u>H</u> e	lp .			- 1	аx
D 😅	🔓 🖬 🙀 🖉	à 🗈 🎪 🏠 🖻	- 🔡 🕅	?			
.0)	PC			^	<u>F</u> ind:	<u>n</u>	t Mi
1		<u> </u>			Profile:	Standard	-
3	E OFC Server				⊞ <mark></mark> B F	ROFIBUS DP	
4						HUFIBUS-PA	
<u>5</u> 6						IMATIC 400	
7					📄 🖳 S	IMATIC HMI Station	
8	All contena					IMATIC PC Based Control 300	J/4UU
9 10	A CP 1613	~					
					÷	CP Industrial Ethernet	
				~			
<				>		User Application	
	1					Application	
	(0) PC				6	OPC Server	
Index	Module	Order number	Fi M	I Comment		SW V6.0 SP4	
1	-			^		SW V6.1	
$\frac{2}{2}$	OPC Server		V6.1.0				
4							
5							
6							
1/8					OPC Ser	ver for the DP_EDL_EMS	ŧ٤
9	CP 1613	6GK1 161-3AA00	V6.0.1	~	S7 (betw	een different subnets),	
1 10					ISUTICE	, SNMP, DP master class 🗸	

From the hardware catalog choose "user application" and move the "OPC server" with "drag & drop" into the slot.

In the next step the fault-tolerant S7 connection between the S7400-H system and the OPC server will be created.

Figure 2-9 NetPro Symbol



Open the program NetPro. Use the symbol which is marked in red in the Toolbar (see Figure 2-9 NetPro Symbol).





To insert a connection choose the OPC server. With "Insert  $\rightarrow$  New Conncetion" create a connection.



sert New	Connection
	Partner
	the current project FAQproject_IE_S7H SIMATIC H Station(1) CPU 417-4 H/CPU 417-4 H(1) (Unspecified) All broadcast stations All multicast stations unknown project
Project:	FAQproject_IE_S7H
Station:	SIMATIC H Station(1)
<u>M</u> odule:	CPU 417-4 H/CPU 417-4 H(1)
Connection	
Connection <u>I</u> ype:	S7 connection fault-tolerant
Connection Iype: Display	S7 connection fault-tolerant
Connection Type: Display	S7 connection fault-tolerant

Figure 2-11 Insert a new connection in NetPro with STEP 7

Choose as partner the existing S7400-H CPU and use as connection type "S7-connection fault-tolerant" connection.

Deactivate the box "Display properties before inserting".

By confirming the settings with "OK" the connection will be created in the station. A redundant connection to each S7 CPU of the SIMATIC S7400-H system will be created automatically.







If you mark the OPC server in the SIMATIC PC station the connection you have created will be shown in the connection table.

After the fault-tolerant S7 connection has been created the configuration is done. Save and compile the project ("Network  $\rightarrow$  Save and Compile"). Proceeding that way the information in the project will be updated.

Save and Compile	
Compile Compile and check everything Compile changes only	
OK Cancel	Help

Figure 2-13 Save and Compile



**NOTE** Warning indications can be displayed while proceeding with the "Save and Compile" of a project. Warnings serve as piece of information and have no functional effect. In case error warnings occur, search for possible divergences in the previous steps of the instructions.

After the configuration is finished successful you have two possibilities the download the configuration on the PC station.

#### 2.1 Configuration and download from STEP7 or NCM PC

With this function it is possible to perform a configuration completely from a remote computer, if a network connection (standard Ethernet) to the target PC station is available. It is assumed that the PC station can be reached via network connection. The project engineering can be downloaded after that.

#### 2.2 Configuration and Download via "Import Station"

With this function it is possible to download the configuration and project engineering at once also without a connection to the target PC station. Depending on the application, other configurations can be loaded.

Open the "Station Configuration Editor". You will find its icon on your desktop and also in the system tray.



ation:	PC_Station		Mode:	RUN	_P		
Index	Name	Туре	Ring	Status	Run/Stop	Conn	
1							
2							
3							
-4							
5							
6							
7							
8							-
9							
10							
11							
12							_
13							4
14							
15							_
16							
17							1 1000
ew dia	gnostic entry arrive	:d!					
	Add	<u>E</u> dit		)elete		Ring <u>O</u> N	
		-	-				

#### ~ 4 4 04 ... **–** .04

Click on the button "Import station ..." marked in red.

Figure 2-15 Import station



Click on the button "Yes" marked in red.



Figuro	2 16	Soorahing	for	VDD
rigule	2-10	Searching	101	

Import XI	DB file			? ×	1
Look jn:	🗀 XDBs	*	수 🔁	<b>💣 🎟 -</b>	
pcst_:	Desktop     My Documents     My Computer     J31/2 Floppy (A:)     SYSTEM (C)				
	Program Files     SIEMENS     Step7     S7proj				
File <u>n</u> ame	FAQproje			<u>O</u> pen	
Files of ty	<ul> <li>DATA (D:)</li> <li>Win2K (E:)</li> </ul>		•	Cancel	1.

In the dropdown choose the directory which contains the \*.xdb file. The XDB file is generated by STEP 7. You have to copy it from the engineering station to the PC station.

The XDB file is always set in the project directory ".../SIEMENS/STEP 7/S7PROJ" (see Figure 2-1 Opening the project)

Index	Name	Туре	Status	Error	-
1					
2	OPC Server	OPC Server			
3					
4					
5					
6					
7					-
8	444				
9	CP 1613	CP 1613			
10					
11					
12					
13					
14					
15					
16					
<b>;</b> )	I NE AUB IMPORTIS P	Jossible. Herer to t	ne list adov	re ror me conriguration.	
Worl	k in offline mode (a	download to this s	tation is the	en not possible)	

Figure 2-17 Information from the XDB file

Information about the concerning components and application in the XDB will be shown. Confirm this dialog box with "OK"

tation:	PC_Station		Mode:	RUN	LP		
Index	Name	Туре	Ring	Status	Run/Stop	Conn	I
1						J.	
2	OPC Server	OPC Server		No.	0		
3							
4							
5							
6							
7							
8	197			1.1			
9	CP 1613	CP 1613		1			
10							
11							
12							
13							
14							
15							
15							
lew dia	gnostic entry arrived! Add	<u>E</u> dit		Delete	1	Ring <u>O</u> N	
	- N - 1		1				

Figure 2-18 PC station is now configured

The import is now completed and the configuration is loaded. The connection column shows that the connection is also loaded.

**NOTE** After loading the PC station, the S7 system must be loaded.

Without the loaded connection information from NetPro the S7400-H station will not accept the connection establishment from the PC station. Therefore the connection can not be established.

# **3** Testing the communication with the OPC Scout

You can now start the OPC Scout with "Start  $\rightarrow$  SIMATIC  $\rightarrow$  SIMATIC NET  $\rightarrow$  OPC Scout".

Connect to the OPC server by double-clicking on "OPC.SimaticNet ". Enter a suitable group name in the dialog box and confirm this with "OK".

Figure 3-1 Connecting to the OPC server and creating a group

🖉 OPC Scout - New Project1						
File View Server Group ?						
🛎 🖬 👼 🚮						
Servers and groups	Items incl. status informa	ition				
⊡ de Server(s)		Item Nam	es	Value	Format	Туре
Local Server(s)	1					
1_OPC.Siemens.XML						
OPC.SimaticHMI.HmiRTm						
[New group]						
OPC.SimaticNET.DP	Nunc					
- 💇 OPC.SimaticNET.PD	Ser Add Group					
ProfiDrive.ProfilServer	Group Properties:					
Add Remote Server(s)	Enter a ' <u>G</u> roup Name':					
	OPC_NET					
	Create your group and					
	create new group act	ive	<b>V</b>			
	Requested update rat	e in ms	500		-	
	Troquestes <u>a</u> posto fat	0 111110	,		-	
	-					
	Extended	<u>0</u> K	<u>C</u> ancel	Apply		
Successfully connected to: 'OPC.SimaticNET	L		No.	No	).	

Once the group has been created, double-click on it and the "OPC Navigator" opens. You will now see your protocols in the OPC Navigator Double-click on "S7". The connection you have just created will appear from NetPro





OPC-Navigator				
Nodes	Leaves	Item Names		The listed Item(s) will be added to
■         Connections           ■         40         DX           ■         40         DP2           ■         40         DP2:           ■         40         VDP2:           ■         40         VP2:           ■         40         VP10:           ■         40         VP10:           ■         40         SV           ■         40         SV           ■         40         SV           ■         40         SVMP:           ■         40         SYM:	C &sapiversion[] © &version[] ( ↓	S7:[SYSTEM]&sapiversion[] S7:[SYSTEM]&version[]	-2 5- 6	ilter <u>QK</u> <u>Cancel</u>
\S7: is selected				30.03.2006 11:53

With a double click on the connection and on "objects" you see the structure which contains the objects will be displayed. If the blocks are downloaded into the CPU then they will appear here.



OPC-Navigator	
Nodes	10000
E Connections	-
⊕- <b>#</b> ¶ \FDL:	
i⊒(=] \S7:	
E S7 connection_1	
🖻 🔄 objects	
⊕_ <b>#4</b> M	
⊕- <b>#</b> 4)E	
⊕_ <b>#4</b> A	
⊕-∯A PE	
连 💏 PA	
⊕ <b>#</b> Z	
🖻 🔄 DB	
🖻 💏 DB1	
🖻 🗁 🔂 DB10	
🖻 💏 DB11	
🕀 💏 DB12	
🖻 🚰 DB100	
庄 🚔 DB101	
🗈 💏 blocks	
🔃 🚧 scan	
主 💏 aliases	
D-🙀 \SNMP:	-
⊕- <b>#4</b> \SR:	-

Figure 3-3 Objects in the OPC Navigator

With a double click on a "DB" you can add a variable. If the DB is crossed through in red, this is OK. You will find a more detailed explanation in the SIMATIC Technical Support in the internet under the following entry:

http://support.automation.siemens.com/WW/view/en/8763769

To add items double click on "new definition". Following a new dialog appears where the different variables and data types can be defined.



30-5			Leaves	Item
Connections			Louros	Troin
D AN VDP:				
- 🚧 \FDL:				
- 🙀 \FMS:				
🗄 🔄 🛯				
🖻 🔄 S7 conr	nection_1			
🖃 🔄 obje	ects			
	M			
± 99	E ^			
• P	PF			
÷.44	PA			
	Z			
±-#4	Т			
ē-🔄	DB			
Đ-1	🙀 DB1			
Ē-	DB10			
		and a second second		
	New Del	ridori		
Define New Iten	New Del			-
Define New Iten 3JECTTYPE_S7—	New Del			
Define New Iten 3JECTTYPE_S7 Datatype	Adress	Bit No.	No	. Values
Define New Iten BJECTTYPE_S7 Datatype	Adress	Bjt No.	No [1]	. <u>V</u> alues
Define New Iten BJECTTYPE_S7— Datatype B	Adress	Bjt No.	No [1]	. ⊻alues
Define New Iten BJECTTYPE_S7— Datatype B	Adress	Bjt No.	No [1]	. ⊻alues 1 to
Define New Iten BJECTTYPE_S7— Datatype B 💌	Adress	Bjt No.	No [1]	. ⊻alues 1 to 141
Define New Iten BJECTTYPE_S7 Datatype B	Adress	Bjt No.	No [1]	. <u>V</u> alues 1 to 141
Define New Iten BJECTTYPE_S7 Datatype B	Adress	Bjt No.	No [1]	. ⊻alues 1 to 141

Figure 3-4 Adding a new item in the OPC Scout

In the example is accessed to the second Byte in the Block DB10.

The Syntax for DB is:

S7:[<connection name>]DB<no>,{<type>}<address>{,<number>}

You have to click on "OK". The item will be displayed in the middle of the window. With a click on the " $\rightarrow$ " button you can drag the item into the right column.



🚰 OPC-Navigator		
Nodes	Leaves	The listed Item(s) will be ad
Houses         A           Image: A State of the st	DB10,B1,1	-≥ ≤-

With a click on the button "OK" the item will be inserted into the OPC Scout. If the quality is good, the connection will be established and a "read/write" process is possible.

Figure 3-6 OPC Scout





he Item(s)	
Sync write     Async write     OK Cancel A	voolv
	ie Item (s) ⓒ Sync write ⓒ Async write     

With double click on the field you can write a value.

Figure 3-7 Writing Values

If the write process is successful the dialog closes itself without an error message.

# 4 History

Version	Date	Changes
V 1.0	06.12.2007	First Issue