FAQ Kommunikation over PROFIBUS

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**FDL connection over PROFIBUS between PC
station and SIMATIC S5 95-U**

SIEMENS

FAQ

Entry-ID: 16705498

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Question

How do I create a FDL connection to a SIMATIC S5 95-U over PROFIBUS for the SIMATIC NET OPC Server 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 CP5611 is used, that implements FDL communication over the OPC Server with a SIMATIC S5 95-U on PROFIBUS.

NOTE The method described in these instructions also applies to the communications processors CP5613/14 (A2), CP5621, CP5511 and CP5512.

1.1 Condition

It is assumed that one of the two following configuration tools is installed:

- NCM PC
  NCM PC is supplied with the SIMATIC NET CD and allows you to create PC projects and open STEP 7 projects. It is, however, not possible to edit S7 blocks in the STEP 7 project with this software.

- STEP 7
  STEP 7 is a separate software package with which you can create S7-400, S7-300 and PC projects. S7 blocks can be edited with this software.

Only one of these tools can be installed.

In chapter 2 "Configuration of the PC station" is described the configuration of PC station so that you can use the FDL communication over PROFIBUS to exchange data between PC station and SIMATIC S5 95-U.

2 Configuration of the PC station

After successful completion of the hardware and software installation of the SIMATIC NET CD and the configuration tool and after restarting your computer, you start NCM PC or STEP 7 with "Start → (in Windows XP: All Programs→) SIMATIC → SIMATIC Manager or SIMATIC NCM PC Manager or using the desktop icon of the same name.
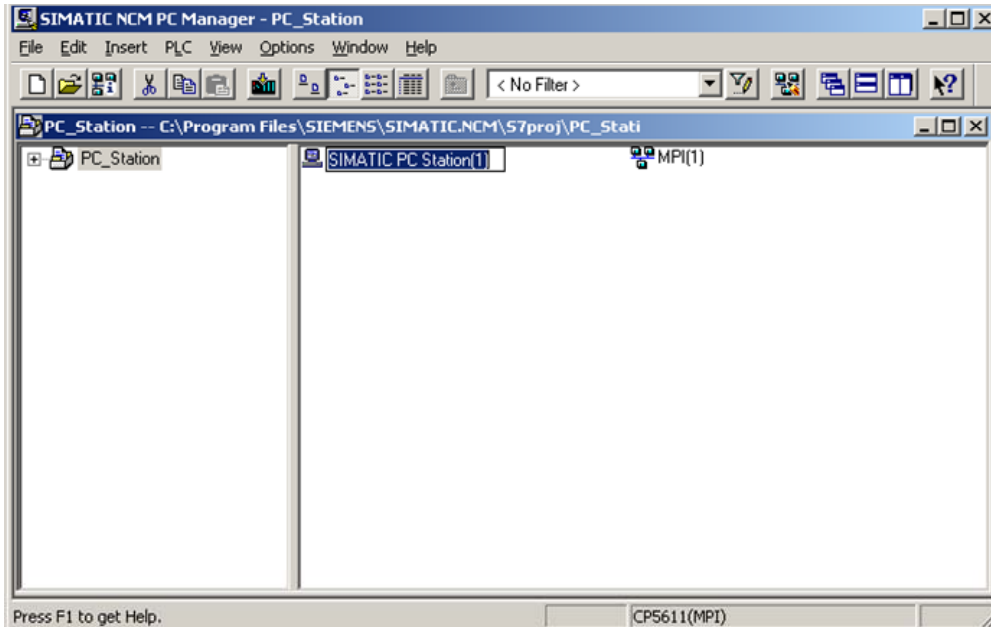
Create a new project with "File → New".

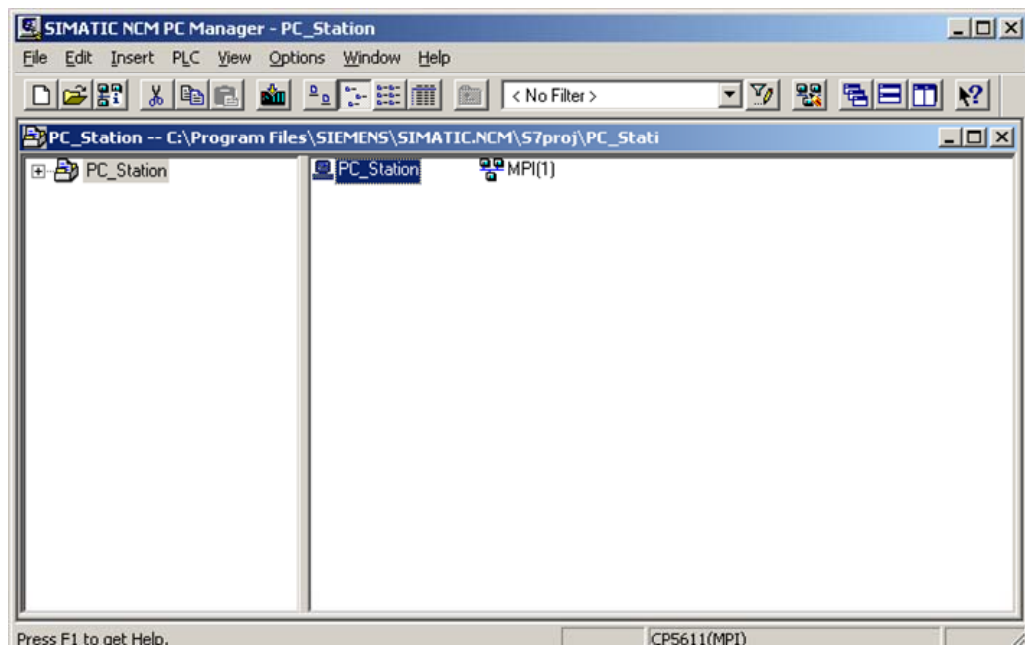Figure 2-1 giving the project a name
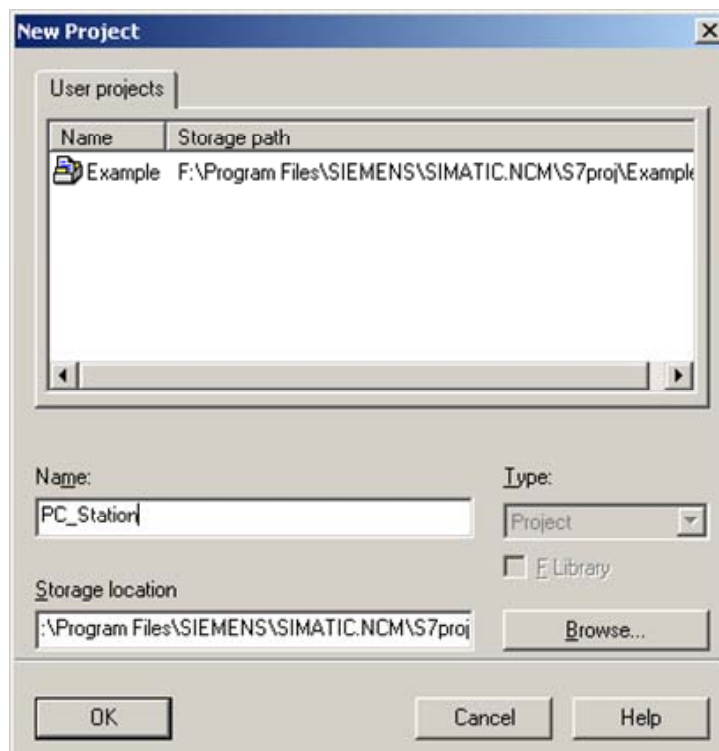
Confirm the project name you have entered (in the example: "PC_Station") with OK. An empty STEP 7 or NCM PC project is then created.

Figure 2-2 inserting the PC station

With the menu command "Insert → Station → SIMATIC PC Station", you insert the PC station.

Figure 2-3 changing the name of the PC station

Give the PC station you have just inserted the same name as your computer (in the example: "PC_Station").
Now open the hardware configuration of the PC station by selecting the PC station, then pressing the right mouse button and selecting "Open Project" (STEP 7: "Open Object").

Figure 2-4 hardware configuration of the PC station
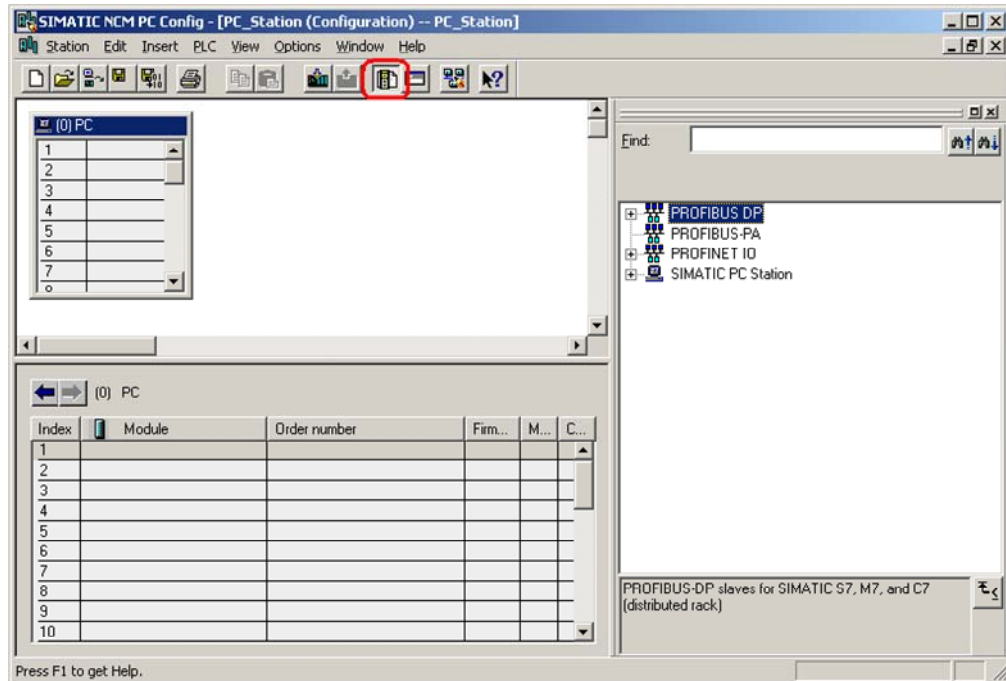
You will see an empty rack. If you cannot see the hardware catalog, click on the button marked in red.

Figure 2-5 selecting the modules from the hardware catalog
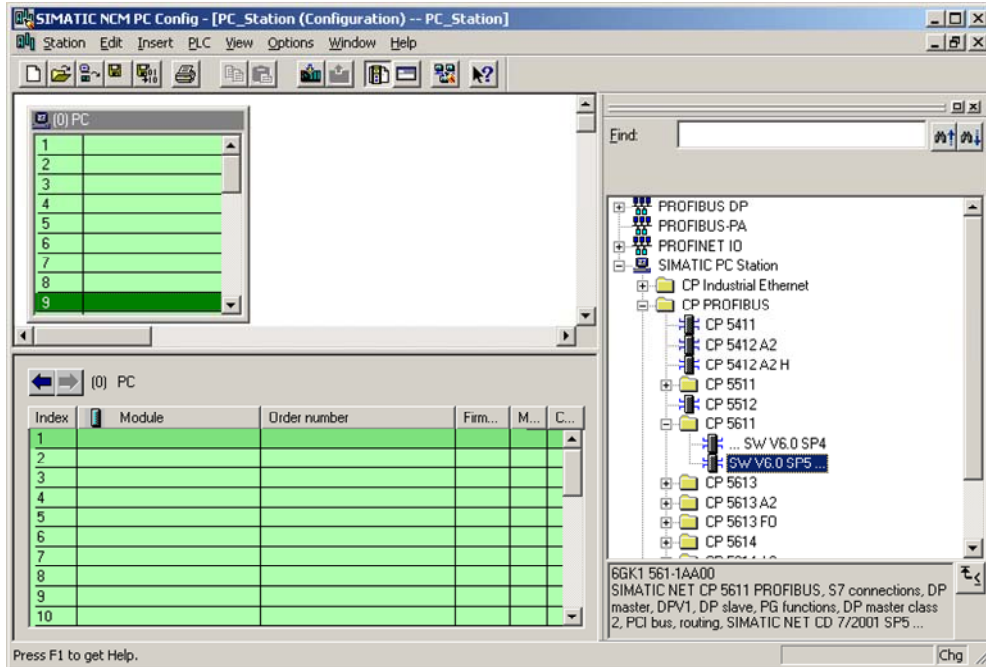
Now place your PC modules in this rack (for example by dragging them from the hardware catalog).

If you use a CP5613/14 (A2) (or CP5511 or CP5512) you will select the CP5613/14 (A2) (or CP5511 or CP5512) from the STEP7 hardware catalog.
If you use a CP5611 A2 or CP5621 you will configure these modules as CP5611.

The following dialog appears automatically after you insert the module in the PC station.
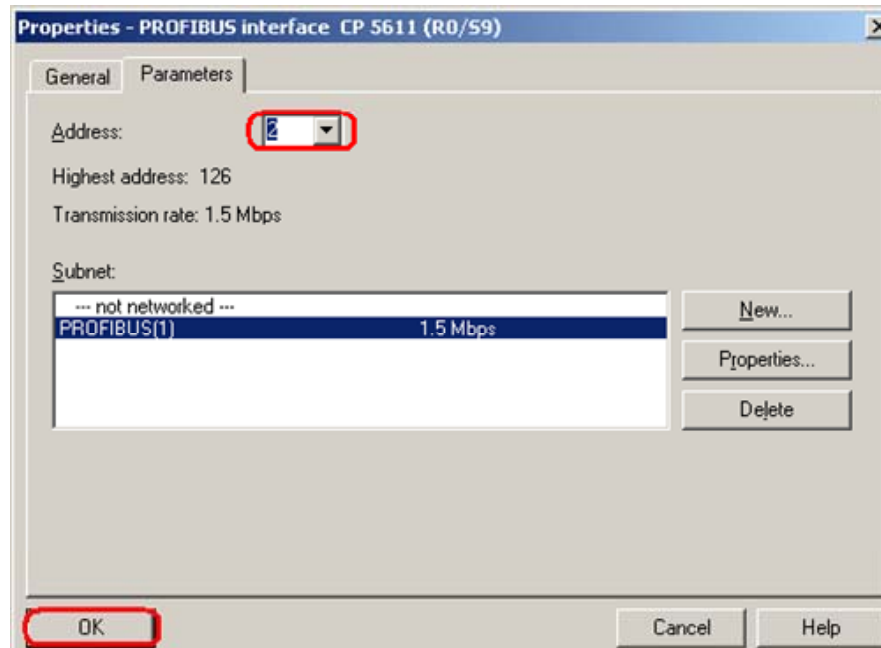
Figure 2-6 address assignment dialog
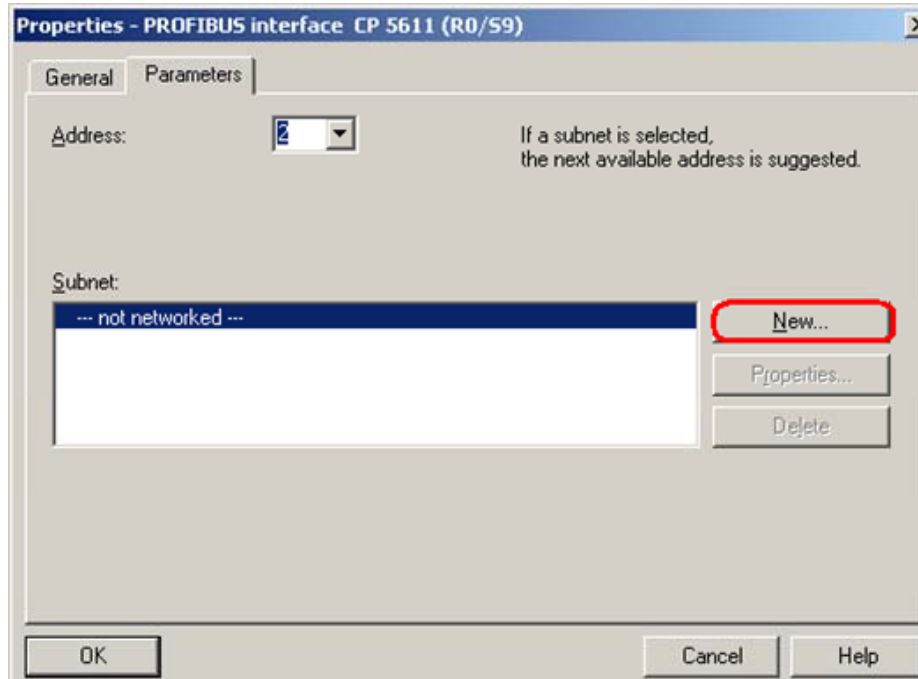
Click on the button "New" to create a new PROFIBUS subnet. The property view of the PROFIBUS subnet will open. Change to the register „Network Settings"and set the relevant bus parameters.

Figure 2-7 configuring bus parameters for PROFIBUS subnet
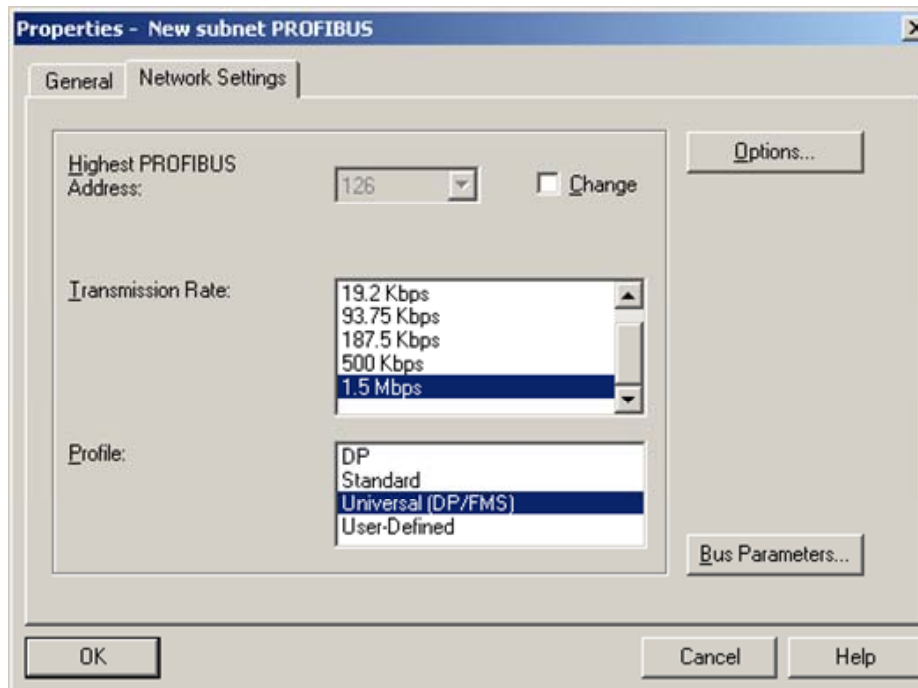
Confirm the dialog with „OK".
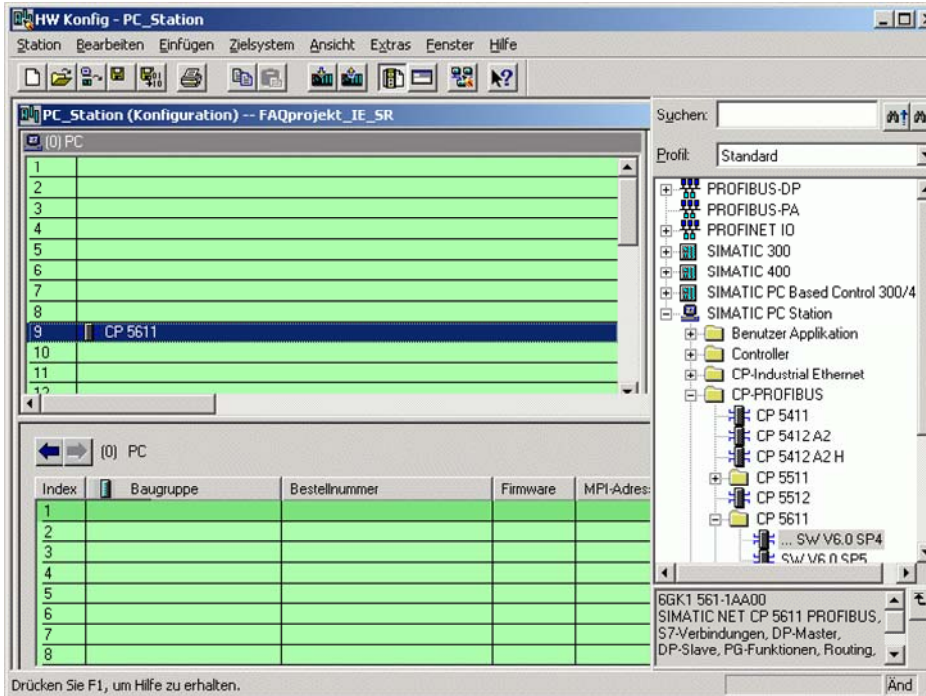
Figure 2-8 property view of the CP5611

Connect the CP5611 to the PROFIBUS subnet which you just have configured or to a PROFIBUS subnet which already exist.

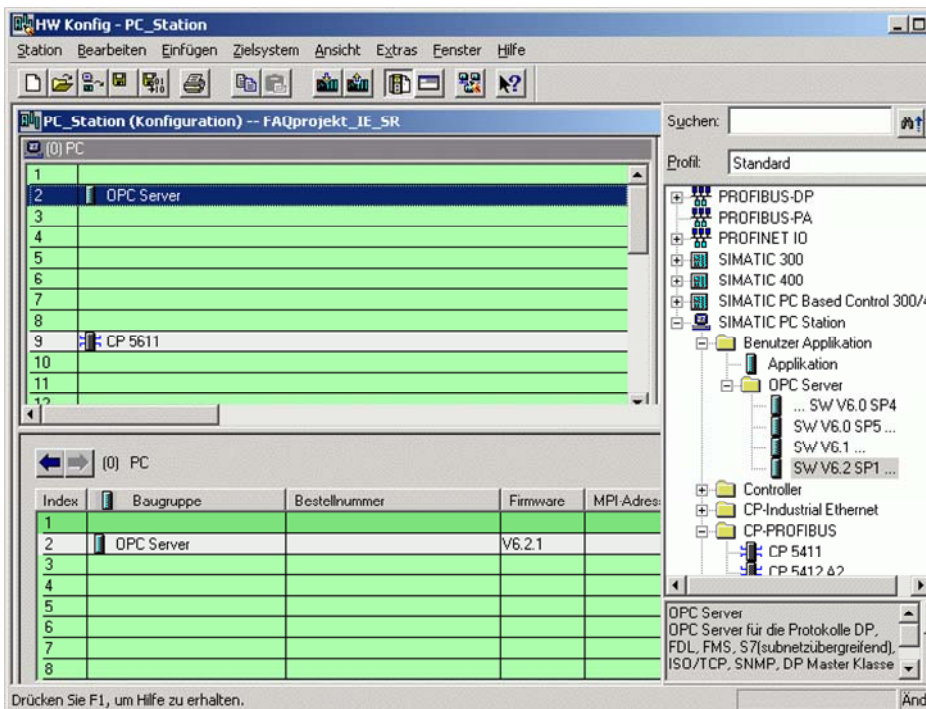Close the property view of the CP5611 with „OK".

The configuration and networking of the CP5611 is finished now.

Figure 2-9 hardware configuration – projecting the CP5611

The module has now been placed in a slot in the rack. You can select any slot. There are no restrictions.

Figure2-10 configuring the OPC server

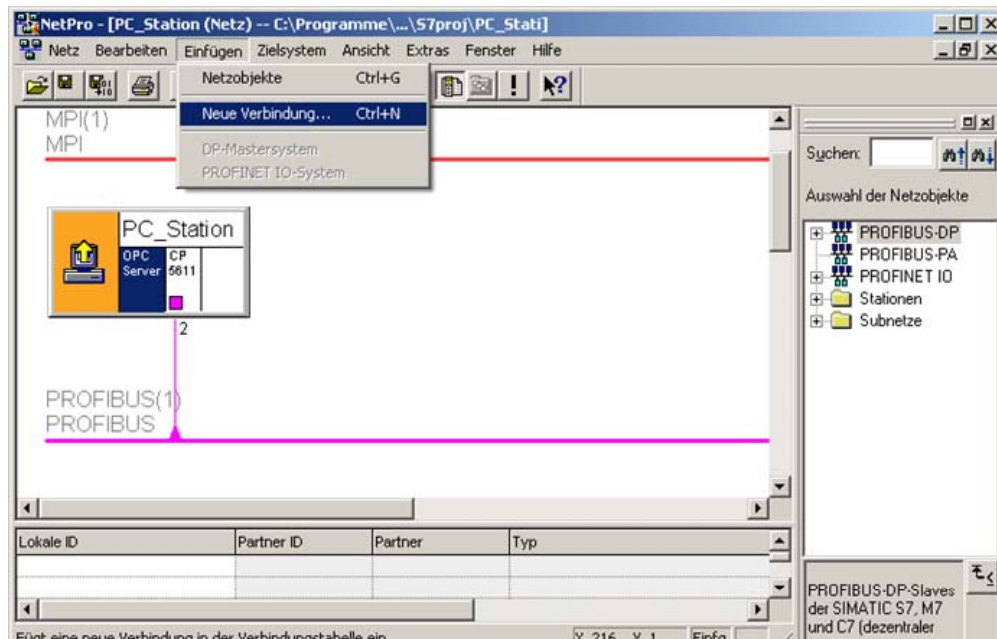Select the OPC server in the hardware catalog and then drag it to any slot.

Figure 2-11 button „NetPro"

Now open the NetPro program. Use the button marked red in the toolbar in Figure 2-11 button „NetPro".

In NetPro you configure a FDL connection to exchange data between the OPC server and the SIMATIC S5 95-U.

Figure 2-12 configuring the FDL connection in NetPro anlegen

Select the OPC server and choose the menu command "Insert → New Connection" to create a new connection for the OPC server or right-click the OPC server → „Insert → New connection".

Figure 2-13 insert a new connection in NetPro
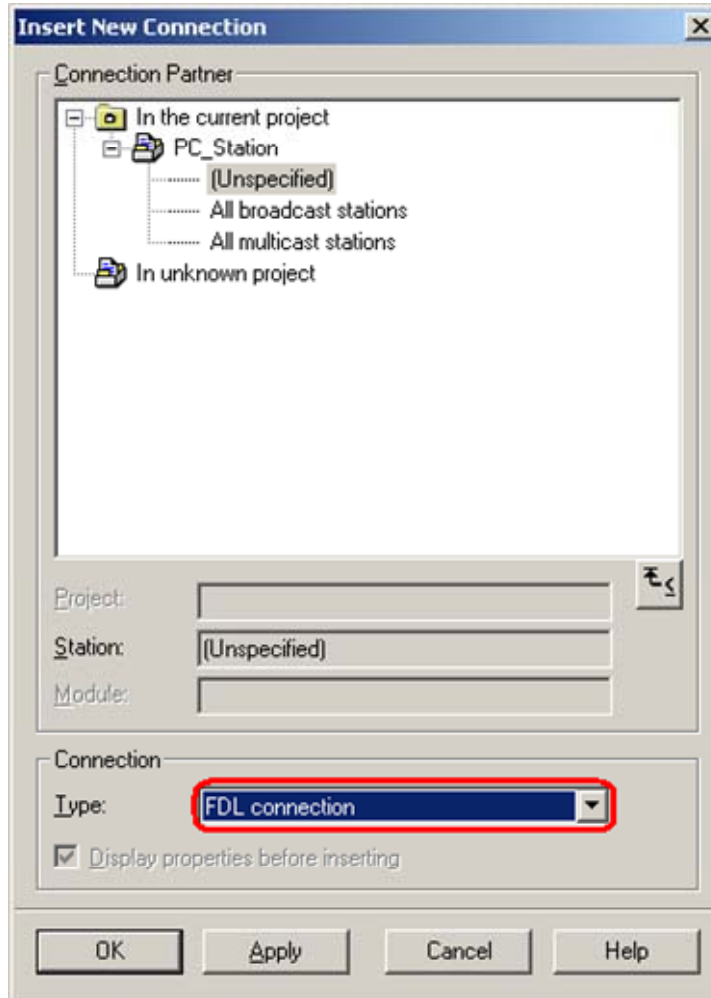
Because the communication partner isn't configured in the same S7 project like the PC station, you have to configure unspecified connection. In the dialog box "Connection Partner" you have to select „Unspecified" for the connection partner.

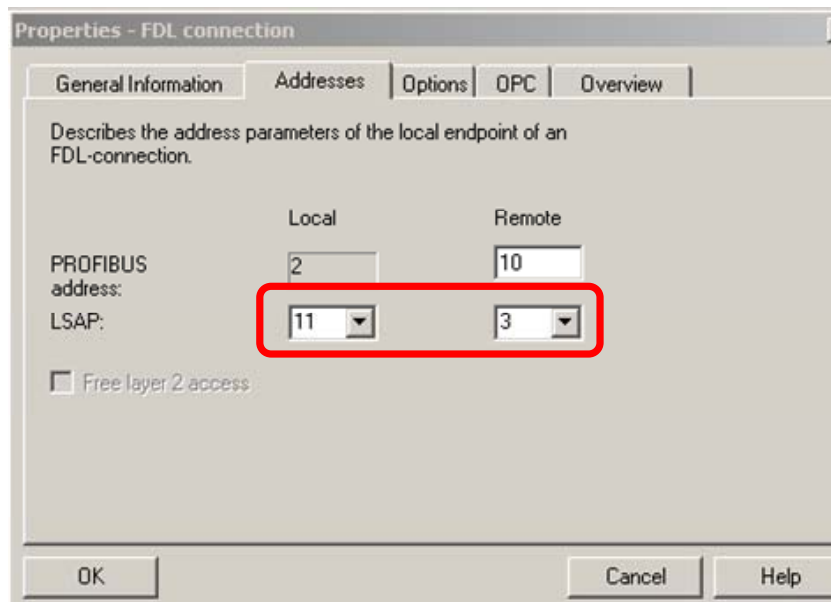Des Weiteren wählen Sie den Verbindungstyp „FDL-Verbindung" aus.

Click on the button „Apply" so that the property view of the FDL connection will open.

Figure 2-14 property view FDL connection → register „General Information"
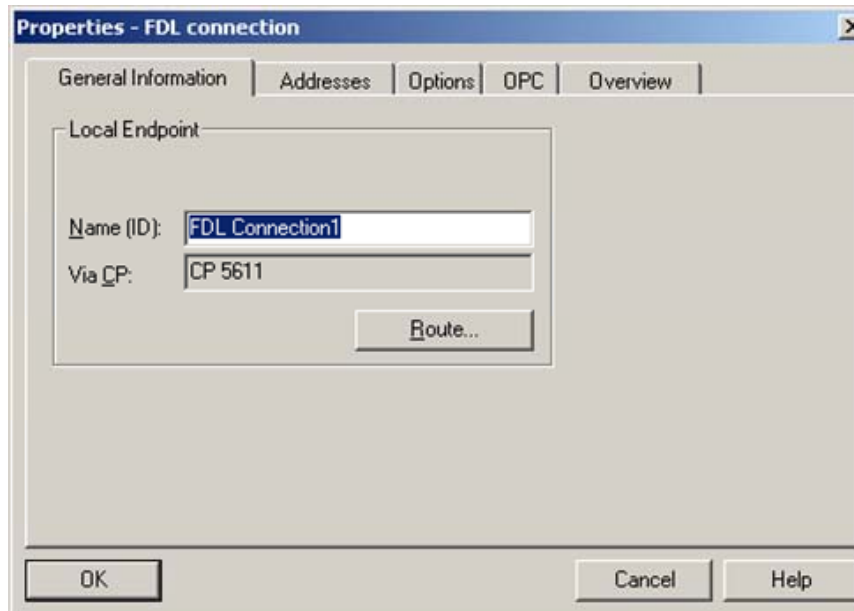
Insert a name for the FDL connection. Following change to the register "Addresses".

Figure 2-15 property view FDL connection → register „Addresses"

For "Remote" set the PROFIBUS address of the SIMATIC S5 95-U.

Following set the LSAPs for „Local" and „Remote". That`s neccessary to uniquely identify the FDL connection between PC station and SIMATIC S5 95-U.

The following LSAP rules have to be considered in a connection project with a SIMATIC S5 95-U:

- local LSAP:
  PROFIBUS address of the partner + 1

- remote LSAP
  local PROFIBUS address + 1

These settings are set by the S5-95U. They must be taken into account.

NOTE	You will have to consider the indication of the PROFIBUS addresses and LSAPs if you configure the FDL connection in the S5 station.

Change to the register „OPC-Properties".

Figure 2-16 property view → register „OPC-Property"
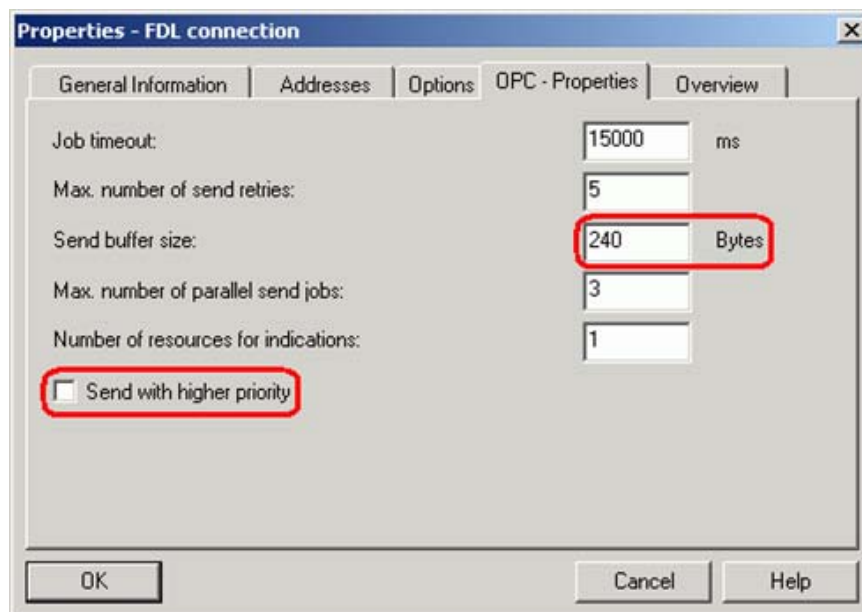
Deactivate the function „Send with higher priority", because the SIMATIC S5 95-U doesn't support a high sending priority. The size of the send buffer is up to a maximum of 240 Byte for a SIMATIC S5 95-U.

Apply the settings with „OK".

If you select the OPC server in the PC station you will see the FDL connection which you have just configured in the connection table of the PC station.
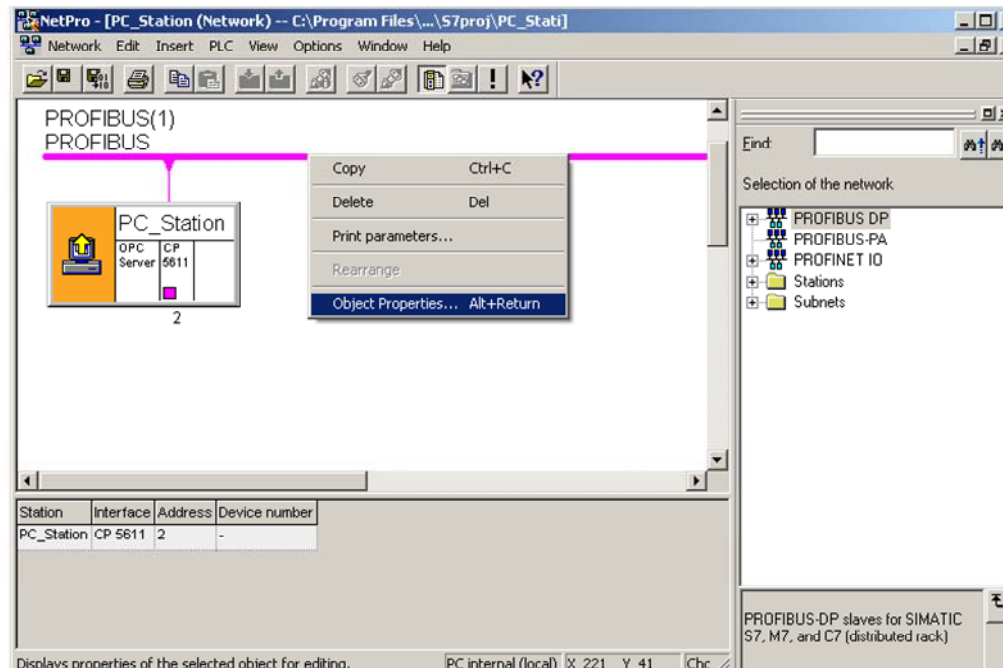
Figure 2-17 connection table
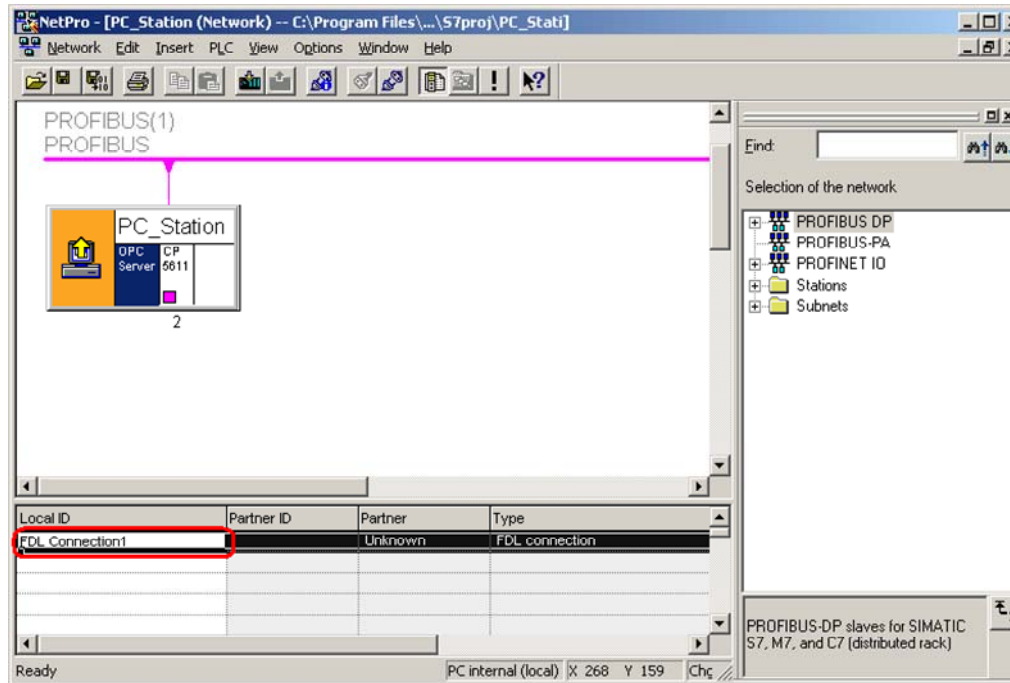
Now the configuration of the of the FDL connection is finished.

Check the network settings referring transmission rate and bus profile. Therefore in NetPro right-click the PROFIBUS subnet which is assigned to the CP5611. Open the object properties of the PROFIBUS subnet.

Figure 2-18 opening object properties of the PROFIBUS subnet

In the object properties of the PROFIBUS subnet change to the register „Network Settings". Select the profile „User Defined" and click the button „Bus Parameters…".

Figure 2-19 property view of the PROFIBUS subnet
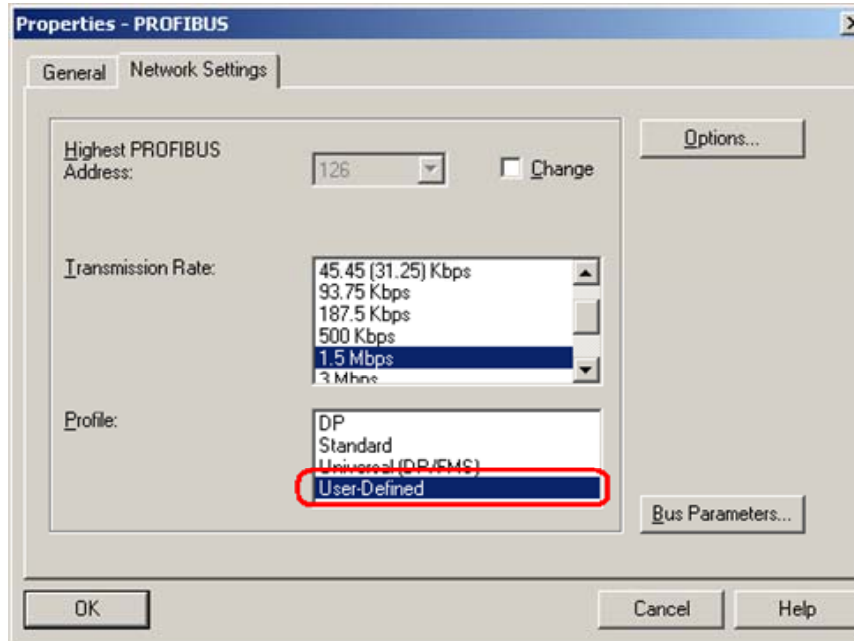
The bus parameters are forced by the SIMATIC S5-95U. In the PC station you have to adapt the bus parameters according to this presetting.

Table 2-1 bus parameters forced by the SIMATIC S5 95-U

baud rate in kBit/s	9,6	19,2	93,75	187,5	500	1500
bus parameter in bit times						
Tset	10	15	45	80	80	**80**
Tslot	100	170	240	400	1000	**3000**
Min. Tsdr	12	15	45	80	80	**150**
Max. Tsdr	60	65	200	360	360	**980**

The baud rate is 1500 kBit/s in this example.

Click the button „Recalculate" to define the parameters which are missing.

Figure 2-20 dialog „bus parameter"
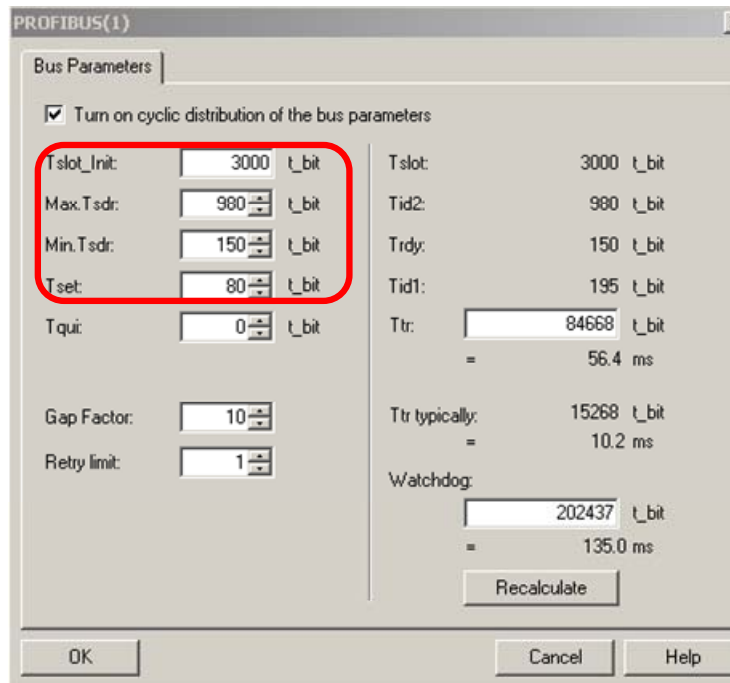
After you have adapted the bus parameters close the dialog with „OK".

Save and compile the S7 project. Therefore select the PC station in NetPro and click the button „Save and Compile" in the toolbar. This updates the information in the S7 project.

Figure 2-21 Save and compile
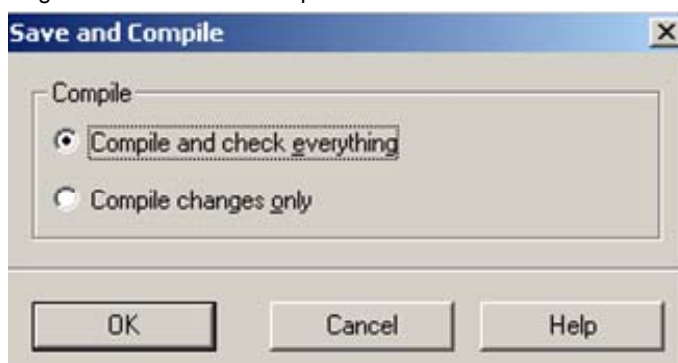
| NOTE	Warning indications can be displayed while proceeding with the "Save and Compile" of a S7 project. Warnings serve as piece of information and have no functional effect. In case error warnings occur, search for possible divergences in the previous steps of the instructions.

3 Download the configuration into PC station

Open the „Station Configuration Editor" in the Windows START Menu →
„Station Configuration Editor" or with the following button in the Windows
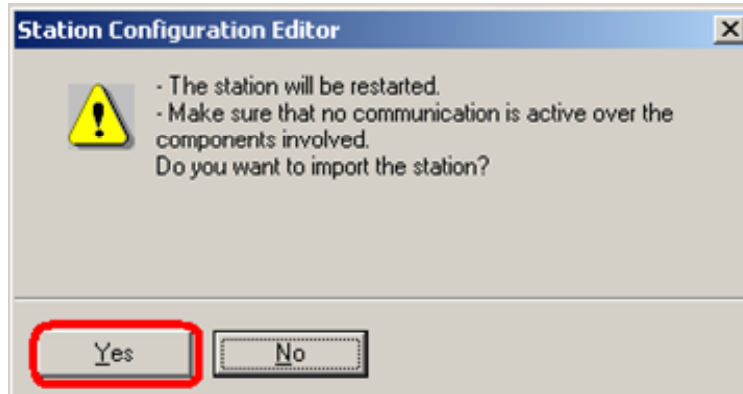task bar.

Figure 3-1 button „Station Configuration Editor"

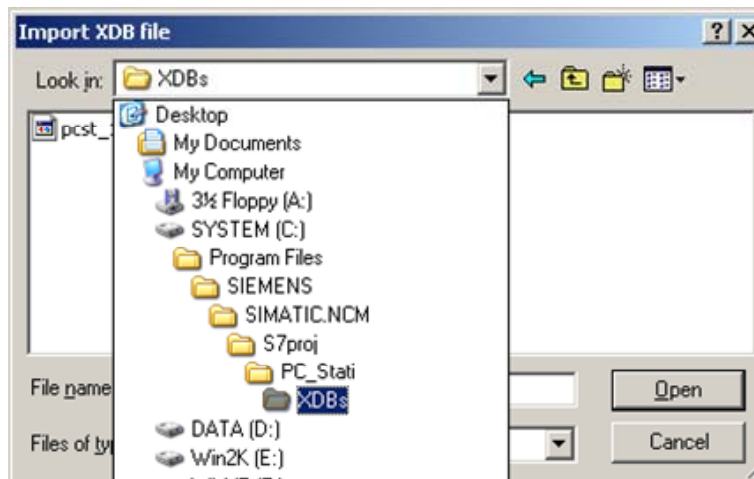Figure 3-2 Station Configuration Editor
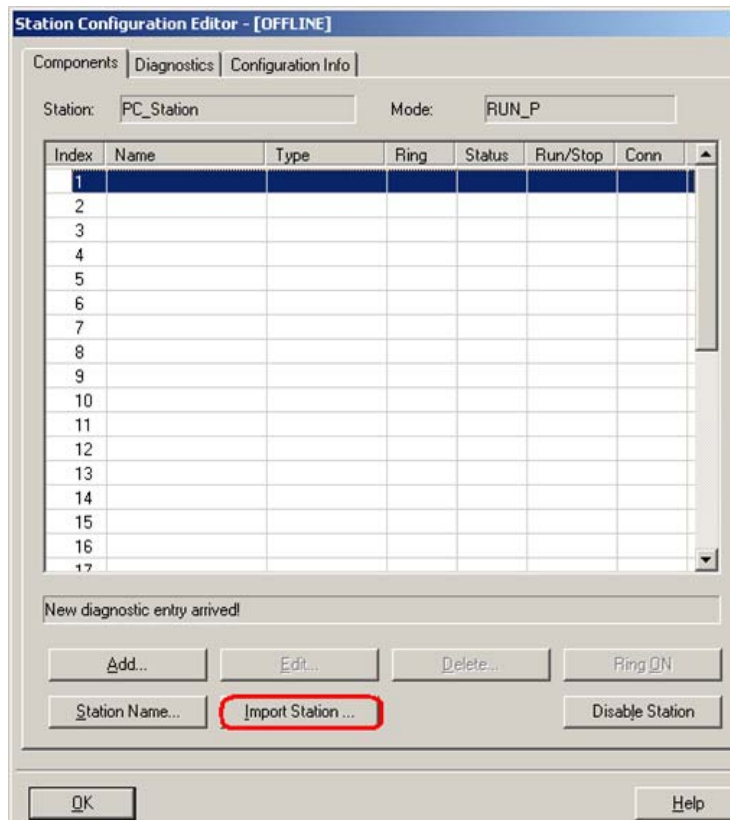
Click the button "Import Station…". A message about restarting the PC
station will open.

Figure 3-3 message about restarting the PC station

Confirm the message about restarting the PC station with „Yes". The following dialog to select the XDB file, which should be import, opens.

Figure 3-4 selecting the XDB file

In this dialog you enter the path of the XDB file. The XDB file is always created in the project by NCM PC / STEP 7 (see Figure 2-1 giving the project a name). With the combo box „Search in: "you navigate in the path of the XDB file.

Figure 3-5 Information from the XDB file
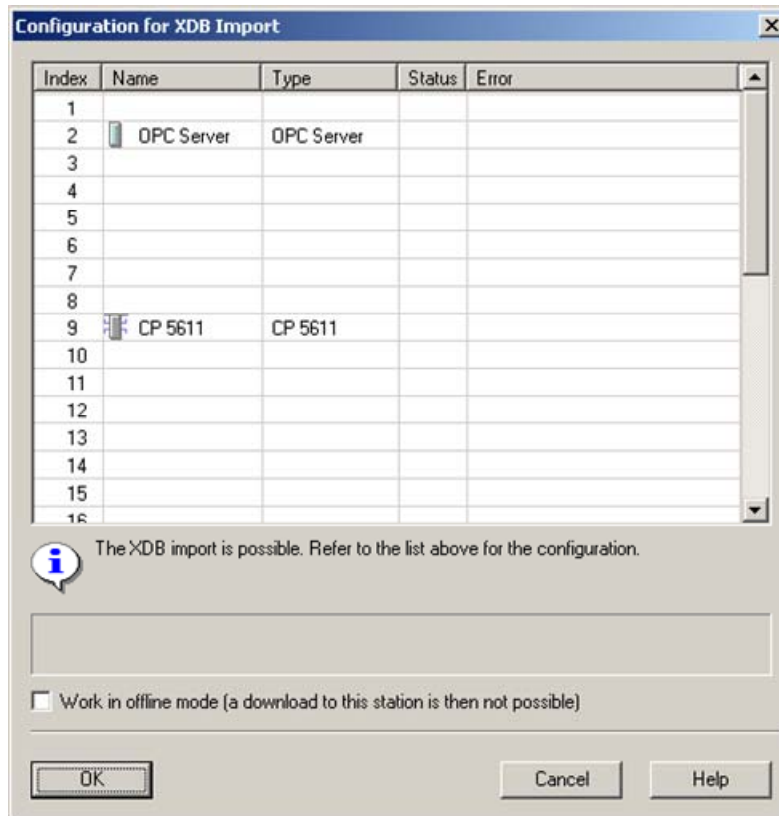
As information, you can see once again which modules and applications are configured in the XDB file.

Figure 3-6 PC station configured
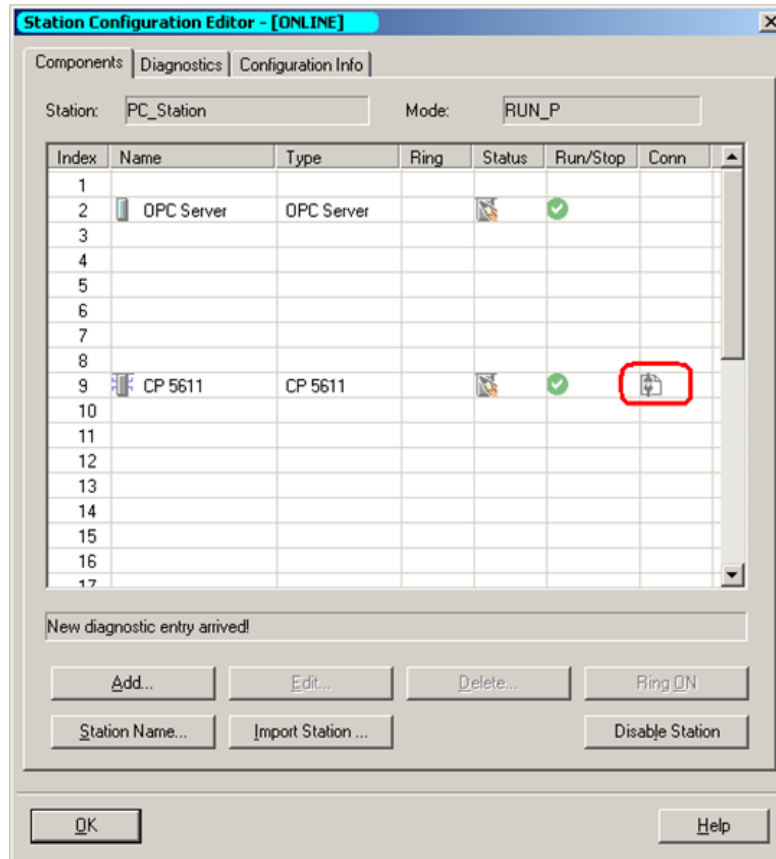
Now the import of the XDB file is finished and the configuration is downloaded.

In the column connection, which is marked red, you see that the connection is also been downloaded.

So the configuration of the PC station is finished.

4 Configuration of the SIMATIC S5

4.1 Initialize the PROFIBUS Interface of the SIMATIC S5 95-U and create a PLC-to-PLC link

Start STEP 5 clicking Start → SIMATIC → STEP 5.

Create a new S5 project file e.g. AG95U@ST.S5D press on „File → Project → Adjust → Modules.

Connect yourself to the PLC with the mode „Online" press on „File → Project → Adjust → AG".

Transfer the modules FB252 and FB253 from the PLC to the S5 program file "AG95U@ST.S5D" with "File → Modules → Transfer ".
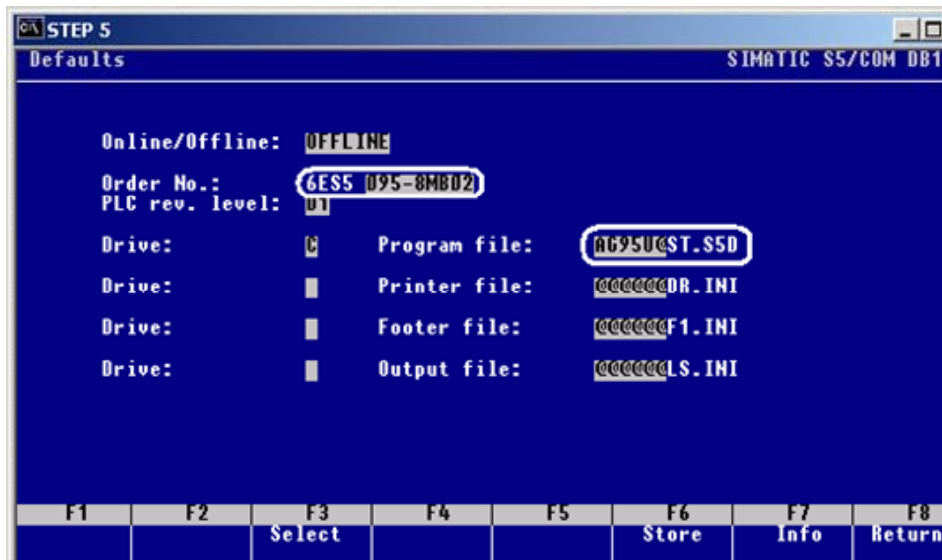
Starting the configuration tool COM DB1 press on „Switch → COM DB1".

Choose the language of the program with „F" keys.

Assign a MLFB number to the dialog box that has appeared.

Enter the S5 filename in which the configuration data block will be transferred later.

Figure 4-1 presetting for the configuration of the interface

Adopt the settings with „F6".

In the next dialog all parameters will be shown. Select „SINEC L2" and confirm you choice with „Return".

Figure 4-2 possible configurations: SINEC L2

Select „Basic parameters" from the authorized parameters and confirm it with „Return".

Figure 4-3 possible configurations: Basic parameters

The „Basic parameters" include the configuration of the bus parameter and the definition of the PROFIBUS address (Own station address) for the SIMATIC S5.

In order that the data are exchanged between SIMATIC and PC station you have to set the „Own station status" to „active".

The bus parameters were set in NetPro. Adopt the setting from Figure 2-19 and Figure 2-20.
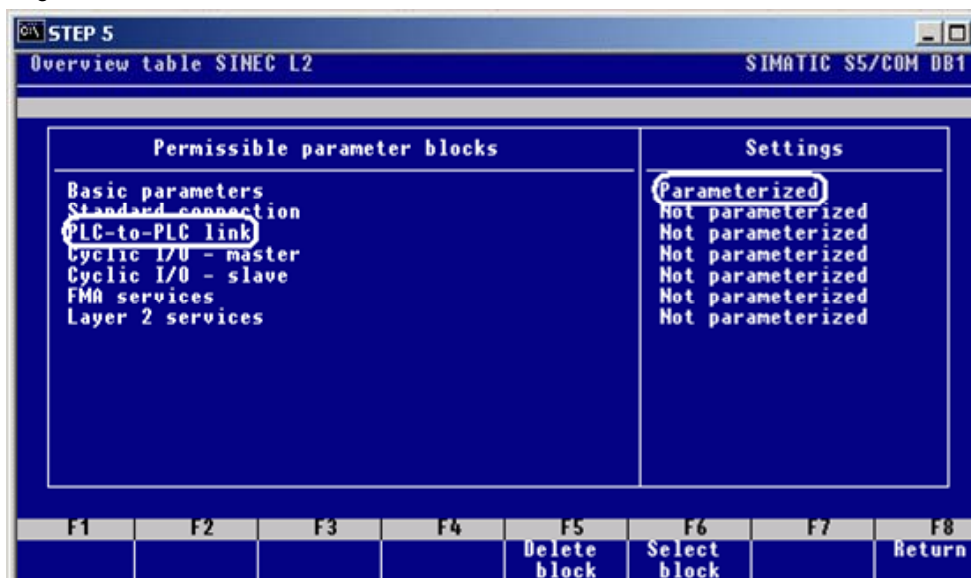
Figure 4-4 Basic parameters
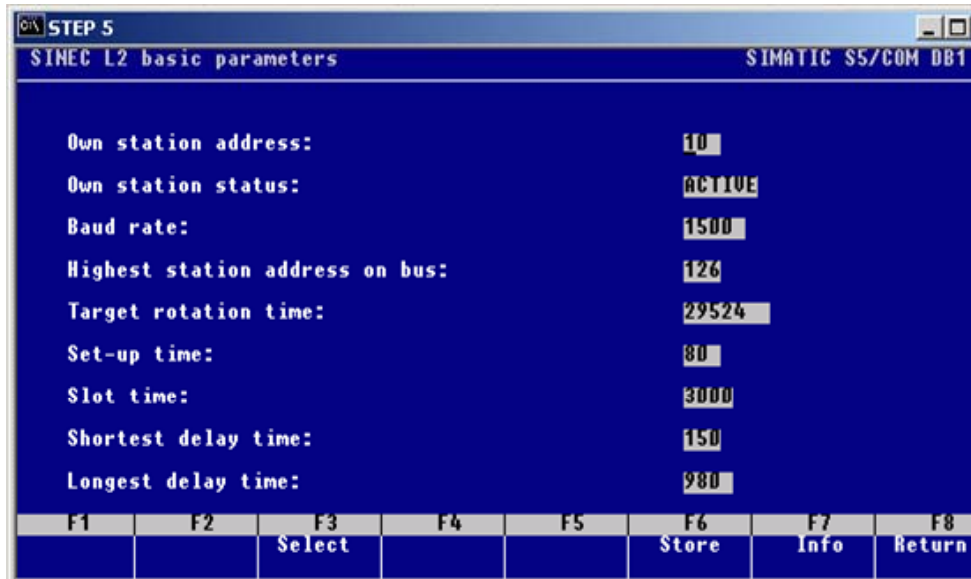
Adopt the „Basic parameters" with „F6".

Select „PLC-to-PLC link" and confirm it with „Return".

Figure 4-5 PLC-to-PLC link

In the first column „PLC-PLC link to station" you have to select the row with the PROFIBUS address of the PC station. In this example the PROFIBUS address of the PC station is „2".

In the row, which you have selected, set two status bytes for the indication of the PLC-PLC link.

Because the SAPs are uniquely defined by the PROFIBUS addresses of the PC station and SIMATIC S5 it's not possible to edit the local and remote SAP.

Figure 4-6 configuring PLC-PLC link
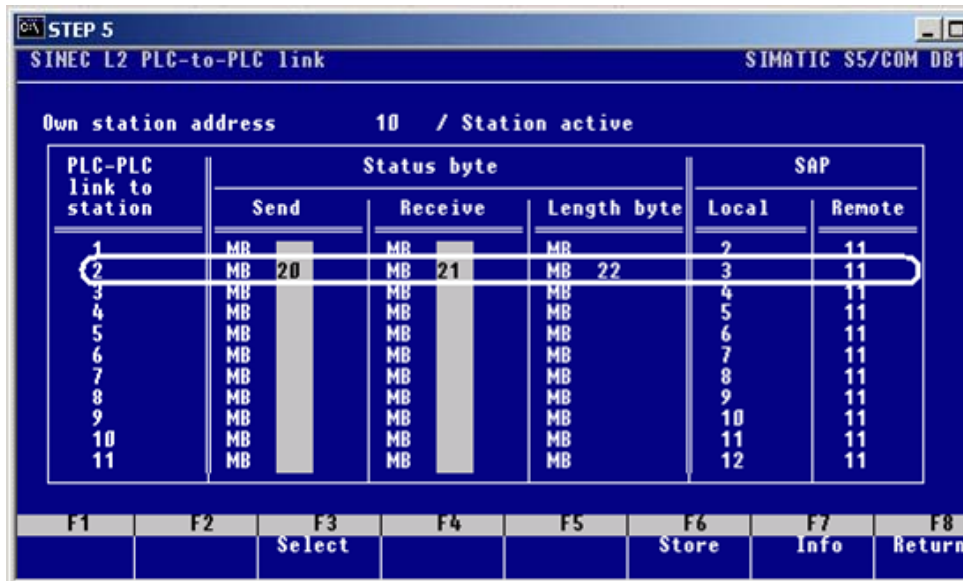
Adopt the setting with „F6".

Leave the interface configuration with „F8".

Saving the configuration which you have created with „F3 – DB1 transferred".

Following transfer the DB1 to the S5 project file which you have selected with „F1 – Transfer to FD".

Switch back to STEP 5 with „ESC".

4.2 Description of the S5 program

Open the DB1 which was created by the configuration tool COM DB1. The configuration appears.

Figure 4-7 configuration block DB1

Adopt the setting with „F7".

| NOTICE | It's not allowed to change the DB1 with STEP 5. All changes have to be making with the configuration tool COM DB1. |

Call the blocks L2-SEND and L2-RECEIVE in the OB1

Create the OB1.

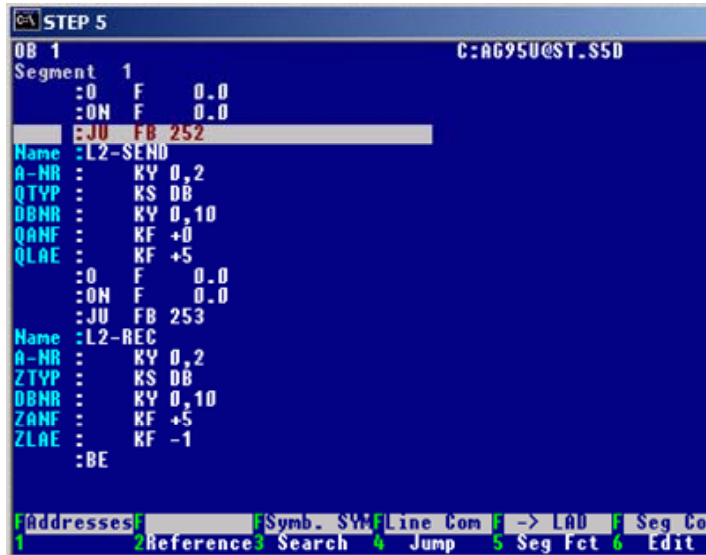Build a VKE = 1 with the following commands:

- O M0.0

- ON M0.0

Call the function block FB252 „L2-SEND" (see Figure 4-8).

Build a VKE = 1 with the following commands:

- O M0.0

- ON M0.0

Following call the function block FB253 „L2-RECEIVE" (see Figure 4-8).

Figure 4-8 calling the function blocks FB252 „L2-SEND" and FB253 „L2-RECV"

NOTE	The function blocks L2-SEND and L2-RECV are executed only when VKE = 1 prior to the call.
	The length of the send area is specified in words (parameter: QLAE = 5 → 5 words).
	If the length of the receive area is preset with „-1"the length of the data will detect automatically (parameter: ZLAE = -1).

Saving OB1 with „F7".

Creating the send and receive buffer

Because the send and receive buffer must be located in DB10, this must be created in the project and declared with an adequate length.
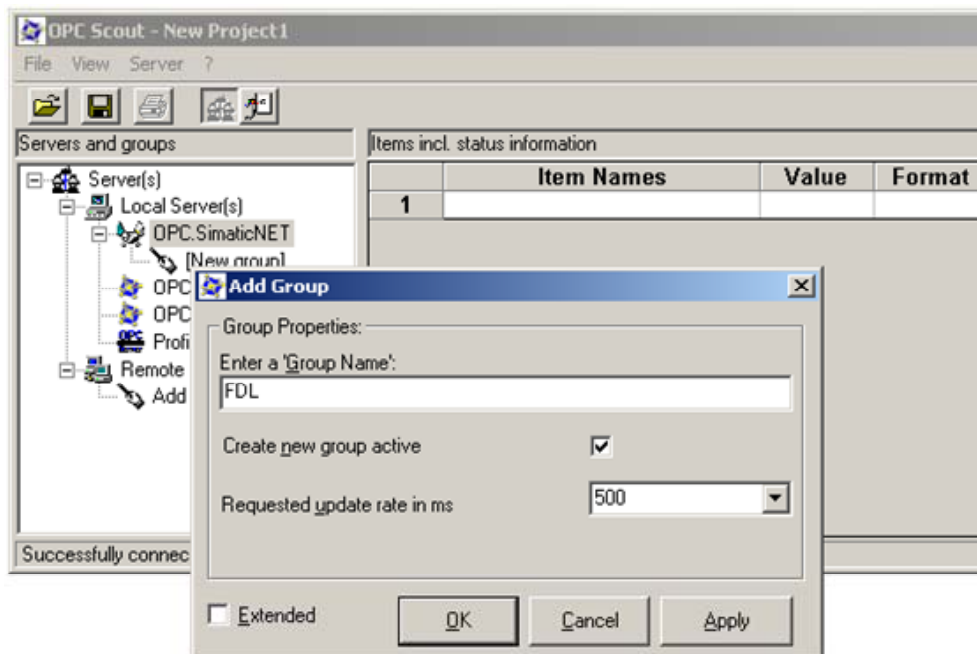
Then download the entire program to the S5 station.

5 Start of the OPC-Scout

Start the OPC Scout with "Start → SIMATIC → SIMATIC NET → OPC Scout".

Double-click the „OPC.SimaticNet"for connection with the SIMATIC NET OPC server. In the dialog that appears, enter a suitable group name and confirm this with OK.

Figure 5-1 connecting with the OPC server and enter a group name

Double-click the OPC group which you have created. The "OPC-Navigator" opens. You will now see your protocols in the OPC-Navigator. Double-click on "FDL". The connection name you configured in NetPro appears.
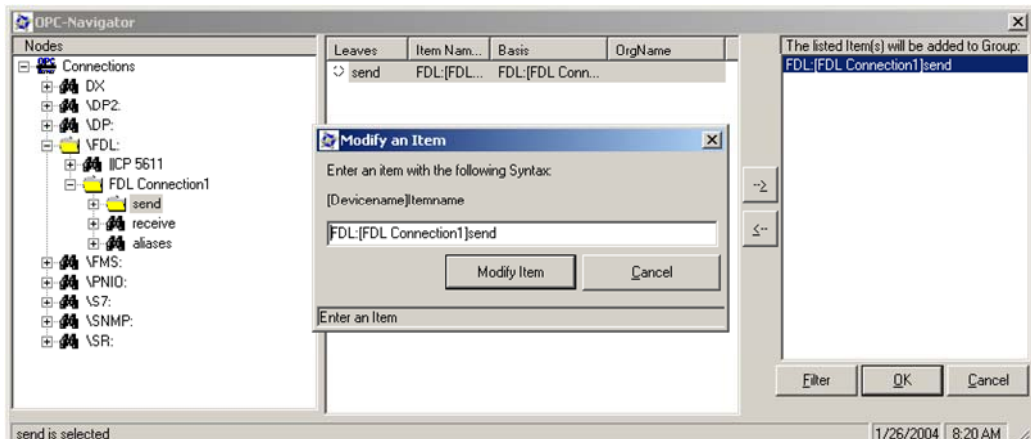
Figure 5-2 OPC-Navigator
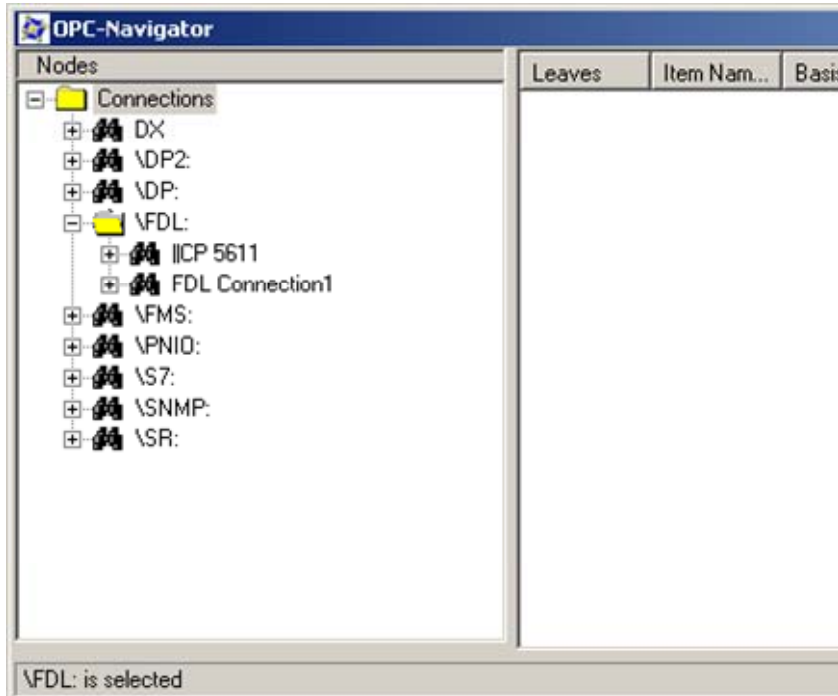
Double-click the FDL connection to define new items and add existing items respectively for the communication.

In the OPC-Navigator select "send". In the middle section appears an item. Move this "send" item to the right section with the button "→".
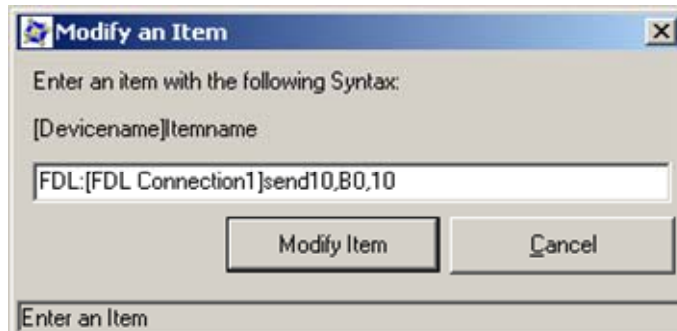
Double-click the „send"item in the right section.

Figure 5-3 adding the „send" item

Change the name of the „send"item (see Figure 5-4 changing the name of „send" item) and click the button "Modify Item".
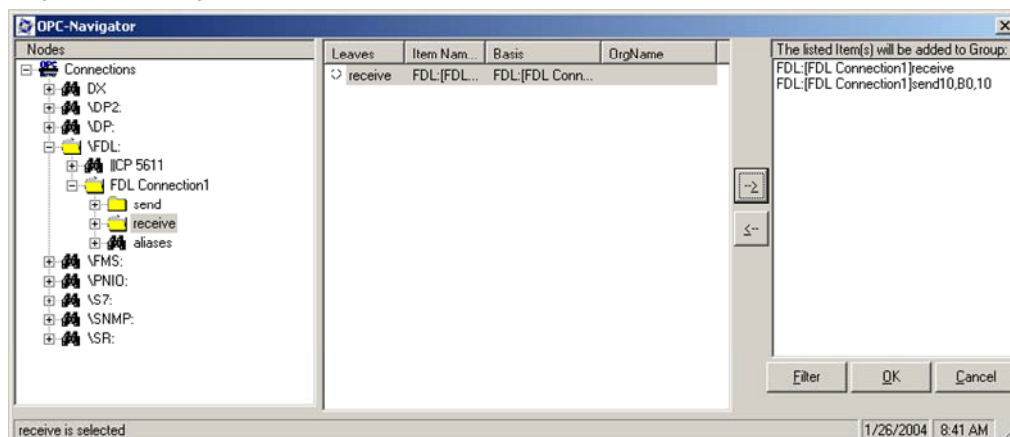
Figure 5-4 changing the name of „send" item

NOTICE	**The item "... send 10, ..." means, that a send buffer of 10 Bytes is reserved on the PC station.**

In the OPC-Navigator select "receive". Move the existing "receive" item which appears in the middle section to the list in the right section with the button "→".
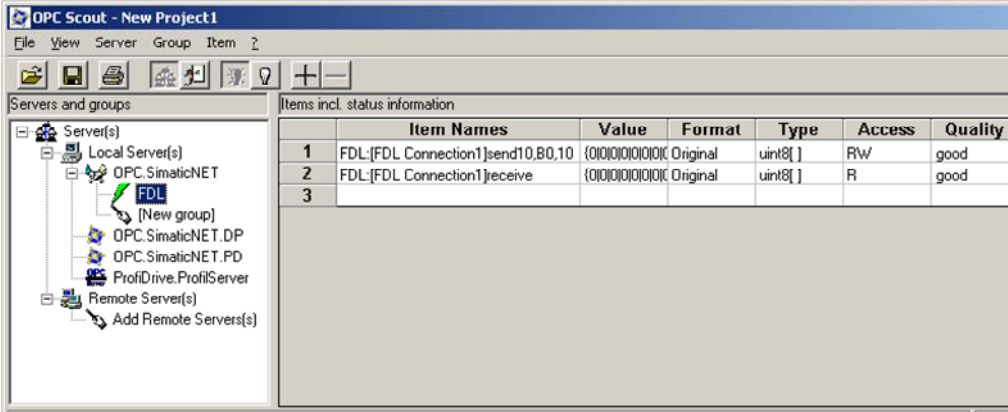
Following click the button "OK".
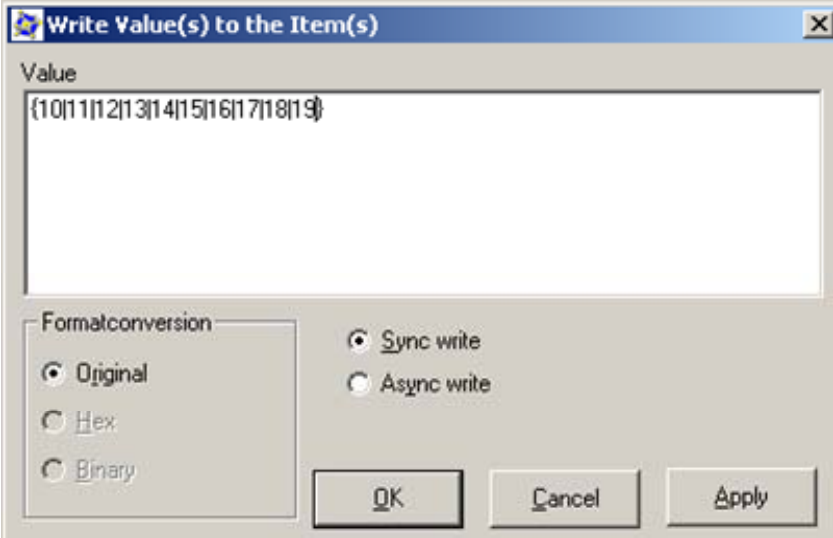
Figure 5-5 adding the „receive" item

The items are added in the OPC Scout. If the quality is good the connection is established and it's possible to read and write the items respectively.

Figure 5-6 OPC-Scout

Double-click the column value of the "send" item to write values to the send buffer.

Figure 5-7 writing values

The default structure of the value input {0|0} must not be modified. Only the values themselves may be modifying {1|1}.

Figure 5-8 successful write job

With the services send and receive successful writing of data must be checked in the columns „Write Result" and „Error". The columns „Write Result" and „Error" can be made visible in the „View → Options" menu.

6 History

Version	Date	Changes
V 1.0	02.04.2008	First Issue