Anybus X-gateway Modbus-TCP

Exchanging data between a Modbus-TCP slave and a PROFIBUS master

History

Revision	Date	Description	Responsible
1.00	2011-05-18	First release	KaD

Contents

1 Applicable Anybus Products

Description	Name / Type
Anybus X-gateway Modbus-TCP	PROFIBUS DP-V1

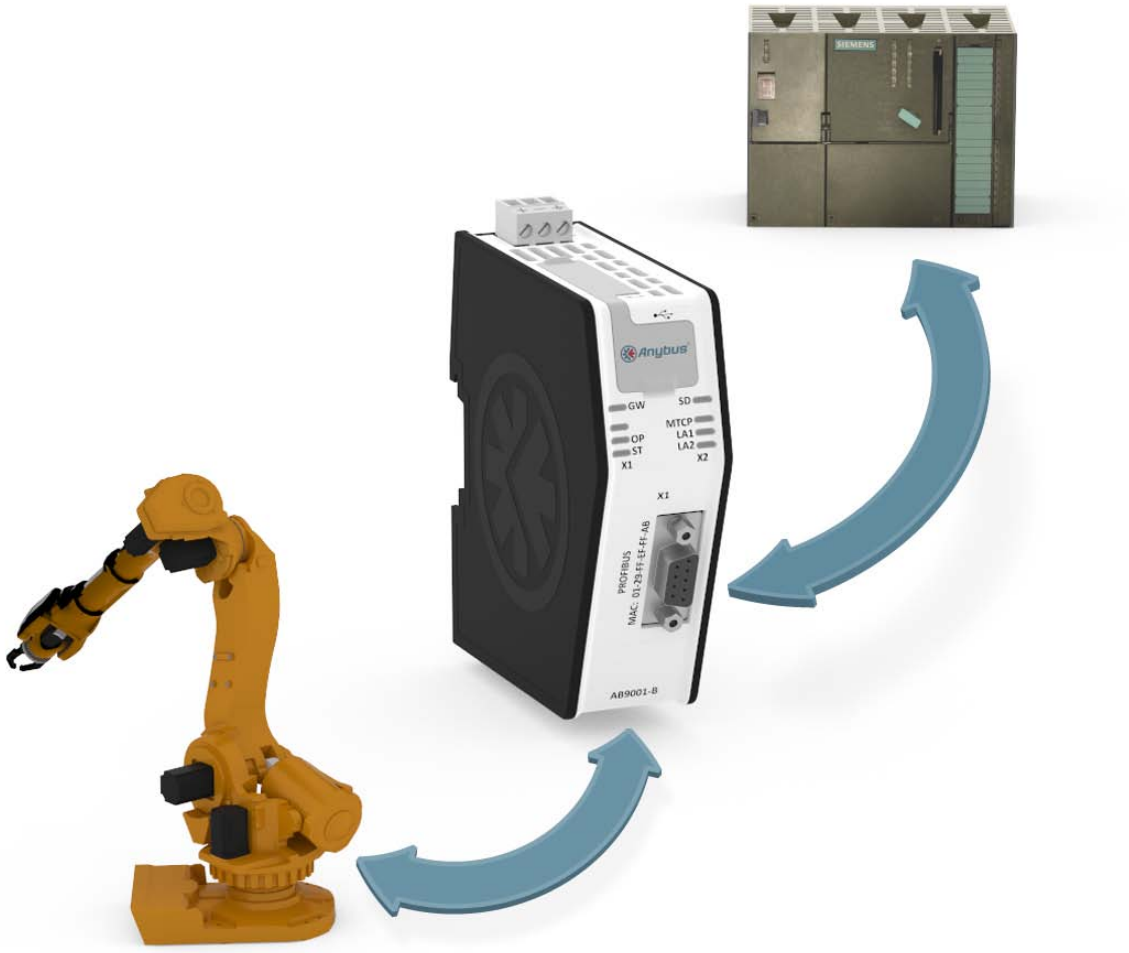
2 Requirements

Description	Name / Type	Version
Anybus X-gateway for Modbus-TCP	AB9001	N/A
PROFIBUS master	-	N/A
Modbus-TCP slave (I/O Block)	-	N/A
Anybus NetTool for PROFIBUS Master	Software	N/A
Simatic STEP7	Software	N/A
PROFIBUS Master Simulator	Software	N/A

Note: The GSD file can be downloaded at the HMS website www.anybus.com.

3 Solution Overview

An overview of the system described in this document is found below. This application note describes the necessary steps needed to be able to exchange data between a Modbus-TCP slave and a PROFIBUS master, using an Anybus X-gateway Modbus-TCP to PROFIBUS DP-V1 from HMS Industrial networks AB. The contents describe step by step how a configuration is done. This document assumes the reader is familiar with industrial communication.



4 Hardware Installation

Perform the following steps when installing the hardware:

1. Mount the module. See “Mounting the X-gateway” on page 16 in the manual for details.

2. Connect the X-gateway to the Modbus-TCP network. See “External View” on page 15 in the manual.

3. Connect the power cable and apply power.

4. Connect a PC to the Modbus-TCP network connector (see “External View” on page 15 in the manual) and open a web browser. Enter the IP address of the X-gateway and access the configuration web pages.

5. If the IP address of the X-gateway is unknown, use the Anybus IPconfig tool to find it. See “Anybus IPconfig Tool” on page 36 in the manual. For this example, set the IP address of the X-gateway to 192.168.0.207.

6. Connect the Modbus-TCP Server (slave) to exchange data with. In this example a simple I/O-block with 16 inputs and 16 outputs is used. The inputs are connected to the outputs to loop the data. For this example, use IP address 192.168.0.206.

7. Connect the PROFIBUS DP-V1 slave interface of the X-gateway to the PROFIBUS master used in the setup. In this example a master from Siemens is used, configured with STEP7, Anybus NetTool for PROFIBUS and the PROFIBUS Master Simulator.

5 Web Configuration

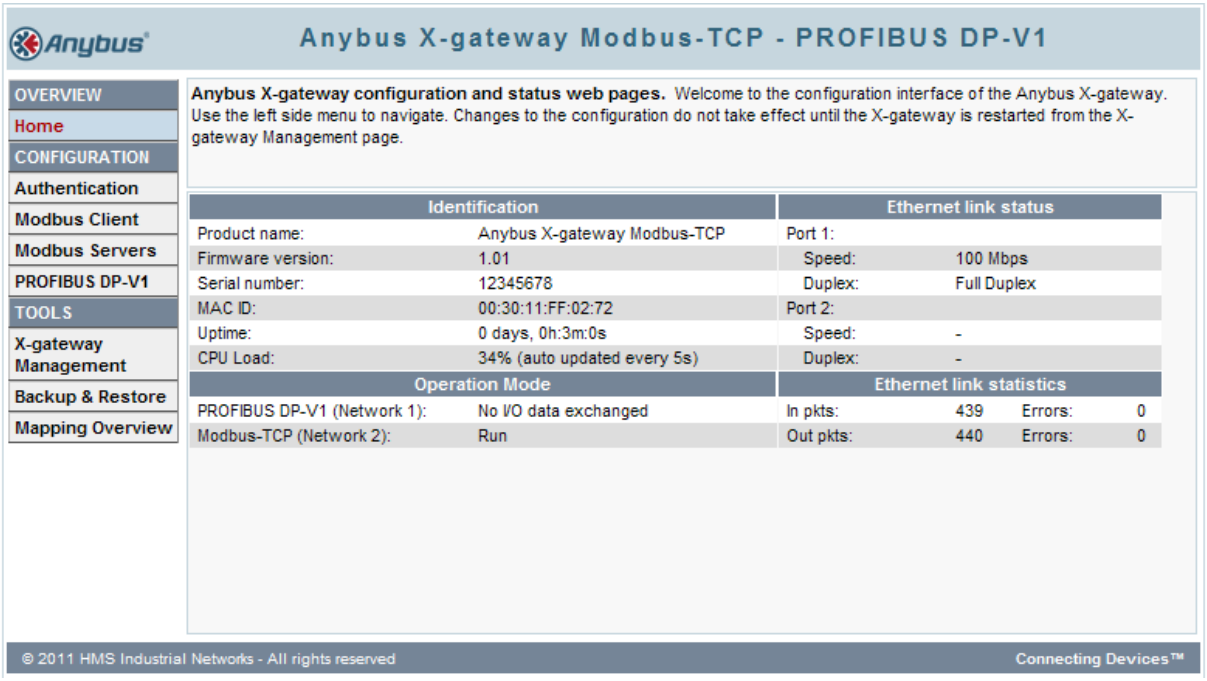
The Anybus X-gateway is configured via Internet Explorer version 7.0 or later and with JavaScript enabled.

The configuration and status web pages are divided into three sections.

For further information, see chapter 5.3 in the manual.

5.1 The X-gateway Start Page

Access the configuration web pages using the IP address of the X-gateway (http://192.168.0.207 is used as the client address). The start page of the X-gateway looks like this:



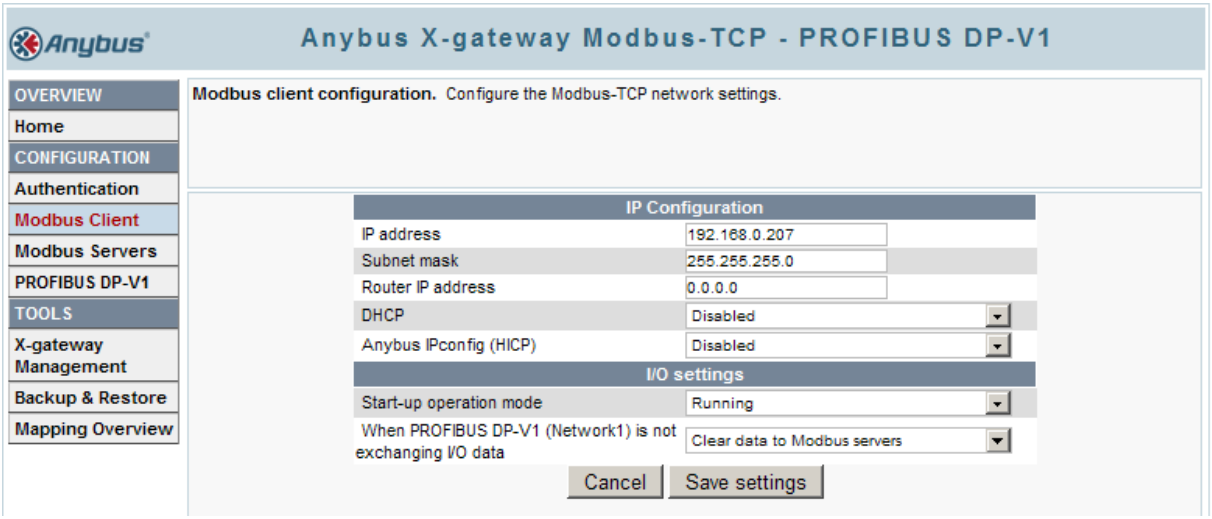
This window of the configuration and status web pages presents important error tracking information, as well as general information and statistics.

For further information see chapter 5.3.1 in the manual.

5.2 Modbus Client Settings

Select the Modbus Client tab from the menu on the left. Configure the Modbus-TCP client (master).

For further info see chapter 5.4.2 in the manual.



To be sure that the IP address cannot be changed from the DHCP server, disable DHCP.

To be sure that the IP address cannot be changed from the Anybus IPconfig tool, disable HICP.

As mentioned before, the IP address of the Modbus-TCP client of the X-gateway is set to 192.168.0.207. Set subnet mask to 255.255.255.0 and router address to 0.0.0.0, as all modules are on the same local network.

Leave Start-up operation mode as “running”, as the control word will not be used.

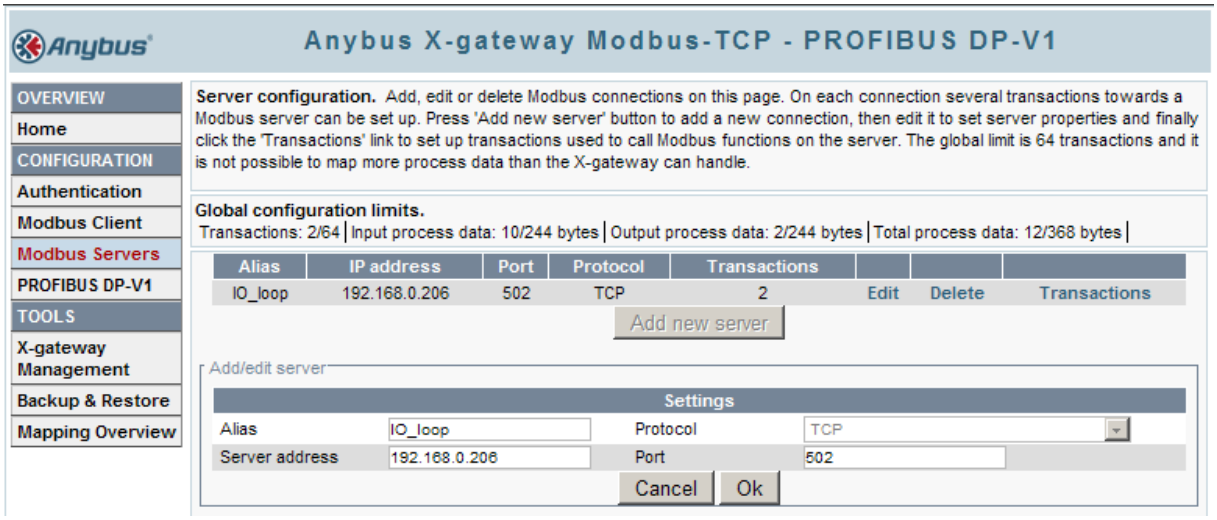
Select to clear data from the Modbus-TCP client to the servers when the PROFIBUS network is not exchanging data.

Click ‘Save settings’ to save the settings in the web server. Please note that the changes will not take effect until they are applied in the X-gateway Management section later on.

5.3 Modbus Servers Settings

Select the Modbus Servers tab from the menu on the left. Add a server by clicking ‘Add new server’ and then click ‘Edit’ to configure the Modbus-TCP Server.

For further information see chapter 5.4.3 in the manual.



For this example, rename the server to ‘IO_loop’ in the Alias field. Note that it is only possible to use uppercase and lowercase characters, numerals and underscore (_) for a maximum of 12 characters.

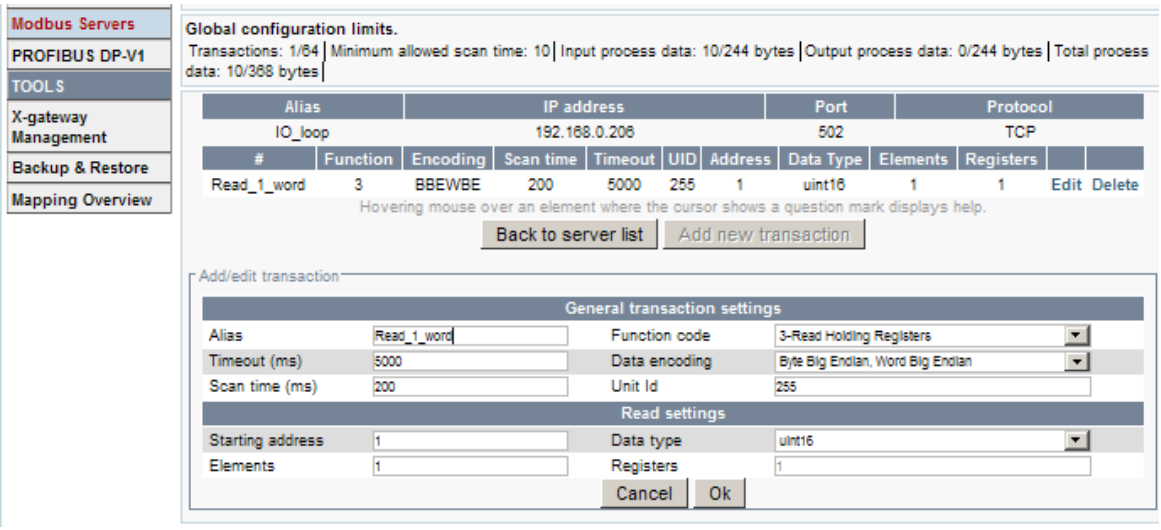
Set the IP address of the server: for this example, use 192.168.0.206.

The default Modbus-TCP port is 502.

Click ‘OK’ to save the settings. Please note that the changes will not take effect until they are applied in the X-gateway Management section later on.

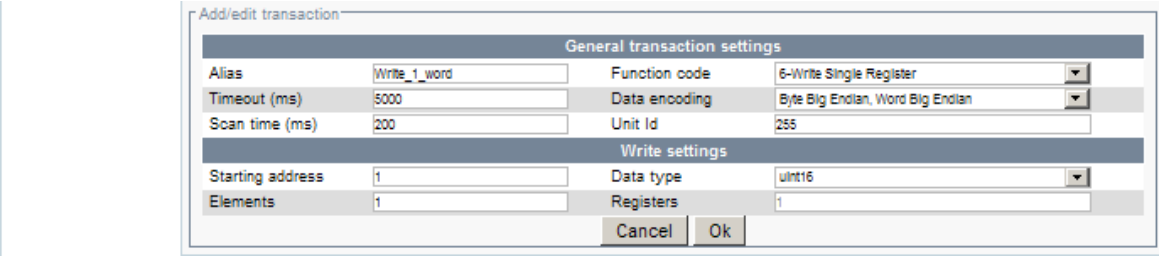
5.4 Modbus Server Transactions Settings

Still in the Modbus Servers section, click ‘Transactions’. Click ‘Add new transaction’ to add a new default transaction to the list and click ‘edit’ to edit it.



- For this example, choose Read Holding Registers (function code 3) and name the transaction ‘Read_1_word’.
- Use the default value for the data encoding as the server is a standard Modbus-TCP module.
- Use the default value for unit id (255) as the client connects directly to the server via TCP/IP.
- Use default values for timeout time and update time/scan time.
- Set start address to 1, number of elements to 1 and data type to UINT 16 (resulting in one 16-bit register).

Click ‘OK’ to save the settings. The changes will not take effect until they are applied in the X-gateway management section later on.



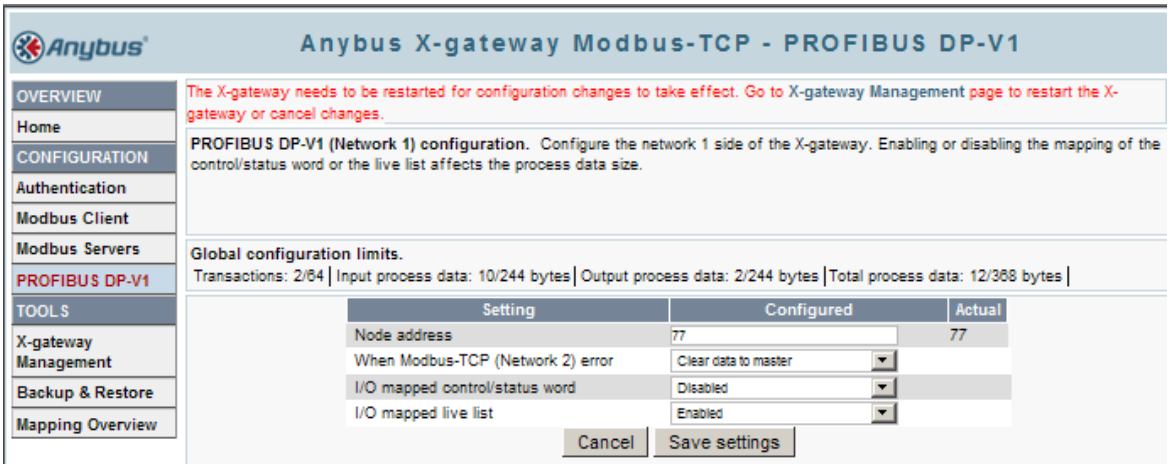
Click ‘Add new transaction’ to add another default transaction to the list and click ‘edit’.

- This time, choose Write Single Register (function code 6) and rename the transaction ‘Write_1_word’.
- Use default values for data encoding, unit id, timeout time and scan time.
- Set start address to 1 and number of elements to 1 of the type uint 16 (one 16-bit register).

Click ‘OK’ to save the settings. The changes will not take effect until they are applied in the X-gateway management section later on.

5.5 PROFIBUS Settings

Select the PROFIBUS DP-V1 tab from the menu on the left to configure the PROFIBUS slave interface of the X-gateway. For further information see chapter 5.4.4 in the manual.

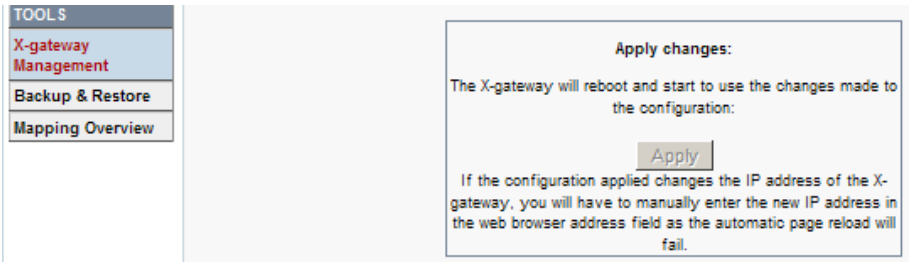


- For this example, set the node address to 77.
- Choose to clear data from the PROFIBUS slave to the master when the Modbus-TCP network is not exchanging data.
- Disable the control/status word.
- Enable the live list.

Click ‘Save settings’ to save the settings. The changes will not take effect until they are applied in the X-gateway management section later on.

5.6 Applying the Settings in the X-gateway

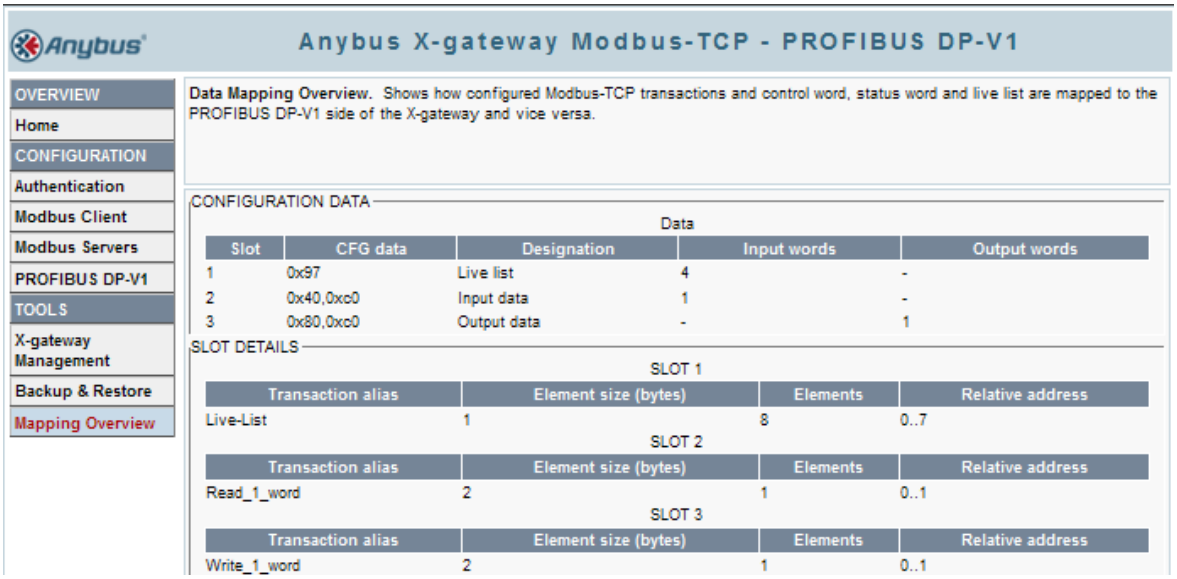
To save and apply the settings in the X-gateway, select the X-gateway Management tab from the menu on the left. Click the ‘Apply’ button under Apply changes. For further information see chapter 5.5.1 in the manual.



The X-gateway will go offline for a little while, and the Modbus-TCP network side as well as the PROFIBUS network side will be restarted and reinitialized.

6 PROFIBUS Master Configuration

Select the 'Mapping Overview' tab from the menu on the left, to find information about how the PROFIBUS slave of the X-gateway is configured. For further information see chapter 5.5.3 in the manual.



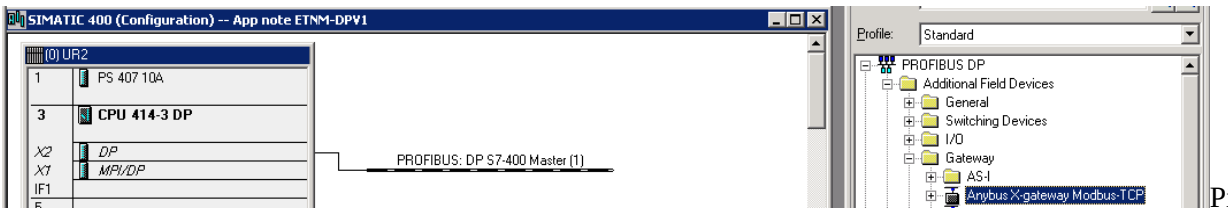
Download the appropriate GSD file from http://www.anybus.com/upload/HMSA1837.zip.

This example will show how configuration is made in "STEP7", "Anybus NetTool PROFIBUS" and via the "PROFIBUS Master Simulator".

6.1 Configure the X-gateway PROFIBUS Slave to the PROFIBUS DP-V1 Master via STEP7

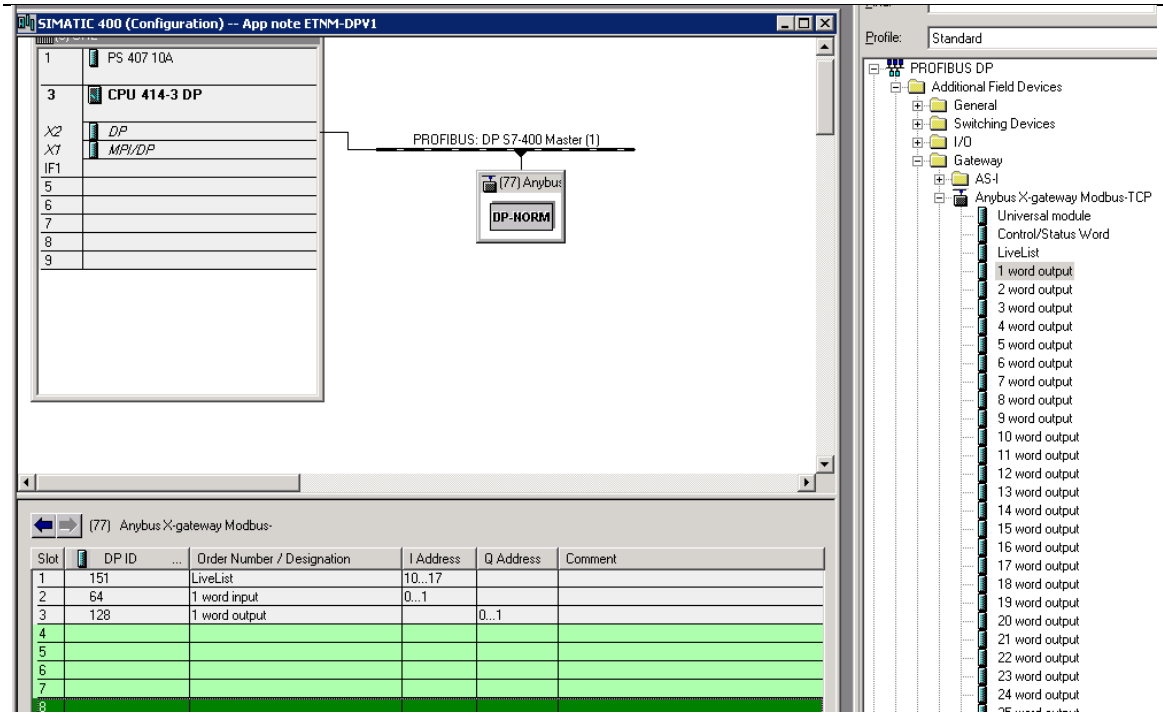
Load the GSD-file into STEP7.

Find the X-gateway PROFIBUS slave interface under PROFIBUS DP\Additional Field devices\gateways\...



Pic1:

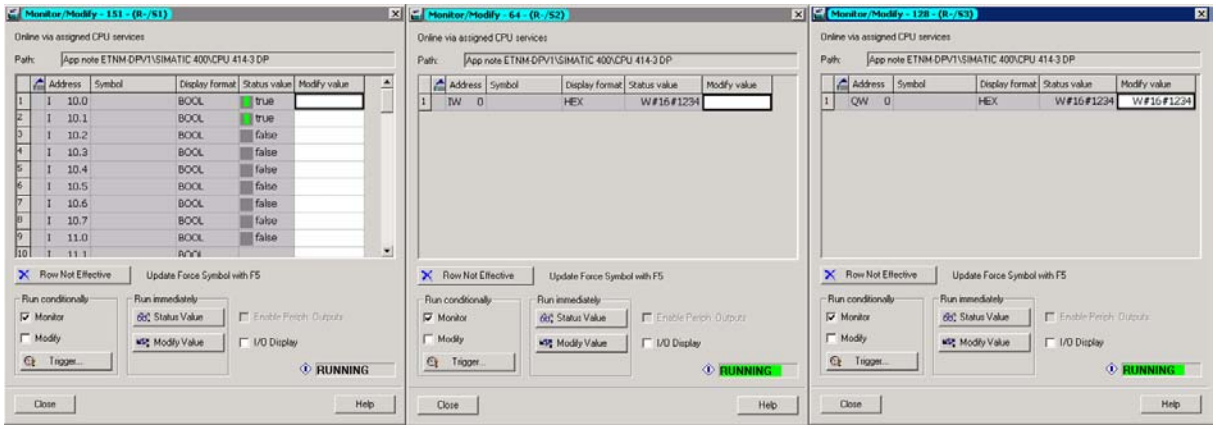
Add as slave node 77.



Select the data modules according to the 'Mapping Overview' in the configuration web pages of the X-gateway. (STEP7 shows decimal values: 97h=151, 40h=64, 80h=128).

6.1.1 Monitor Data in STEP7

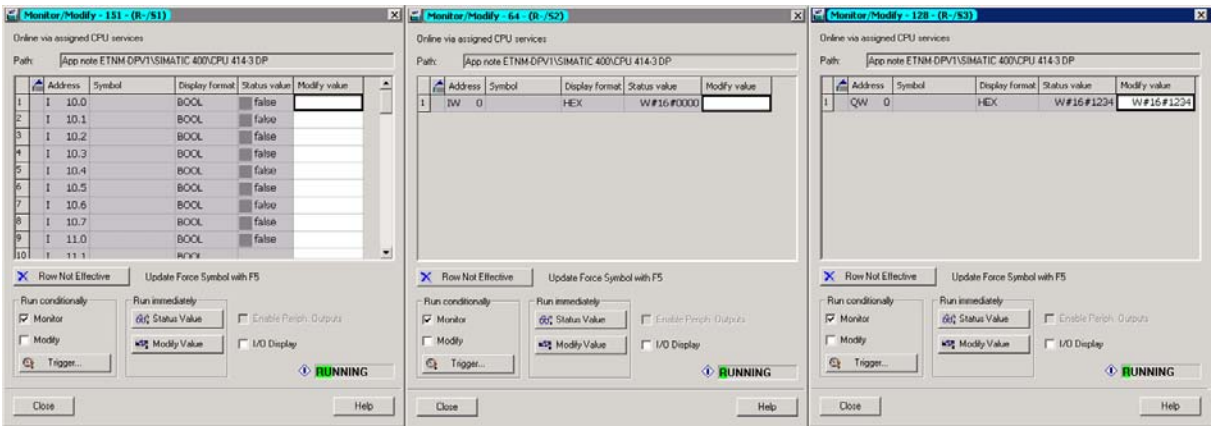
Start up and monitor data in the PROFIBUS slave.



The live list rows I10.0 and I10.1 show that the two transactions are working ok.

Modify the output data field for address QW0 and press "Modify". The data is looped back to the Modbus-TCP server and can be seen in the status value of address IW0.

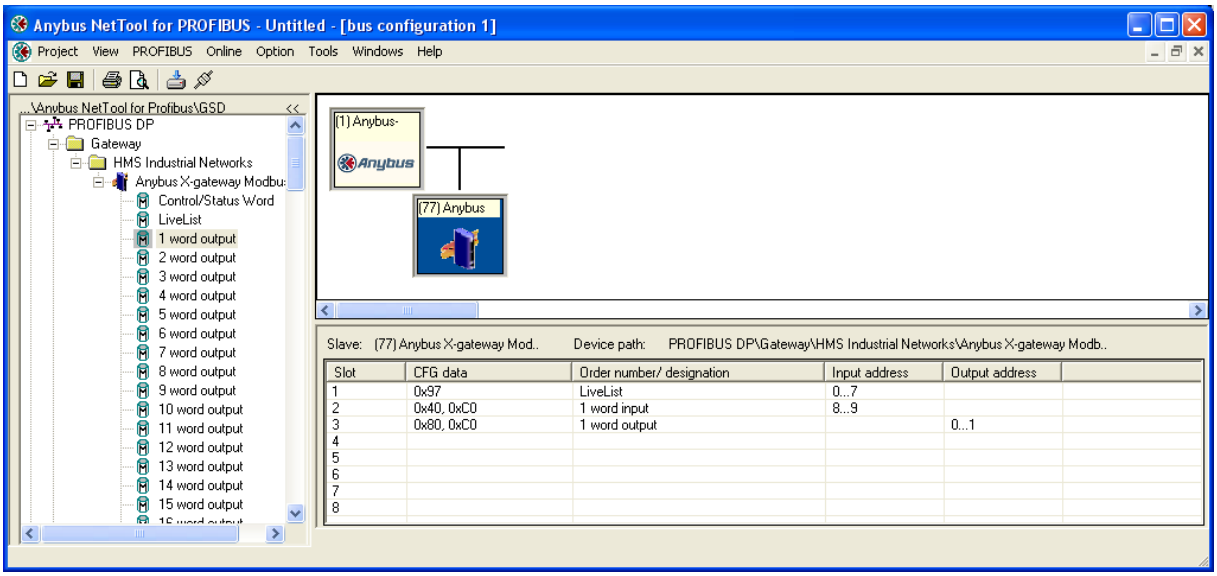
6.1.2 Check Transaction State via Live List Monitoring in STEP7



If the Modbus-TCP server is disconnected, the live list will go empty. No transactions will show in the list. The IW0 data will also be empty, since the selection of 'Clear data to master' when there is a Modbus-TCP (Network 2) error, on the PROFIBUS DP-V1 configuration page.

6.2 Configure the Slave to the PROFIBUS DP-V1 Master via Anybus NetTool for PROFIBUS

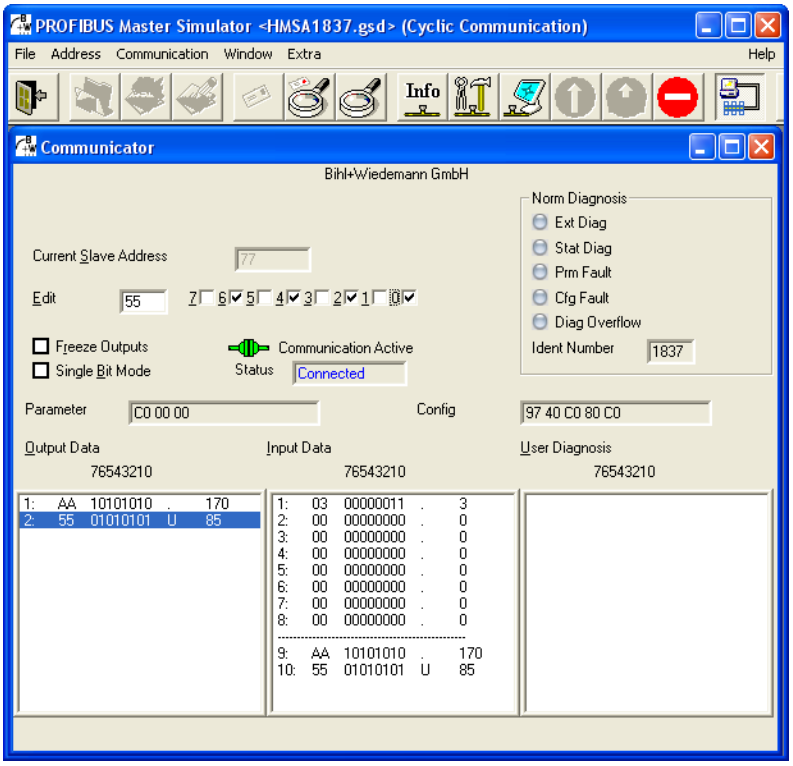
Selecting the data modules according to the "Mapping Overview" in the configuration web pages of the X-gateway in "Anybus NetTool for PROFIBUS" from HMS, will generate the following screen:



The data can be monitored and changed when the tool is connected to the master, by clicking the configured modules.

6.3 Configure the Slave to the PROFIBUS DP-V1 Master via the PROFIBUS Master Simulator

Select the data modules according to the 'Mapping Overview' in the configuration web pages of the X-gateway in "PROFIBUS Master Simulator" from HMS, to generate the output below (the simulator can access the slave without a GSD-file or any mapping of modules):



Data is looped between the first two bytes of the output data and byte nine and ten in the input data.

The first eight bytes of the input data contain the live list. The first two bits in the first byte of the live list show that the two Modbus-TCP transactions are working ok.

7 More Information about the X-gateway and PROFIBUS

The latest information and manuals can be found on the HMS website, www.anybus.com.

The PROFIBUS user organisation, found on www.profibus.org, provides useful information about PROFIBUS.