Adaptive Vision

Intuitive

Powerful

Adaptable

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Application Note

Interfacing Hilscher cards (Profinet) to Adaptive Vision Studio

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1. Purpose and equipment

Purpose:

This document explains how to interface a Hilscher Profinet PC card to Adaptive Vision Studio.

Required equipment:

- Supported Hilscher Profinet PC card.
- Adaptive Vision Studio 4.12 Professional or later.

2. Hardware connection

All devices must work in a common LAN network – henceforth called *shared network*. In most cases they are connected to each other through a network switch.

The devices shall be connected as follows:

- Connect hardware devices as follows:
  - Master device e.g. PLC to the shared network
  - Hilscher card to PC
  - Hilscher card to the shared network
  - Connect PC's network card to shared network.

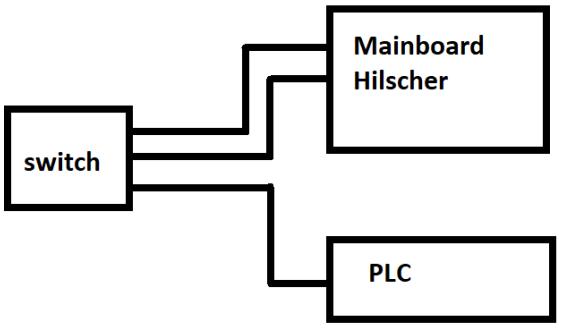


Figure 1- Hardware connection scheme.

Before proceeding to the further point, make sure that all devices are powered up.

3. Configuring Hilscher Devices

3.1 Introduction

- Be sure to have **the newest** version of following drivers installed:
  - Windows driver (recommended **1.5.0.0**)
    https://kb.hilscher.com/display/CIFXDRV/Versions+-+NXDRV-WIN
  - SYCON.net for configuring slots, generating configuration files:
    https://kb.hilscher.com/display/SYCON/Version+History
  - For profinet: Firmware (recommended **3.13** series)
    https://kb.hilscher.com/display/PNS3V5/Version+History+-+V3.5+to+V3.x
- A computer restart is highly recommended after driver installations.

Make sure you have the recommended driver installed, newest SYCON.net, and firmware prepared. Profinet requirements are written down in Hilscher_Channel_Open_Profinet documentation.

The easiest way to install firmware to the cifX Driver is using the cifX Driver Setup software - the Windows Search in the start menu should find this tool, otherwise it is located in C:\Program Files\cifX Device Driver directory.In the cifX Driver Setup Utility select the channel you want to configure (usually channel 0 - CH#0) and remove preexisting firmware by clicking "Clear". To add a new firmware file, click "Add", navigate to the downloaded profinet slave firmware and click "Open". Finally, click "Apply" - the button should turn disabled.

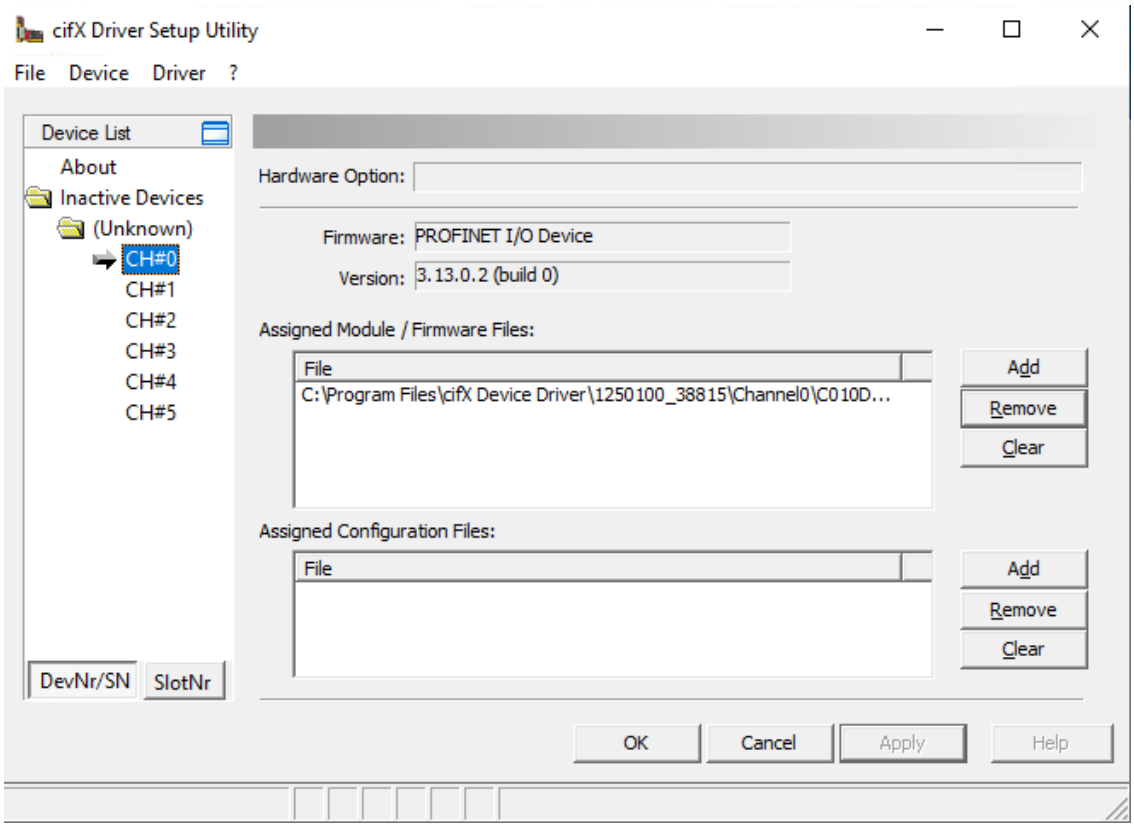


Figure 2 - cifX Driver SetupUtility configuration.

3.2 Generating channel configuration files

Channel configuration files are generated in SYCON.net software. Firstly, pick a proper slave device using a PCI card, here we use the Profinet Stand-Alone Slave, and drag it to the gray bus on the "Network View".

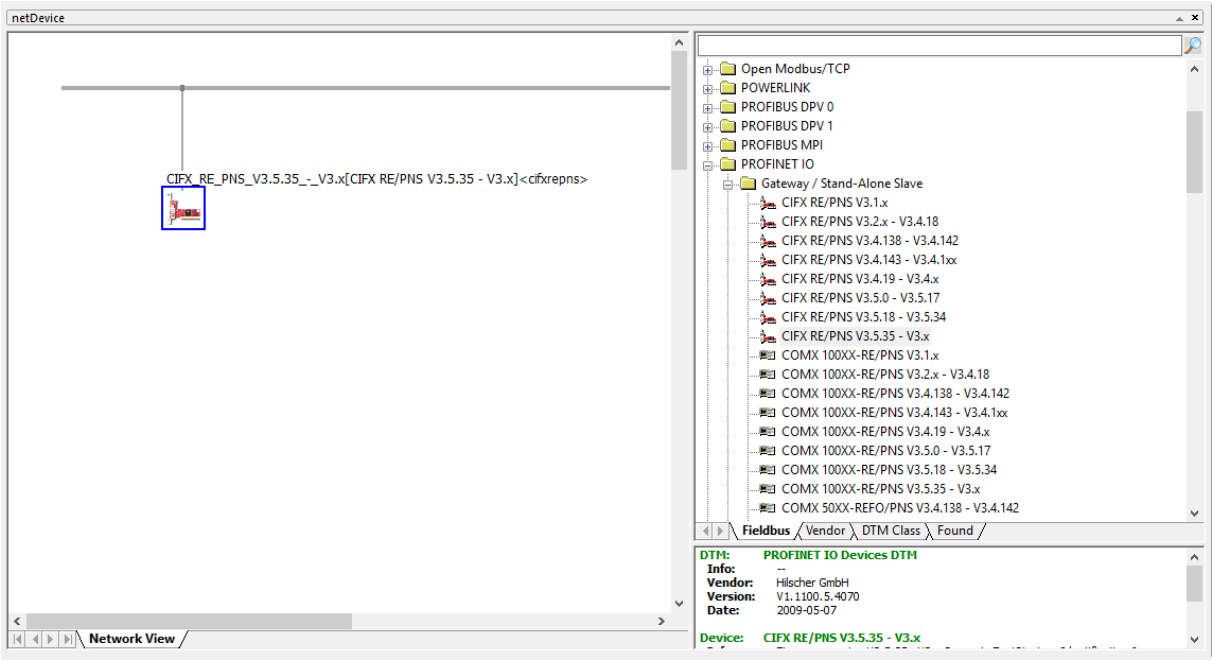


Figure 3 - Network View in Sycon.net application.

To open card configuration, double click on its icon and select the "Configuration/Modules" category in the Navigation Area on the left side of the dialog. In the main window you can add individual modules. Remember that in Profinet, **Slot configuration must match the configuration from your master device, otherwise the connection will not** work. For boolean indicators we recommend "1 Byte Output" or "1 Byte Input".

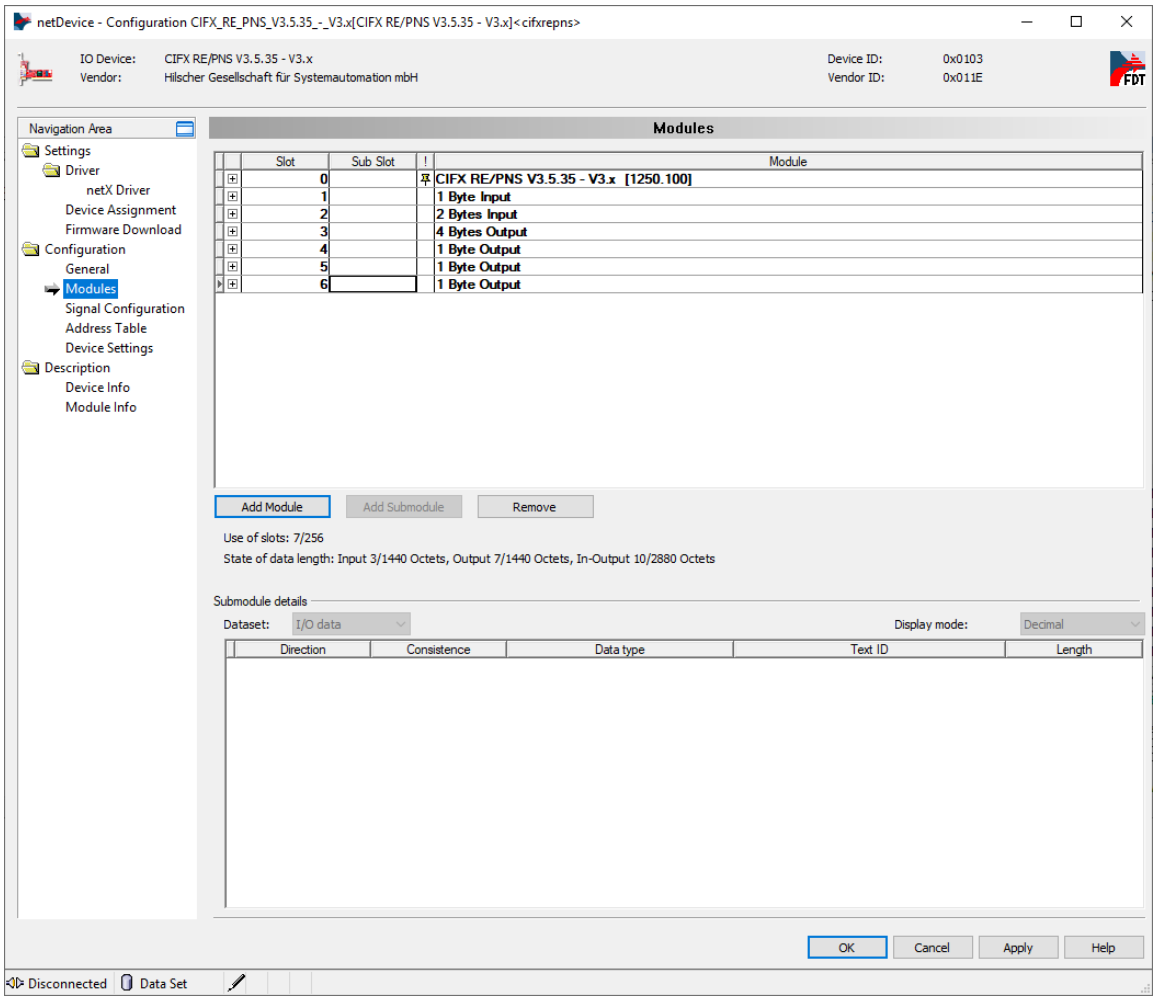


Figure 4 - Slot configuration in Sycon.net application.

You can see the final address table (addresses on the Hilscher device where input or output data will be available) in the "Configuration/Address table" category. If you plan to use IORead and IOWrite filters, for example Hilscher_Channel_IORead_SInt8, note the addresses. You can switch the display mode to decimal, as Adaptive Vision Studio accepts decimal addressing, not hexadecimal. Adaptive Vision Studio implementation of Profinet checks whether the address and data size match. In the sample configuration below, writing a byte to address 0x002 would not work, because that module address starts at 0x001 and spans 2 bytes. Moreover, Adaptive Vision Studio prohibits writing with a SlotWrite filter to input areas and reading with a SlotRead filter from output areas. Click "OK" when you have finished the proper configuration.

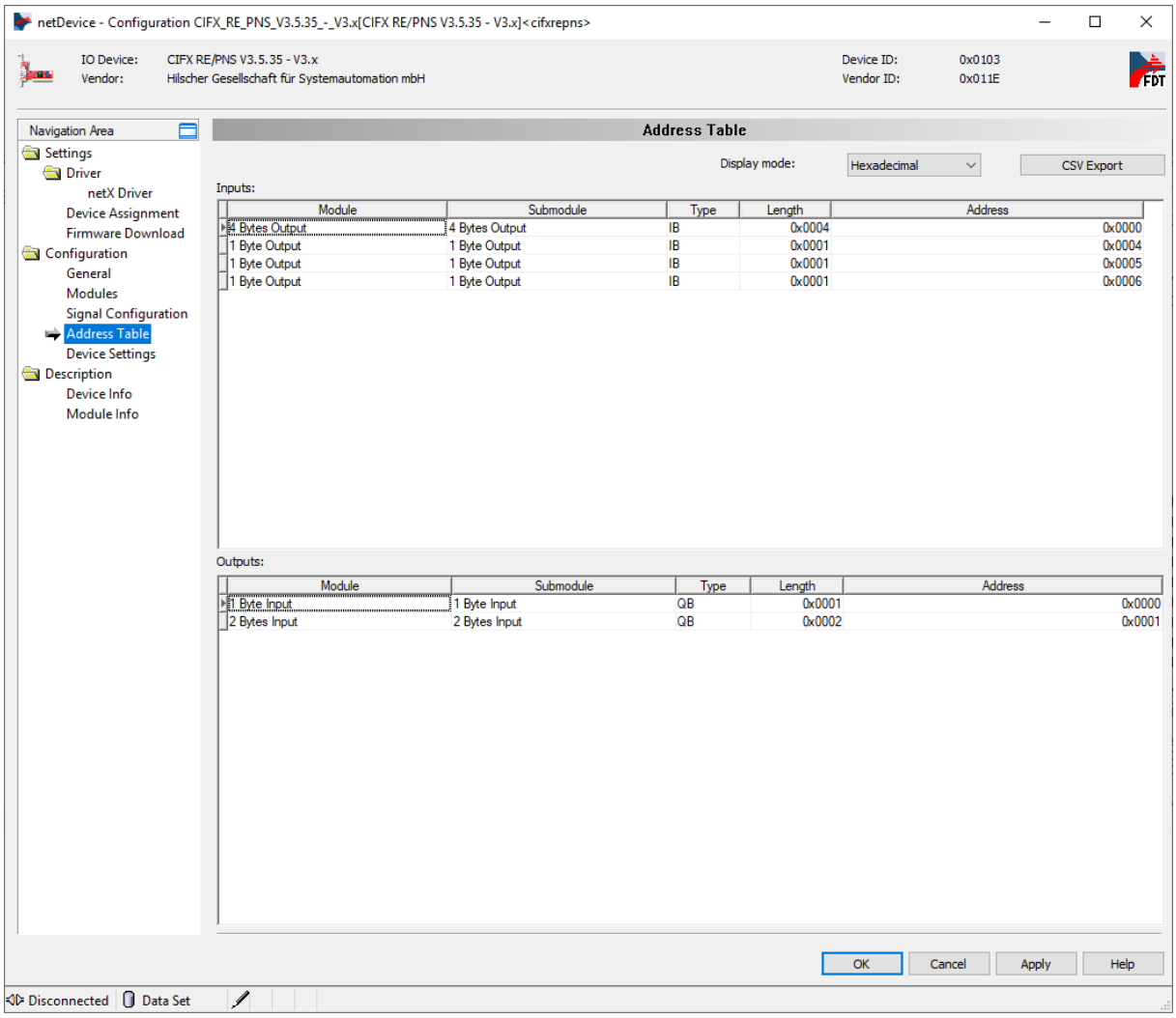


Figure 5 - Adress table in Sycon.net application.

The final step is to generate configuration files for Adaptive Vision Studio. You can do this by right clicking on the device icon, then navigating to "Additional Functions->Export->DBM/nxd...", entering your configuration name and clicking "Save". You can now close SYCON.net for this example, **remember to save your project before, so that it is easier to add new slots.**

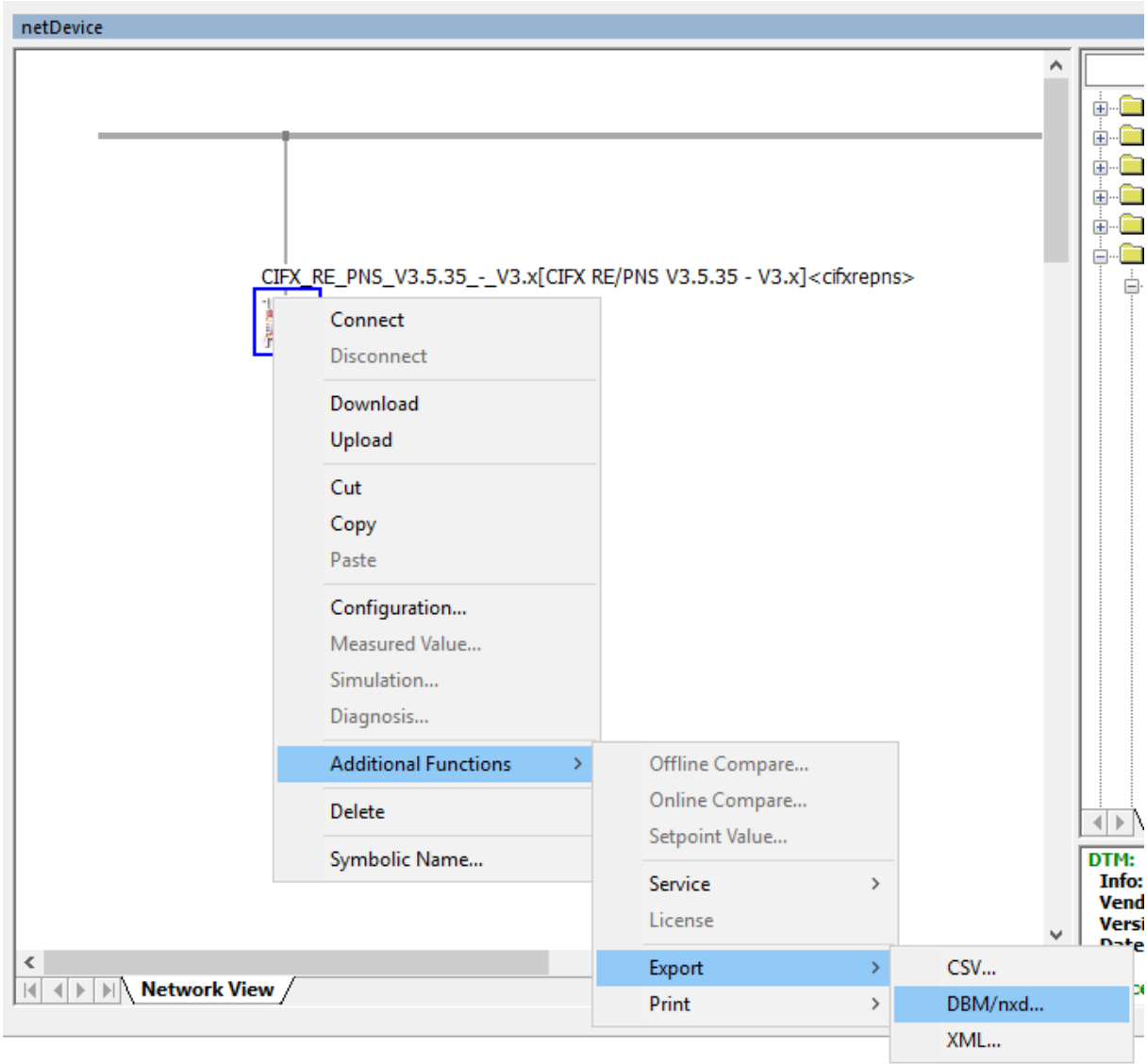


Figure 6 - Exporting files generated in Sycon.net.

4. Working with Profinet in AVS

The full list of filters for communication over Hilscher devices is available here.

Before proceeding to the further steps, please check Hilscher and AVS connection using Hilscher_Driver_GetBoardInformation filter. If all previous steps are done correctly you will be able to get device board information including BoardName and ID. Please note that in this step the connection with the Hilscher card via Sycon.net is required, so you need to run the software, right-click on the card icon and click *Connect*.

Figure 7- Connection with card via Sycon.net.

As described in previous chapter the Sycon.net application is not required for a proper operation. On the contrary, it is highly recommended to keep it closed and use the generated configuration files to guarantee high stability of the connection.

After following the instruction from chapter 3.2, you have a *xxx.nxd* and *xxx_nwid.nxd* files. To send data over Profinet, follow the below steps:

1. Configure connection in AVS with Hilscher_Channel_Open:Profinet filter. Drag it from *Program I/O* category in the Toolbox and drop it in the Program Editor.
2. In InBoardName input enter value acquired from Hilscher_Driver_GetBoardInformation filter. In inConfig and inNwid inputs enter paths to generated files from Sycon.net.

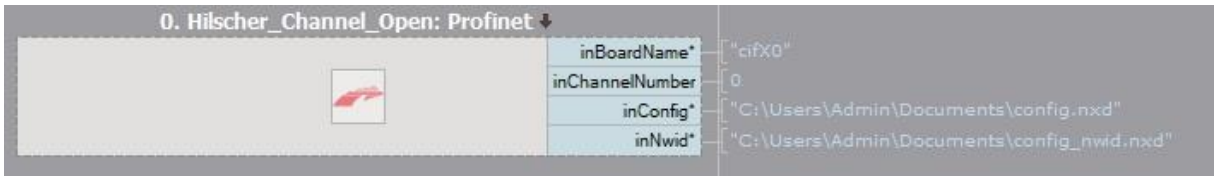


Figure 8 - Hilscher_Channel_Open:Profinet configuration.

3. To prevent from I/O errors make sure that you open connection in the initialization step with Hilscher_Channel_Open:Profinet and close it at the end of the program using Hilscher_Channel_Close filter.
4. For IO, we recommend SlotRead and SlotWrite filters, as they are more convenient. For example, the Hilscher_Channel_SlotWrite_SInt8 filter writes 8 bytes of signed data to the selected slot. Slot numbers match those in the "Configuration/Modules" category of card configuration in SYCON.net program.

5. Example configuration

Below you will find an sample configuration of Siemens TIA Portal, Hilscher Sycon and Adaptive Vision Studio.

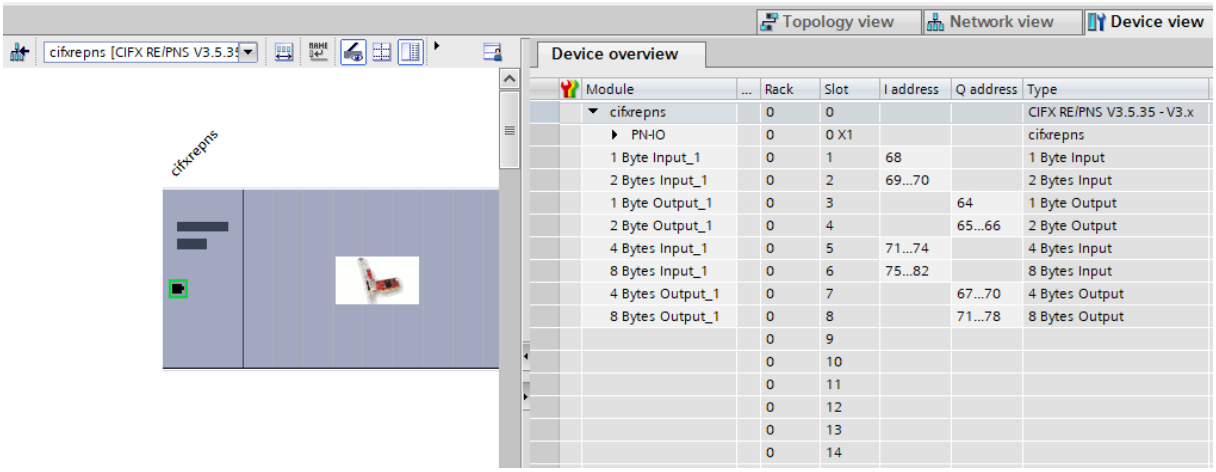


Figure 9 Sample configuration of Siemens TIA Portal

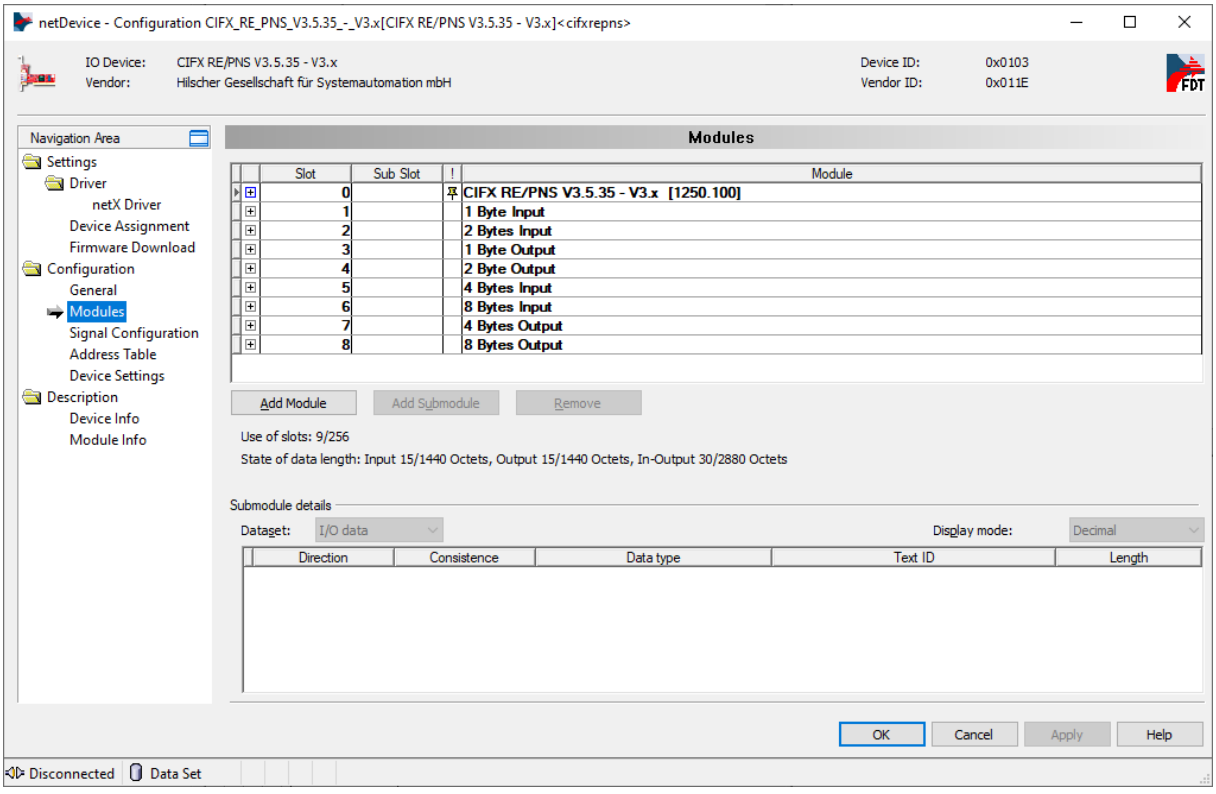
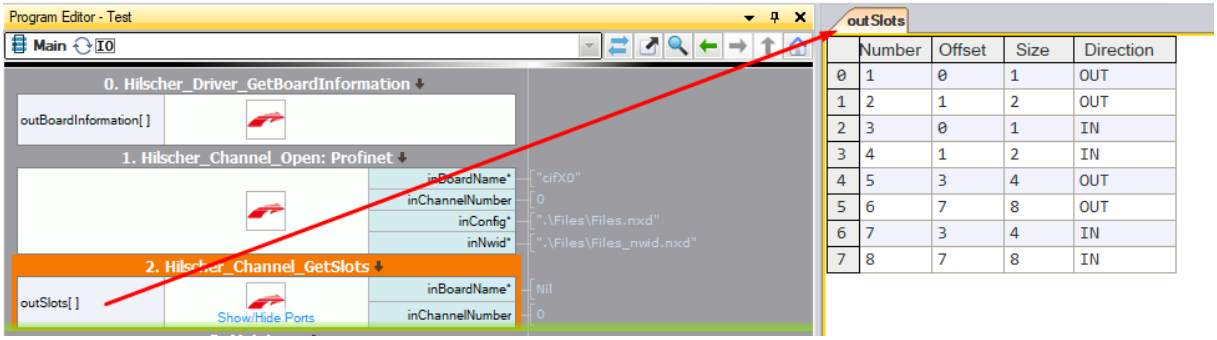


Figure 10 Sample configuration of Hilshler Sycon



	Number	Offset	Size	Direction
0	1	0	1	OUT
1	2	1	2	OUT
2	3	0	1	IN
3	4	1	2	IN
4	5	3	4	OUT
5	6	7	8	OUT
6	7	3	4	IN
7	8	7	8	IN

Figure 11 Sample configuration read in Adaptive Vision Studio

As you can see on the screenshots above the slots are common for each software. The only difference is that Siemens and Hilscher inputs corresponds to outputs from Adapative Vision and vice-versa – Siemens output is Adaptive Vision input. It should be considered in the following manner: data outgoing from PLC (output) is incoming to Adaptive Vision (input) while data incoming to PLC (input) is outgoing from Adaptive Vision (output).

The summarization of data type and directions you will find in the table below:

TIA Portal		Sycon		Adaptive Vision	
Size	Type	Size	Type	Size	Type
1 Byte	Input	1 Byte	Input	SInt8	Output
2 Bytes	Input	2 Bytes	Input	SInt16	Output
4 Bytes	Input	4 Bytes	Input	SInt32	Output
8 Bytes	Input	8 Bytes	Input	SInt64	Output
1 Byte	Output	1 Byte	Output	SInt8	Input
2 Bytes	Output	2 Bytes	Output	SInt16	Input
4 Bytes	Output	4 Bytes	Output	SInt32	Input
8 Bytes	Output	8 Bytes	Output	SInt64	Input

For the slot configuration described in this paragraph the Adaptive Vision Studio program will look as follows:

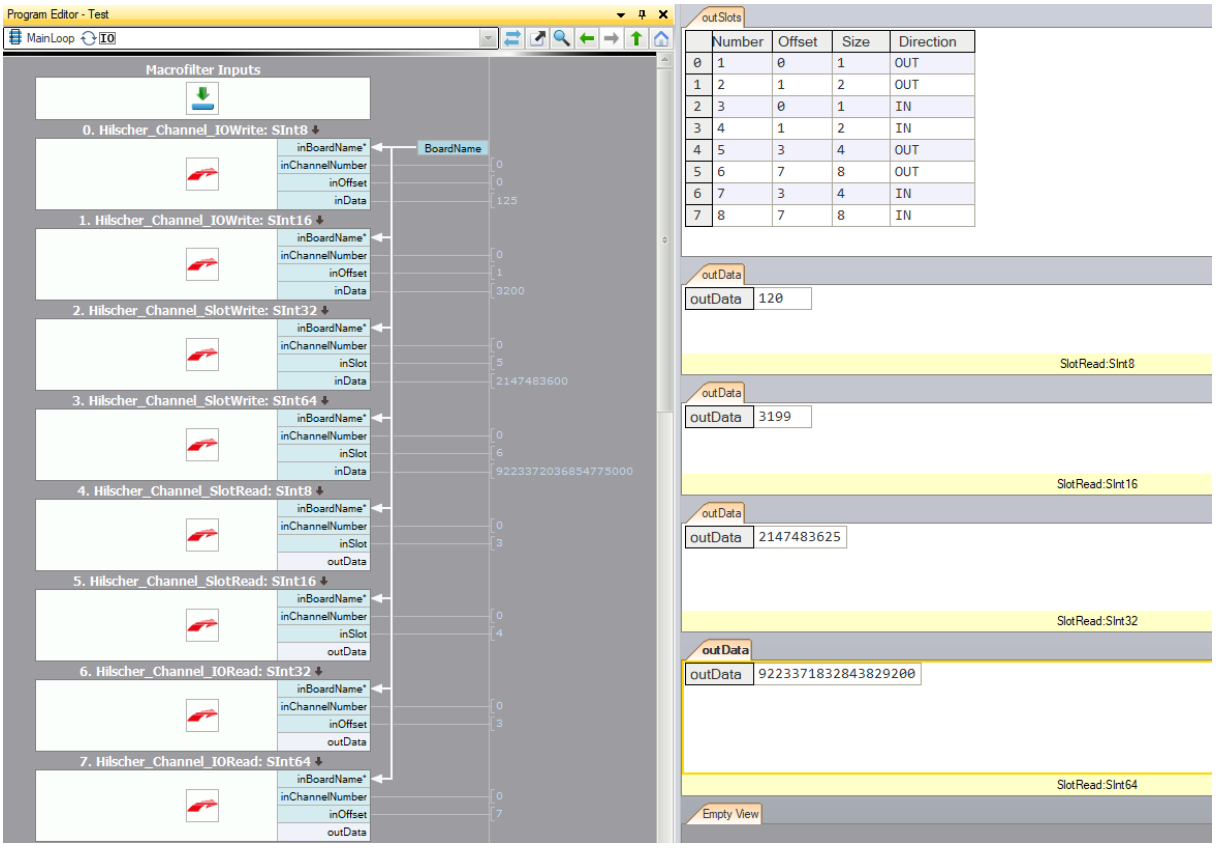


Figure 12 Sample Adaptive Vision program prepared for writing and reading data over Profinet

You can use both Hilscher_Channel_IOWrite/ Hilscher_Channel_IORead and Hilscher_Channel_SlotWrite/ Hilscher_Channel_ SlotRead to send and receive data. The only difference is in addressing the accessible data:

- Hilscher_Channel_IOWrite/ Hilscher_Channel_IORead uses the **offset** value,
- Hilscher_Channel_SlotWrite/ Hilscher_Channel_ SlotRead uses the **slot** numbers.

Both of the information you will find in output *outSlots* from Hilscher_Channel_GetSlots filter.

Sometimes it is necessary to combine few integer values into one slot of data. In order to accomplish this task you can use binary buffers in Adaptive Vision Studio. Let's assume that someone would like to write two 2-bytes integers into one 4 bytes slot (SInt32 in Adaptive Vision). In this situation the program should look as follows:

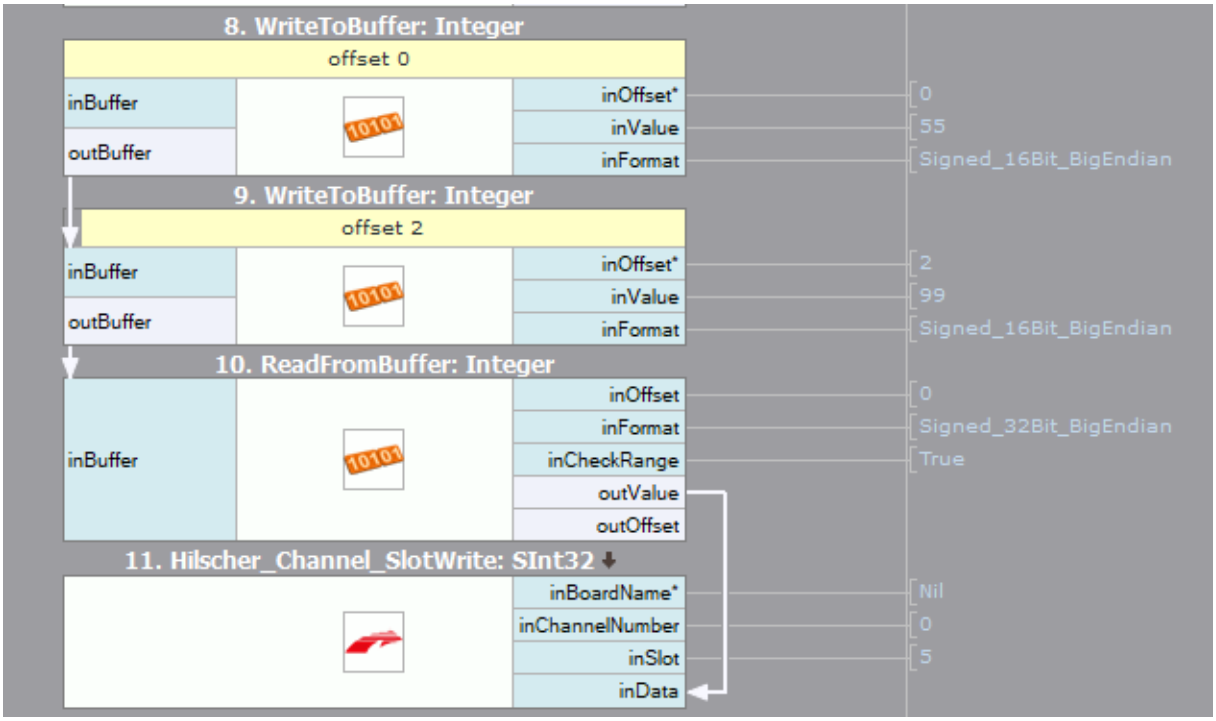


Figure 13 Combining two values into one slot in Adaptive Vision.

First we use two WriteToBuffer:Integer filters with specified format: Signed_16Bit_BigEndian connected in cascade to write two different values into one buffer (in this case 55 and 99). Also we specify the offset where the second value should be written. Later we extract the combined value as one Integer with filter ReadFromBuffer:Integer. For 8 bytes integers should be used ReadFromBuffer:Long. Here we also specify the format of data (Signed_32Bit_BigEndian). Later we send the obtained number with Hilshler_Channel_SlotWrite:SInt32. Between ReadFromBuffer and SlotWrite the data is meaningless but later in TIA Portal when we access it as two separate 2-bytes values we get the send values:

Address	Display format	Monitor value	Modify value
%IW71	DEC+/-	55	
%IW73	DEC+/-	99	

Figure 14 Wathing the values send from Adaptive Vision in TIA Portal.

6. Troubleshooting

If it is still not possible to use AVS with Hilscher card first, make sure that you done correctly all previous steps and then use following advices.

1. Use Ethernet Device Configuration software to set static IP address to Hilscher card.

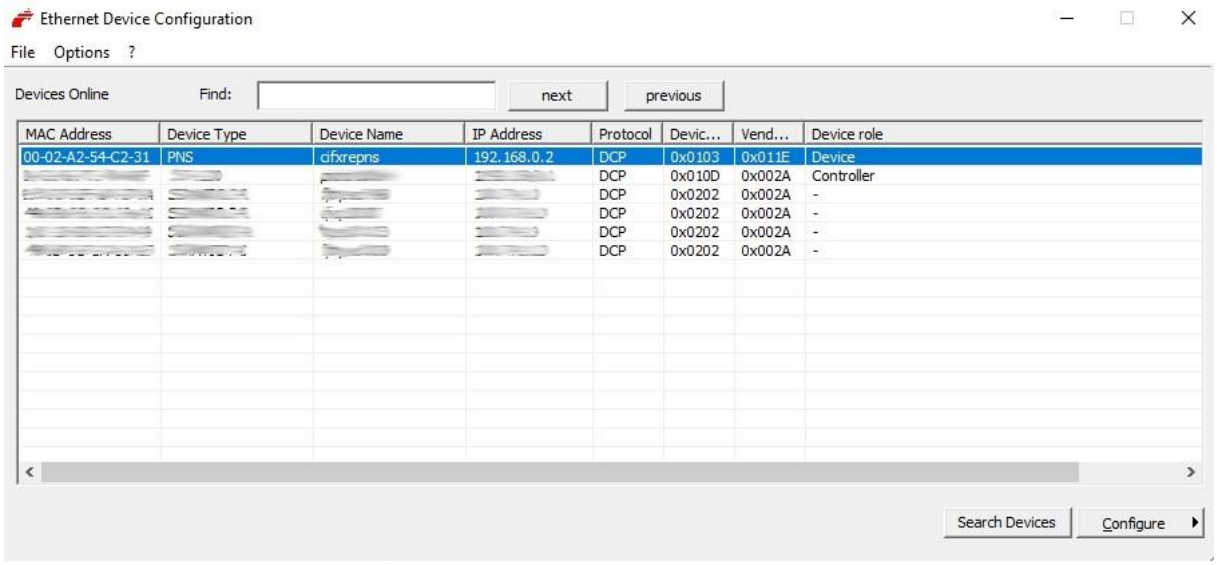


Figure 15 - Ethernet Device Configuration application.

2. Make sure that current program setting is loaded to Hilscher card. If not please use SYCON.net application to connect and download settings to the devices as shown at the picture bellow.

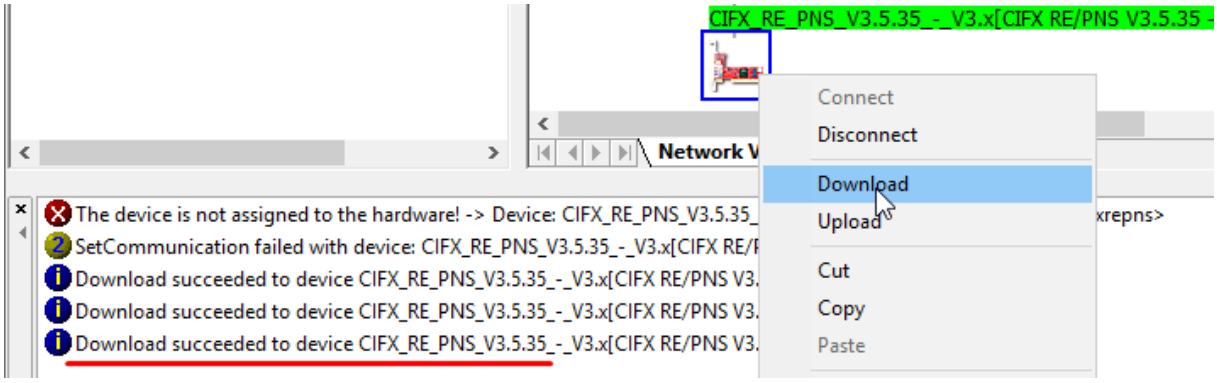


Figure 16 - Download settings to the Hilscher device.

3. If your master device has problem with connection with Hilscher card use following settings using Sycon.net application. In order to do this right-click on the card icon and select *Configuration…*

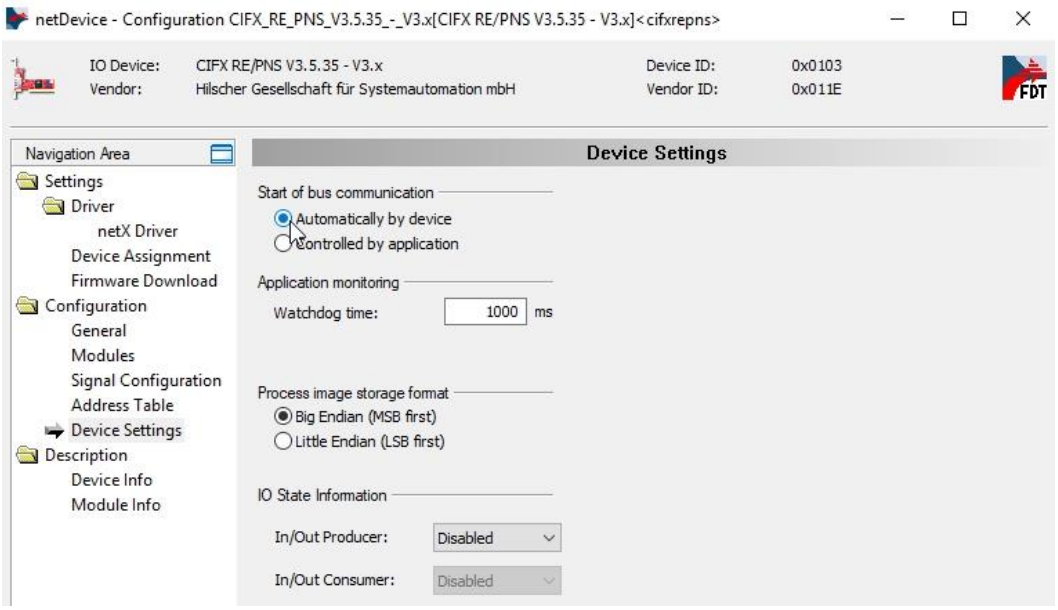


Figure 17 - Changing device settings.

4. After changes it may be necessary to restart ODMV3 service.

Figure 18 - Restarting ODM Service.

5. If none of the above advice has helped, please restart your computer.