



**Application Note**

**PROFINET IO Controller Programming Example**

**How to use the API to configure the Controller**

**Hilscher Gesellschaft für Systemautomation mbH**

**[www.hilscher.com](http://www.hilscher.com)**

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# 1 Introduction

## 1.1 About this Document

This manual describes how to run the Configuration Example Application for Hilscher PROFINET IO Controller stack.

The required components are

- 1 PC with 1 PC card cifX, e. g. CIFX 50-RE
- Hilscher PROFINET IO Controller stack Version 2.5.5.0 (or newer)
- Microsoft Visual Studio .NET 2005

Additionally the PC may contain a second PC card cifX with a Hilscher PROFINET IO Device firmware. If this firmware is configured using the “Basic host example for PROFINET IO Device” the IO Controller will connect to the IO Device. If this additional card is not available the packet configuration for IO Controller can still be observed.

## 1.2 List of Revisions

Rev	Date	Name	Chapter	Revision
1	2011-04-06	BM	all	Created
2	2013-07-17	HH	4.3	Contacts updated.

Table 1: List of Revisions

## 2 Features of PROFINET IO Controller Configuration Example Application

The PROFINET IO Controller Configuration Example Application is a straight forward implementation which shows how to use cifX Driver API and how to configure the PROFINET IO Controller stack using packets.

It does not show any additional packet interaction or application behaviour. Its only focus is configuration.

By default the application configures the IO-Controller with following values:

- NameOfStation "controller-example"
- IP-Address 192.168.252.127
- Netmask 255.255.255.0

The application configures two IO-Devices which the IO-Controller will try to connect to.

- Hilscher cifX PROFINET IO Device
  - NameOfStation "cifxrepns-1"
  - IP-Address 192.168.252.128
- Hilscher cifX PROFINET IO Device
  - NameOfStation "config-dummy"
  - IP-Address 192.168.252.129

The second IO-Device only exists in the configuration to show how this influences the configuration packets. It is not intended to get this IO-Device in data exchange.

Once cyclic communication is active the application will mirror the received data. This means, that the application will copy the input data to the output data and send it back to the IO-Device.

This is optional and only possible if a second PC card cifX with Hilscher PROFINET IO Device firmware and running application is available.

## 3 Configuration Application Description

### 3.1 Configuring the Hilscher PROFINET IO Controller

- Load PROFINET IO Controller firmware file via cifX Driver Setup Utility on your PC card cifX.

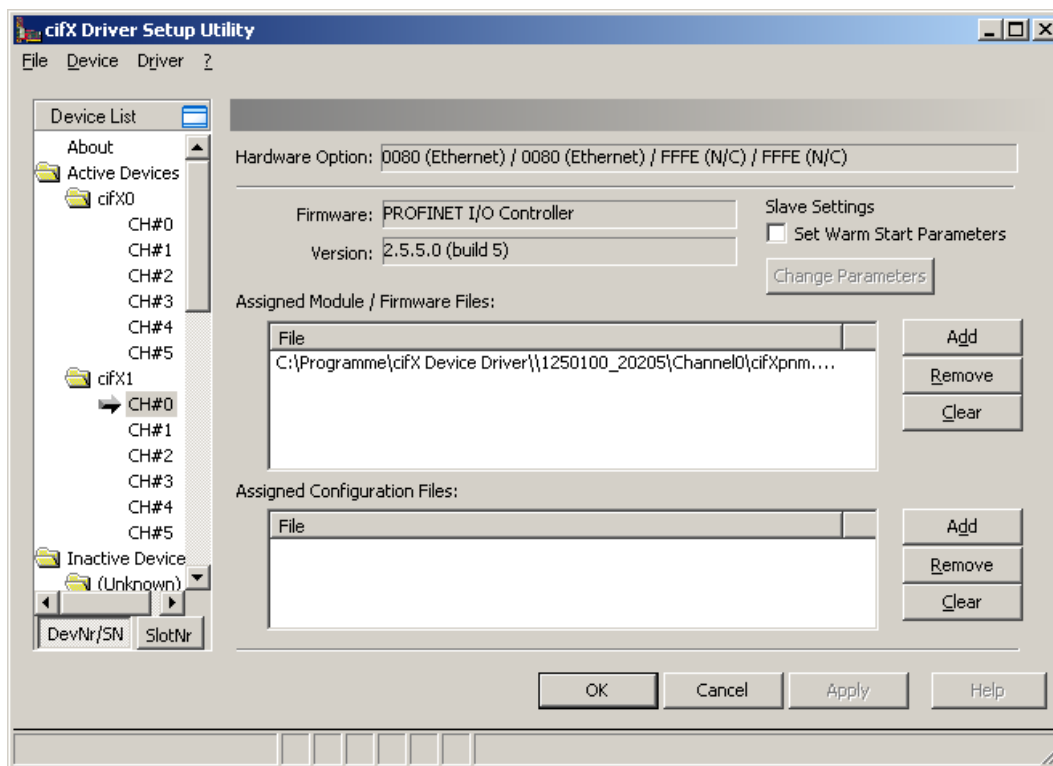


Figure 1: CifX setup to load the PROFINET IO Controller Firmware

## 3.2 Basic Application Startup

- Open PROFINET IO Controller Configuration Example Application (CifX\_ApDemo.sln) using Microsoft Visual Studio 2005 or higher.
- Open file Application.cpp and adjust the board name at the beginning of the App\_main() function. Set the board instance of the PC card cifX to which you have loaded the firmware.

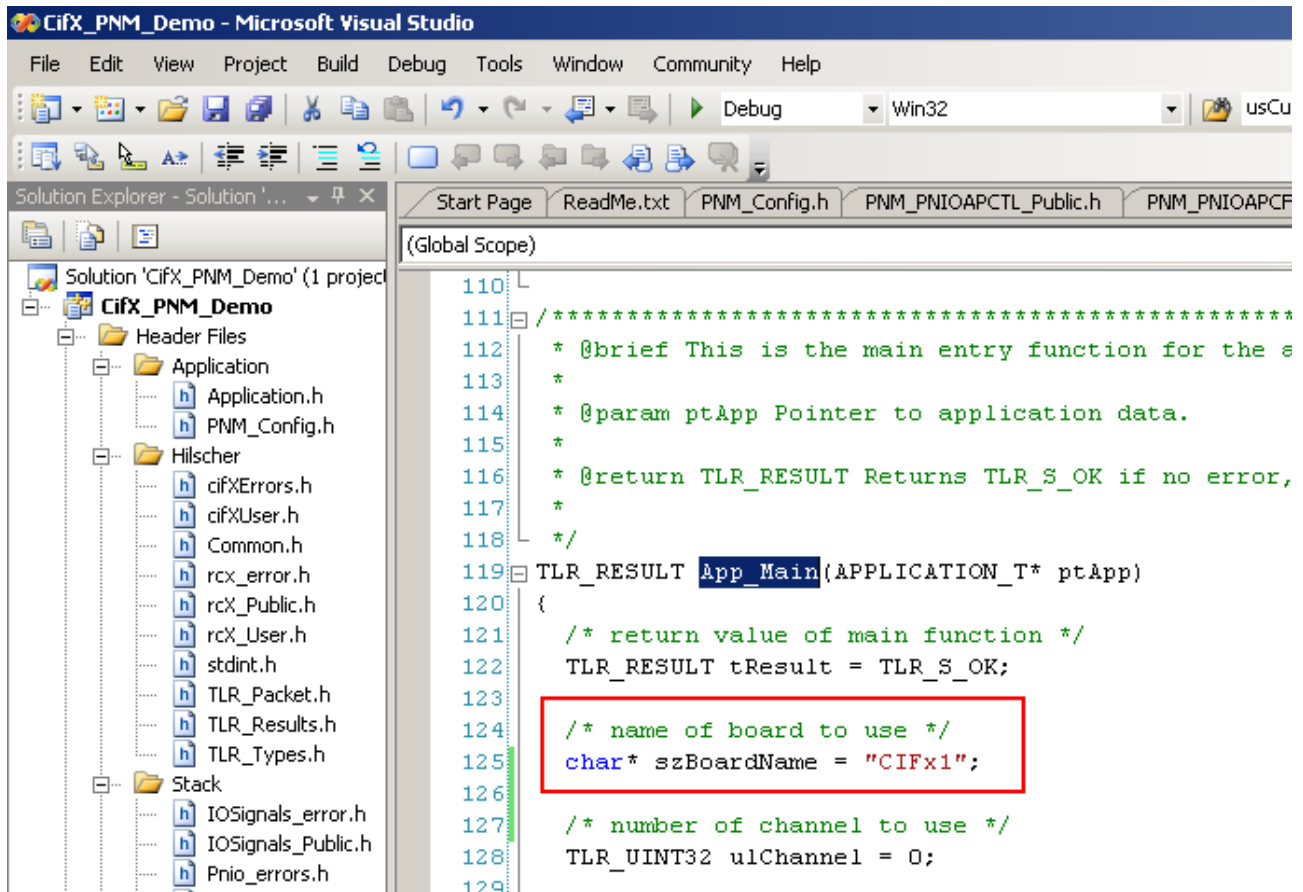


Figure 2: Adjust the CifX Board Instance

- Build and start the Configuration Example Application.

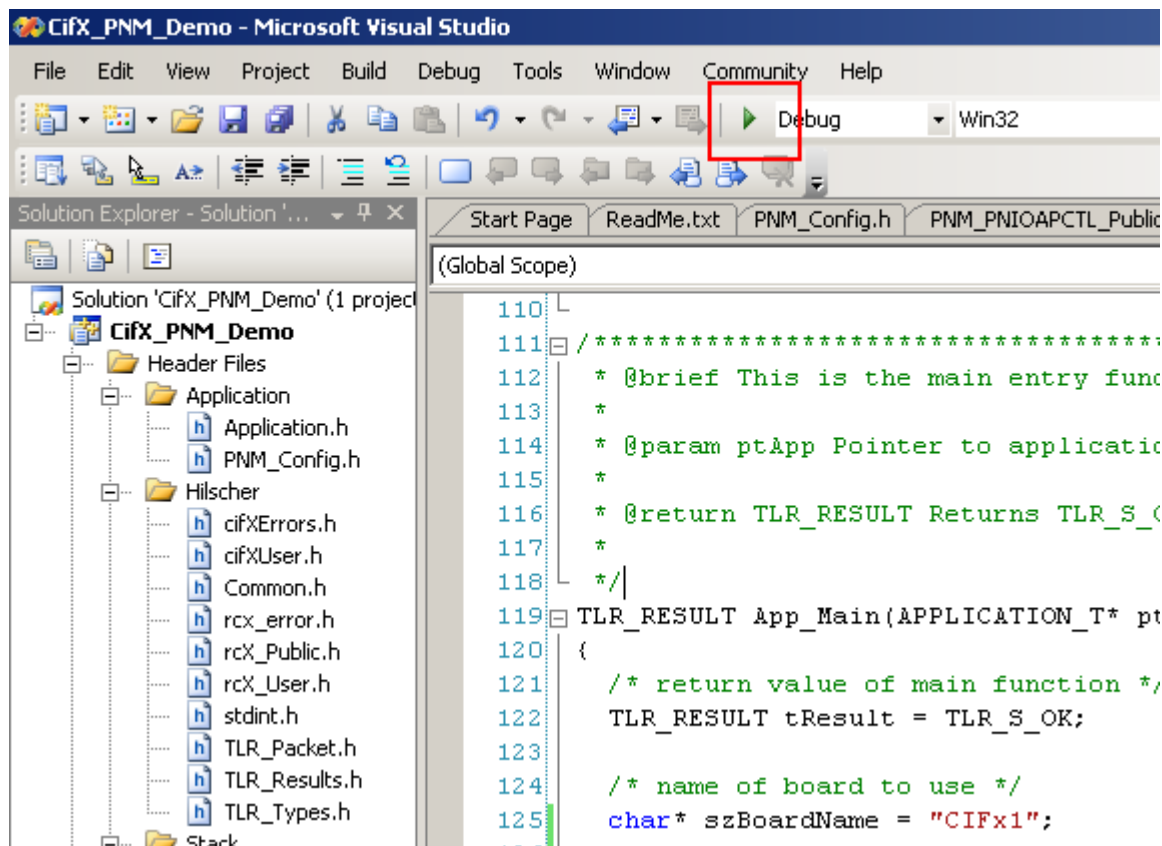
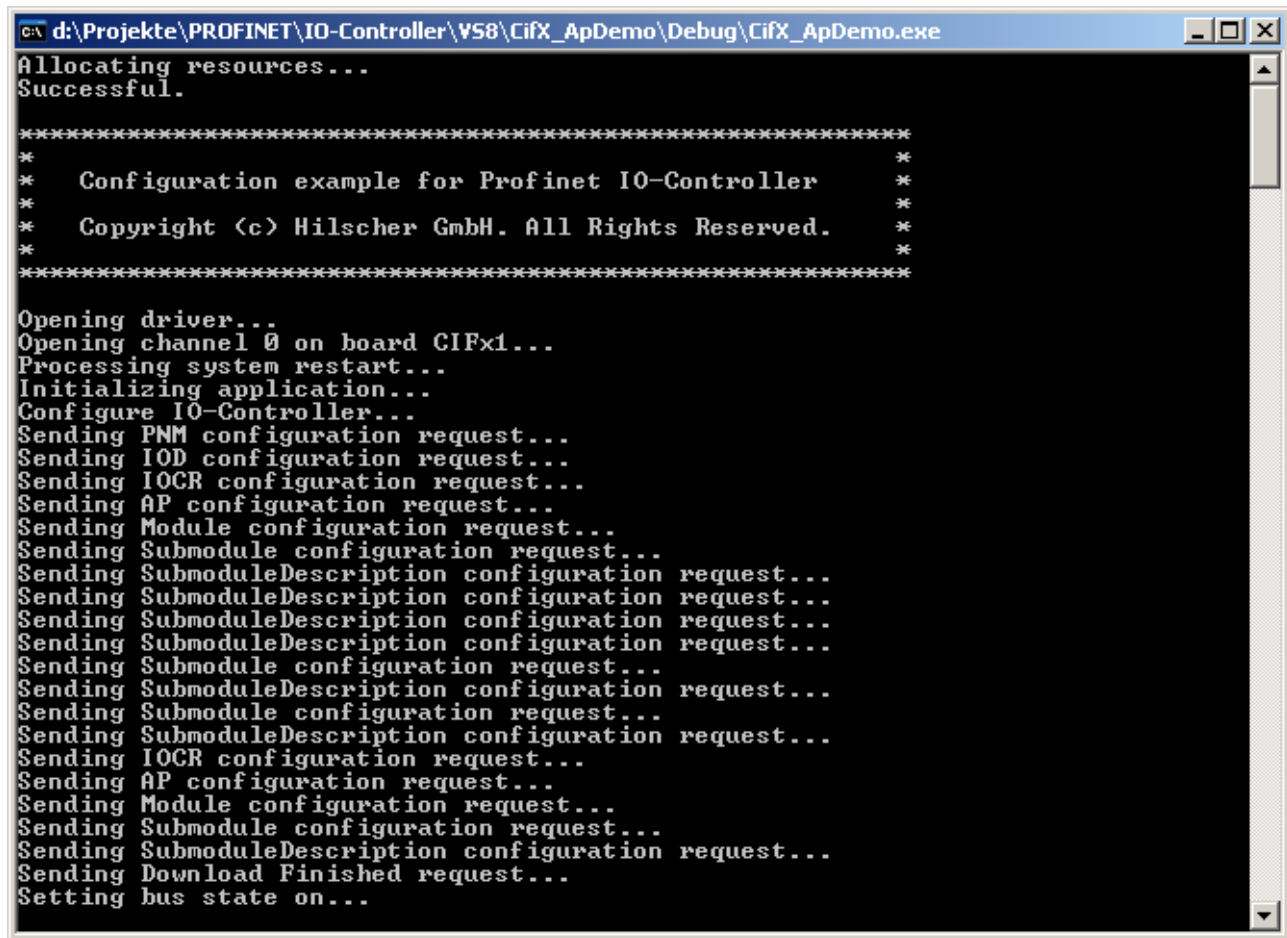


Figure 3: Starting the Example

- You can monitor the system startup by checking the console output.



```
C:\d:\Projekte\PROFINET\IO-Controller\VS8\CifX_ApDemo\Debug\CifX_ApDemo.exe
Allocating resources...
Successful.

*****
* Configuration example for Profinet IO-Controller *
* Copyright (c) Hilscher GmbH. All Rights Reserved. *
*****

Opening driver...
Opening channel 0 on board CIFx1...
Processing system restart...
Initializing application...
Configure IO-Controller...
Sending PNM configuration request...
Sending IOD configuration request...
Sending IOCR configuration request...
Sending AP configuration request...
Sending Module configuration request...
Sending Submodule configuration request...
Sending SubmoduleDescription configuration request...
Sending SubmoduleDescription configuration request...
Sending SubmoduleDescription configuration request...
Sending SubmoduleDescription configuration request...
Sending Submodule configuration request...
Sending SubmoduleDescription configuration request...
Sending Submodule configuration request...
Sending SubmoduleDescription configuration request...
Sending IOCR configuration request...
Sending AP configuration request...
Sending Module configuration request...
Sending Submodule configuration request...
Sending SubmoduleDescription configuration request...
Sending Download Finished request...
Setting bus state on...
```

Figure 4: Startup

- The configuration sequence is now finished, the IO-Controller firmware will start searching for the configured IO-Devices on the bus.



### 3.3 Application Explanation

The configuration of PROFINET IO Controller is done by calling the function `App_ConfigurePnm()` in `Application.cpp`. This function takes the parameters from the application resources and creates the required configuration packets. These functions are all contained in the file `PNM_Config.cpp`.

The parameters to be configured to the firmware are added to the application resources in `App_CreateResources()`. Basically there is an array of IO-Devices. Each IO-Device has an array of submodules. These parameters are the base for the configuration packet sequence.

The arrays are dynamically created and its size can be influenced by changing the values in `PNM_Config.h`.

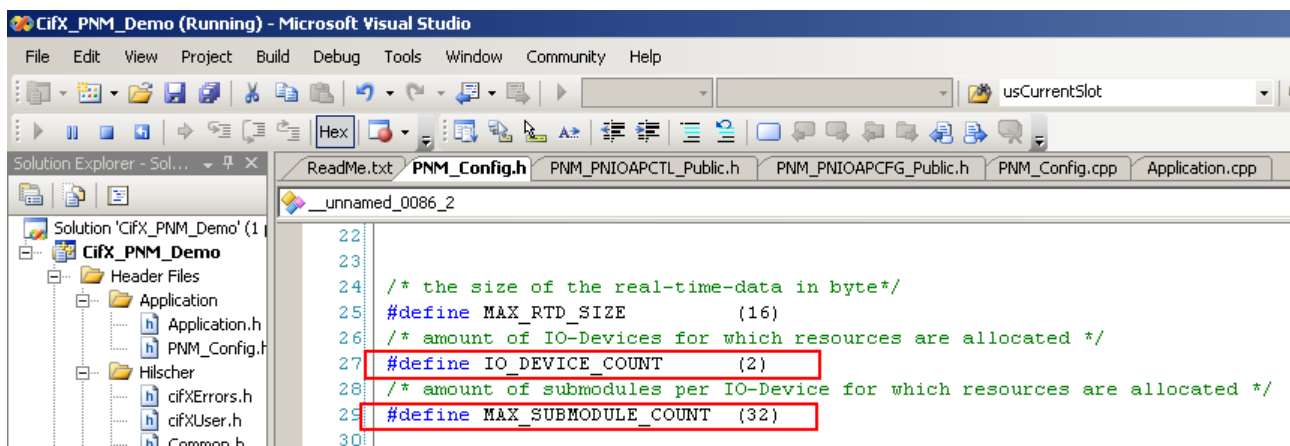


Figure 5: Adjusting parameter array size

Changing the two values `IO_DEVICE_COUNT` and `MAX_SUBMODULE_COUNT` influences how much memory is allocated in the application and how many elements can be added to the array.

The description of the sequence and content of the packets is explained in the PROFINET IO Controller API Manual.

# 4 Appendix

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