



Driver Manual
cifX Device Driver
INtime
V3.1/V4.x/V5.x/V6.x

Hilscher Gesellschaft für Systemautomation mbH

www.hilscher.com

DOC080605DRV06EN | Revision 6 | English | 2015-06 | Released | Public

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1 Introduction

1.1 About this document

TenAsys INtime is a real-time kernel which extends any standard Windows environment on a PC architecture with industrial-grade, full deterministic, hard real-time capabilities.

This manual describes the Hilscher cifX Driver for INtime.

The driver offers access to the Hilscher netX-based hardware (e.g. CIFX 50) with the same functional API as the cifX Device Driver for Windows. It is also possible to use the cifX INtime Driver from normal Windows environment or from inside the INtime real-time kernel.

1.2 List of revisions

Rev	Date	Name	Chapter	Revision
1	2008-06-12	MT	All	Created
2	2011-12-15	SS		INtime V4.x support
3	2012-11-13	SS	2.3 1.4	Note about INtime bug (SetupDiCallClassInstaller failed) added. Information about CIFX API manual added.
4	2013-08-15	MT, SS	1.4 1.9 1.10, 2.1	Reference list updated. Limitation for INtime function knSetKernelTime added. Limitation for INtime autoloader added. References to cifX Windows Driver Installation source fixed.
5	2014-03-05	RM		INtime V5.x support
6	2015-06-12	LC	1.4 1.9 1.10 2	INtime V6.x support Reference list updated. Section <i>Limitations</i> reviewed. Section <i>CD contents</i> updated. Note about upgrading INtime with cifX Device Driver INtime added.

Table 1: List of revisions

1.3 Terms, abbreviations and definitions

Term	Description
cifX	Communication Interface based on netX
comX	Communication Module based on netX
PCI	Peripheral Component Interconnect
DLL	Dynamic Link Library
API	Application Programming Interface
DPM	Dual-Port Memory Physical interface to all communication board (DPM is also used for PROFIBUS-DP Master).

Table 2: Terms, abbreviations and definitions

1.4 References to documents

This manual refers to the following documents:

- [1] Hilscher Gesellschaft für Systemautomation mbH:
CIFX API - Application Programming Interface Revision 3, english, 2014.
- [2] Hilscher Gesellschaft für Systemautomation mbH:
cifX Device Driver - Installation and Operation for Windows XP/Vista/7/8 V1.2.x.x. Revision 8, english, 2013.
- [3] Hilscher Gesellschaft für Systemautomation mbH:
Dual-Port Memory Interface Manual - netX based products. Revision 12, english, 2012.

Table 3: References to documents

1.5 Overview

The cifX INtime driver runs inside the real-time extension in a separate address space. A special version of the cifX Application Interface DLL (cifX32DLL.dll) is provided with the INtime driver to allow Windows applications, like SYCON.net, the access to the INtime driver from the Windows user space.

1.5.1 Accessing the cifX INtime Driver from Windows (non real-time)

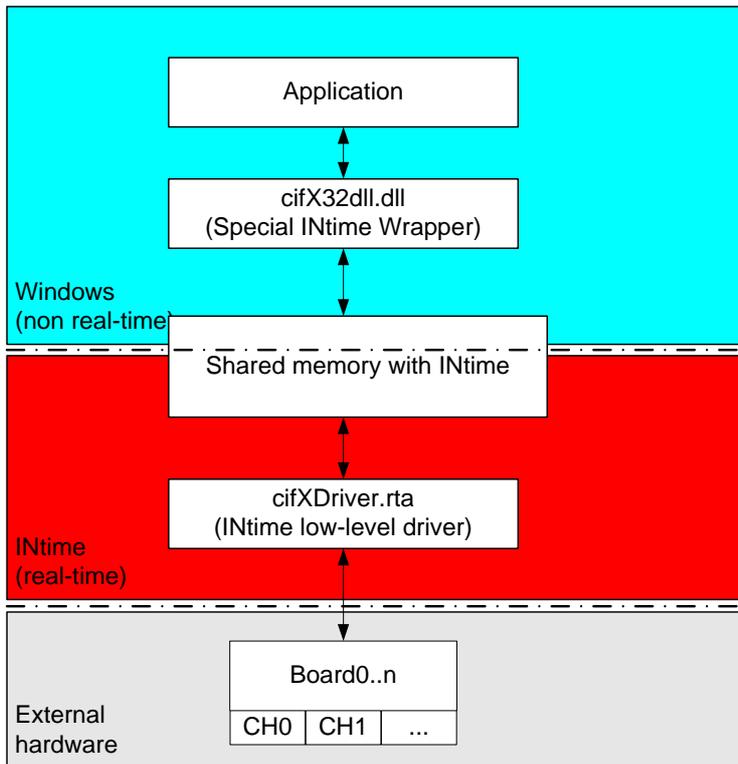


Figure 1: INtime cifX driver architecture (non real-time)

1.5.2 Accessing the cifX INtime Driver from INtime (real-time)

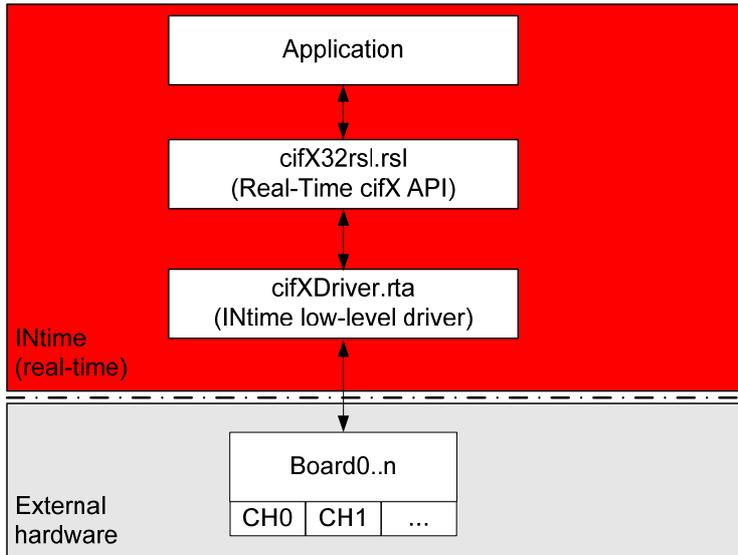


Figure 2: INtime cifX driver architecture (real-time)

1.6 Requirement

- Operating system: Windows 2000, Windows XP, Windows Vista or Windows 7 (32 or 64-bit)
- INtime Version 3.1/4.x/5.x/6.x
- **SYCON.net for netX installation from DVD CIFX version 06/2011 or higher. SYCON.net installation comes on DVD with the PC card cifX.**

1.7 Supported hardware

- PC card cifX (PCI / PCIe)
- netPLC
- NXSB-PCA / NXSB100 / NXHX board
- NX-PCA-PCI / NXHX
- netJACK 100

1.8 Features

- Based on the cifX Toolkit source (V1.2.0.1)
- Interrupt support for PC cards cifX
- DMA data transfer for I/O data (PC card cifX)
- Support for loadable modules
- Interrupt notification for applications
- Unlimited number of PC cards cifX supported

1.9 Limitations

- Simultaneous access (from real-time AND non real-time mode) is not possible
- Downloaded SYCON.net configuration files are only saved for "local" INtime systems. For "remote" access to INtime, the firmware and configuration must be copied manually to the target system.
- CD for INtime Driver does not contain a "SYCON.net for netX" installation. SYCON.net installation comes on DVD with the PC card cifX.
- No Windows 7 or 64 bit support for INtime V3.1
- Configuration/firmware download via SYCON.net may fail if an older version of SYCON.net is used! The issue is fixed by applying the patch delivered with this driver CD (refer to section *Patch the SYCON.net installation* on page 29 for further information).
- Due to a bug in INtime V4 versions **4.20.11208** and earlier, you might encounter a problem during the installation process on Windows 7 host machines. Please refer to section 2.3 on page 14 for further information.
- An application shall never use `knSetKernelTime()` as the kernel time is used internally from the driver for timeout monitoring. Setting the kernel time during runtime may result in temporary incorrect timeout handling (longer/shorter than expected)
- Autostart of the cifX driver via INtime autoloader does not work for outdated INtime V3 versions (V3.14.x.x or higher required)

1.10 CD contents

Folder	Content
API	Application programming interface files
Includes	Hilscher cifX API header files
Libraries	CIFX API library files for use in INtime real-time applications
INtime3	INtime V3.1 CIFX API libraries
INtime4	INtime V4.x CIFX API libraries
INtime5	INtime V5.x CIFX API libraries
INtime6	INtime V6.x CIFX API libraries
Documentation	Documentation of the cifX Windows and cifX INtime driver
Driver	Driver binaries and DLLs
INtime3	INtime V3.1
INtime4	INtime V4.x
INtime5	INtime V5.x
INtime6	INtime V6.x
Examples	Example projects and source code
Installation	Driver installation directories
INtime	INtime V3.1/V4.x/V5.x/V6.x driver installation
Hotfix	Patch files to fix known issues with SYCON.net and INtime
INtime	Hotfix for INtime
SYCON.net	Hotfix for SYCON.net

Table 4: CD contents

1.11 Legal notes

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2 Installation

The INtime driver comes with an installer program. It is also possible to install the driver manually by copying the driver software to the host system. This chapter describes both, the installer program and the manual installation procedure.

Attention: Uninstall any existing cifX INtime Driver before upgrading to a newer release of TenAsys INtime software.

Note: Depending on the INtime installation, the installation directories may change!

Recommended installation order

1. Install cifX Device Driver for Windows
2. Configure the device (firmware/configuration)
3. Install the INtime driver

Note: Recommendation: First, install the cifX Driver, to have the default registry settings available. If you install the driver later, refer to section *Driver registry settings* on page 16 on how to create all necessary driver registry keys manually.

2.1 Installation of the cifX Windows Driver (recommended)

The cifX Device Driver installation for Windows is available on the separately distributed cifX Driver for Windows CD and is located in the folder *Installation*. A detailed description of the installation process is described in the Installation and Operation Guide for the cifX Device Driver for Windows (reference [2]).

When Windows asks for a driver, for your newly inserted PC card cifX, select the path to the cifX driver folder on your CD. Windows automatically installs all needed tools and sets up the registry.

After the installation has succeeded the card can be configured using the cifX Setup tool.

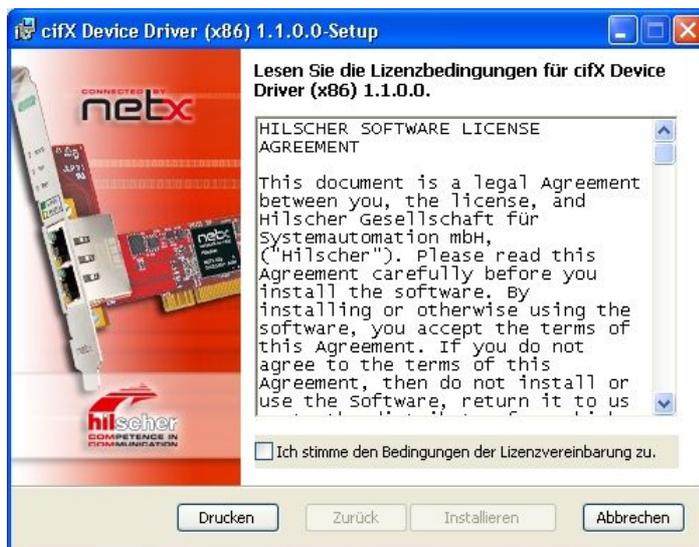


Figure 3: cifX Setup Wizard for Windows

2.2 Installation of the cifX INtime Driver (mandatory)

The INtime cifX driver comes with an automatic setup application and is available on the INtime CD in the folder `Driver\INtime`. Instructions about how to use the setup are described in the next section.

Note: It is highly recommended to use this setup program to install the INtime cifX driver properly!

However, it is also possible to install the INtime cifX driver manually. Please refer to section Manual installation on page 13 for further instructions.

2.2.1 Automatic setup

To install the INtime cifX driver execute the setup wizard (*cifX INtime Driver Setup.exe*) which is located on the INtime CD in the folder `Installation\INtime`. The setup wizard detects your installed INtime version automatically and installs the proper cifX driver (including 64-bit installer on a 64-bit operating systems with installed INtime V4.x and later).



Figure 4: cifX INtime Driver Setup Wizard

During the installation you can choose the setup type that best fits your needs. While the typical and complete setup install all features of the driver, the custom setup allows you to set the destination directory and choose which of the following features shall be installed:

- **cifX SDK:** Installs libraries and headers files required to develop applications for PC cards cifX.
- **Windows Application Access:** In order to enable the usage of Hilscher standard applications like Sycon.NET, cifX Test or cifX Setup within the INtime environment the cifX API library will be replaced by a special INtime wrapper library.

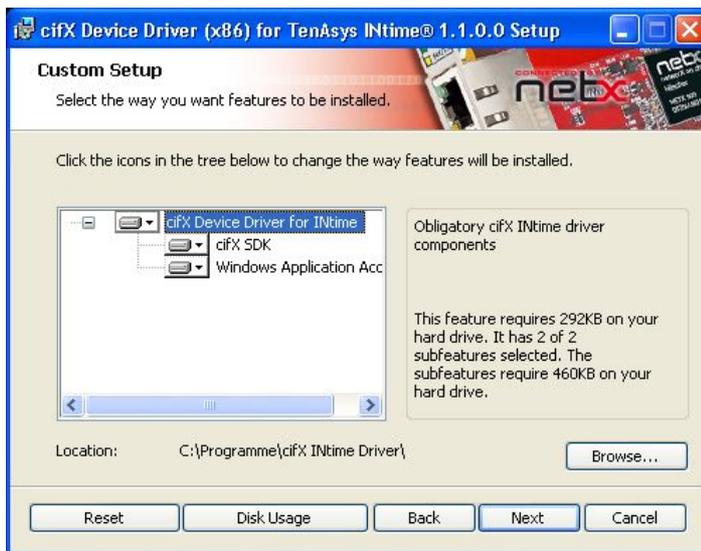


Figure 5: Custom setup

Note: Make sure that no Windows application is accessing the hardware, because the setup tries to rename the original cifX32DLL.dll from the cifX Windows driver (located in the `.\Windows\system32` directory) and copies the INtime version of the cifX32DLL.dll into the directory.

Verifying the cifX32 DLL Version

During the installation of the cifX INtime driver, the cifX32DLL from the original cifX Windows driver installation (located under `.\Windows\System32`, respectively `.\Windows\SysWOW64` on 64-bit OS) will be replaced by an INtime wrapper version. The INtime version of the DLL allows Windows application to access the cifX hardware via the INtime driver. The cifX32DLL.dll version can be verified using the file property dialog from Windows.

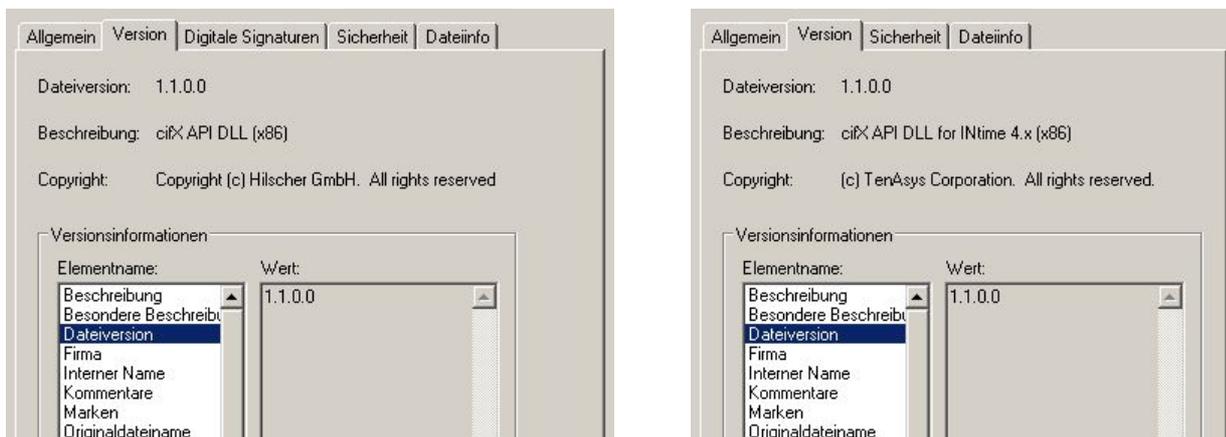


Figure 6: Verifying the cifX32DLL version

2.2.2 Manual installation

To install the driver manually, copy the files from the CD to your INtime installation. The following table shows a recommendation where the files should be placed.

File from CD (Source)	Local folder (Destination)	Description
Driver installation		
Driver\INtime3\cifxdrv.rta Driver\INtime4\cifxdrv.rta Driver\INtime5\cifxdrv.rta Driver\INtime6\cifxdrv.rta	<INTIME>\bin	Low-Level Driver
Driver\INtime3\cifx32rsl.rsl Driver\INtime4\cifx32rsl.rsl Driver\INtime5\cifx32rsl.rsl Driver\INtime6\cifx32rsl.rsl	<INTIME>\bin	API for real-time projects
Driver\INtime3\cifx32dll.dll Driver\INtime4\cifx32dll.dll Driver\INtime5\cifx32dll.dll Driver\INtime6\cifx32dll.dll	On 32-bit operating system: <WINDOWS>\System32 On 64-bit operating system: <WINDOWS>\SysWOW64	ATTENTION: This will replace the "normal", Windows cifX Device Driver DLL. All Windows application will only be able to access the Real-Time driver. If you only want a single application to use the Real-Time driver, copy the INtime cifX32DLL.dll into the applications directory.
Driver\INtime4\x64\cifx32dll.dll Driver\INtime5\x64\cifx32dll.dll Driver\INtime6\x64\cifx32dll.dll	On 64-bit operating system: <WINDOWS>\ System32	ATTENTION: INtime V3.1 does not support 64-bit operating systems.
API / Programming installation		
API\Includes*.h	<INTIME>\rt\include\cifX	These are the header files for interfacing with the cifx32rsl / cifX32dll. Make sure to let your project point to this include folder.
API\libs\INtime3*.lib API\libs\INtime4*.lib API\libs\INtime5*.lib API\libs\INtime6*.lib	<INTIME>\rt\lib\cifX	These are the libraries for interfacing with cifx32rsl / cifX32dll. Make sure to let your project point to this additional library folder.

Table 5: INtime Driver installation (Copying files)

2.3 Pass a PC card cifX to INtime

To be able to use the card under INtime, you need to move the card from the non real-time to the real-time management. This is done via the *INtime Device Manager*. After this step has been executed, the card will not be longer accessible from the *Windows Device Manager* or the cifX driver for Windows.

Note: Make sure that no Windows application is accessing the cifX hardware when passing it to INtime.

Note: Passing a PC card cifX to INtime may fail on Windows 7 systems (INtime V4 versions **4.20.11208** and earlier).

Please see the information given below and contact the INtime support for help.

- Open the INtime *Device Manager*

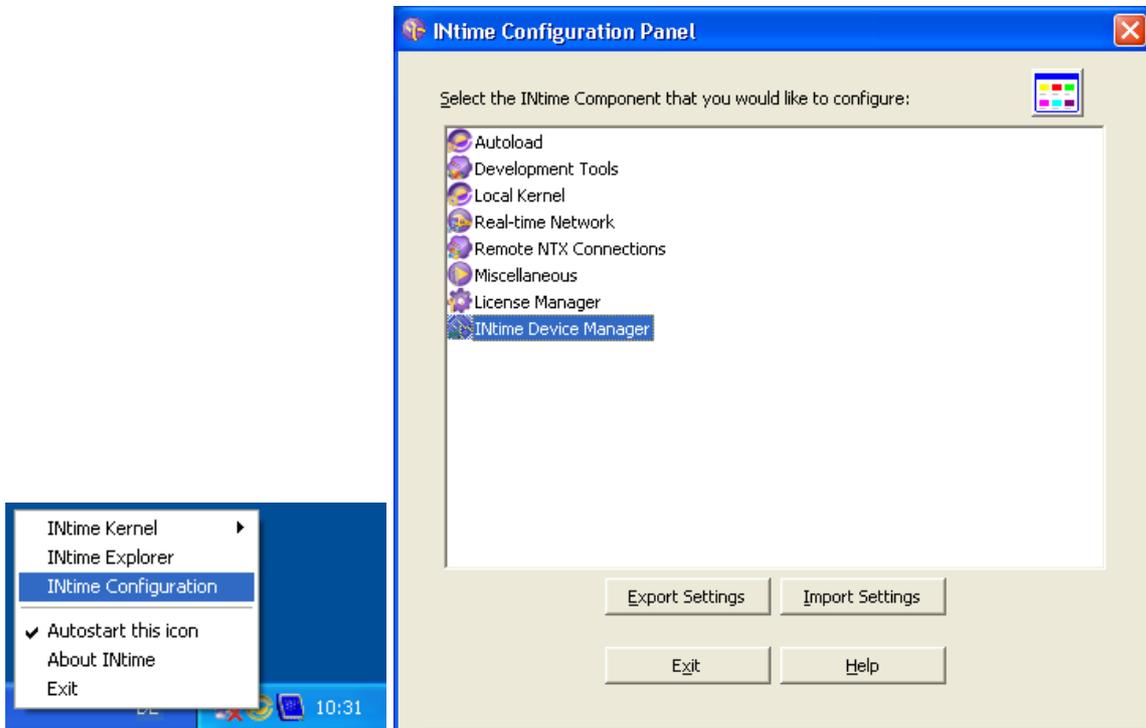


Figure 7: Open INtime Device Manager

- Right-click the PC card cifX and select "**Pass to INtime (non interrupt or MSI)** or **Pass to INtime (with legacy IRQ)** and save the configuration.
If interrupt support is required select the latter (Please make sure that the interrupt channel of your cifX device is not shared with another windows devices, otherwise system stability is compromised).

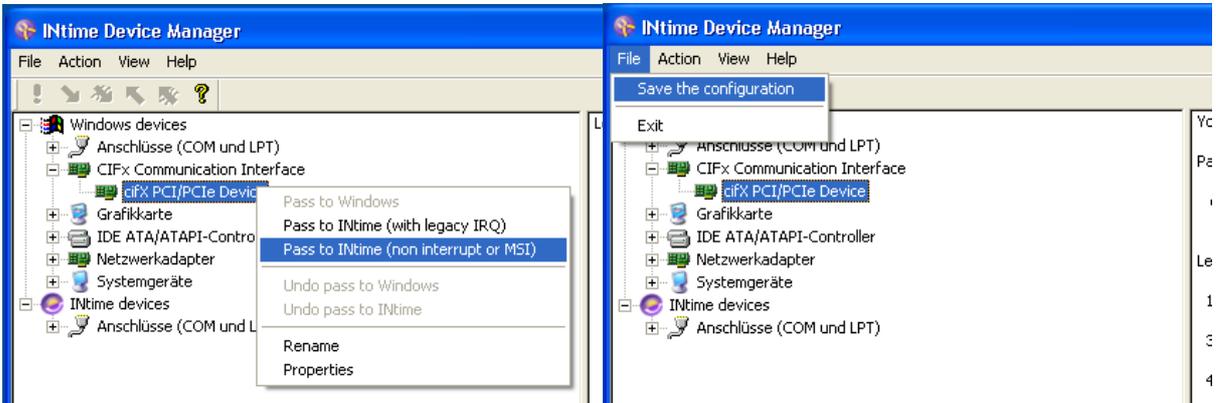
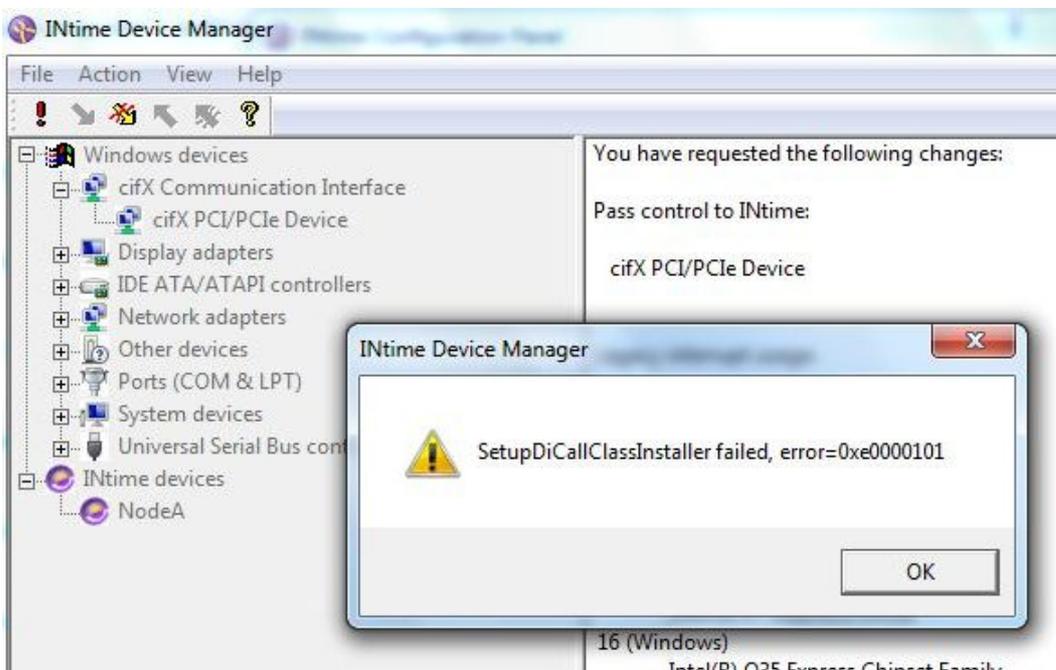


Figure 8: Pass PC card cifX to INtime

Attention: You might encounter a problem with the INtime *Device Manager* when passing the PC card cifX on Windows 7 host machines.

- The following issue occurs in some of the INtime V4 software release and is a problem in the INtime V4 *Device Manger* in combination with Windows 7 host machines. INtime versions **4.20.11208** and earlier are affected and **need to be patched**.

Please contact the INtime support team and ask for an appropriate patch to solve this problem.



- Your final configuration should look like this



Figure 9: Final cifX INtime configuration

2.4 Driver registry settings

The basic driver registry settings are done by the cifX Device Driver for Windows installation. If you skip the driver installation, this chapter describes the necessary registry settings and the keys needed to download a firmware / configuration file to a specific PC card cifX.

Global driver settings		
Value	Type	Description
[HKLM\System\CurrentControlSet\Services\CIFxDrv]		
InstallDir	REG_SZ	Driver base directory. This is the path the second stage loader (NXCIF50-RTE.bin) and firmware / configuration files (in separate subfolders) are expected
[HKLM\System\CurrentControlSet\Services\CIFxDrv\Parameters]		
TraceLevel	REG_DWORD	Adjust the amount of debug outputs of the driver. Each bit represents a level. Bit 0: Enable debug Bit 1: Enable informational data Bit 2: Enable warnings Bit 3: Enable errors
PollingInterval	REG_DWORD	Time in ms to check card for COS bit change
[HKLM\SYSTEM\CurrentControlSet\Services\CIFxDrv\Parameters\NX-PCA-PCI]		
DPM_8_Bit	REG_DWORD	NXPCA-PCI Timings parameter for 8 bit mode.
DPM_16_Bit	REG_DWORD	NXPCA-PCI Timings parameter for 16 bit mode.
DPM_32_Bit	REG_DWORD	NXPCA-PCI Timings parameter for 32 bit mode.

Table 6: INtime-Driver - Global driver settings

Device specific settings		
Value	Type	Description
[HKLM\System\CurrentControlSet\Services\CIFxDrv\DeviceConfig\<DevNr>\<SerialNr>]: or [HKLM\System\CurrentControlSet\Services\CIFxDrv\DeviceConfig\Slot\<SlotNr>]:		
Alias	REG_SZ	Alias name of device
InterruptEnable	REG_DWORD	Device interrupt handling enable/disable 0 = disable (default) 1 = enabled
DMAEnable	REG_DWORD	Direct memory access enable/disable 0 = disable (default) 1 = enable
OSFile	REG_SZ	To use loadable modules, a rcX base firmware is required. This entry specifies the path to the rcX base firmware file relative to: <InstallationDir>\<Device Number>_<Serial Number> <InstallationDir>\Slot_<Slot Nr.>
[HKLM\System\CurrentControlSet\Services\CIFxDrv\DeviceConfig\<DevNr>\<SN>\Channel<0..6>]: or [HKLM\System\CurrentControlSet\Services\CIFxDrv\DeviceConfig\Slot\<SlotNr>\Channel<0..6>]:		
ModuleCount	REG_DWORD	Number of configured modules
Module0	REG_SZ	Each module gets an own entry with an index as suffix. This specifies the complete path to the file.
ConfigCount	REG_DWORD	Number of configured fieldbus databases
Config0	REG_SZ	Each database gets an own entry with an index as suffix. This specifies the complete path to the file.
WarmstartFile	REG_SZ	File name to warmstart parameter file

Table 7: INtime-Driver - Device Specific Settings

Note: All filenames are used as short file names (no path information). The file storage is explained in section *Firmware and configuration file storage* on page 19.

Note: An example registry file "cifX.reg" can be found in the Driver\INtime CD directory.

Sample driver configuration:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv]
"InstallDir"="D:\Programme\CifX Device Driver"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\Parameters]
"TraceLevel"=dword:000000ff
"PollingInterval"=dword:000001f4
```

Sample device configuration:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217]
"InterruptEnable"=dword:00000001
"DMAEnable"=dword:00000001
"Alias"=""
"OSFile"="cifXrcX.nxf"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel0]
"ModuleCount"=dword:00000001
"Module0"="cifXdps.nxf"
"ConfigCount"=dword:00000001
"Config0"="config.nxd"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel1]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel2]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel3]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel4]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel5]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000
```

2.5 Firmware and configuration file storage

PC cards cifX are not using any flash memory to store a firmware or configuration on the card. Each time the card is powered-up, the firmware and configuration files must be downloaded to the hardware.

Note: Firmware and configuration files are not stored on the hardware and must be downloaded each time the card is powered-up.

It is the task of the driver to initialize the card and therefore the driver has to know which files have to be loaded to the hardware.

To allow device specific configuration every file that needs to be downloaded must be stored in an own folder. These folders are created within the cifX driver installation directory (see registry settings, `InstallDir`, usually `.\Program Files`).

This chapter describes where these files are stored.

- **Use the *Slotnumber* (hardware rotary switch)**

The *Slotnumber* serves to distinguish PC cards cifX from each other clearly, especially if more PC cards cifX are installed in one PC. The *Slotnumber* must be set at the cifX card using the rotary switch *Slotnumber*. While *Slotnumber* 0 means, that the cifX card is identified by its device and serial number, values from 1 to 9 corresponds to the *Slotnumber* 1 to 9. The firmware and configuration file must reside in the subdirectory *Slot_<1..9>*.

- **Use the device and serial number (default)**

If the PC card cifX is not equipped with a rotary switch or the *Slotnumber* is set to 0, the device is identified by its device and serial number. The firmware and configuration file must reside in the subdirectory */<Device Number>_<Serial Number>/*.

Note: When using cifX Setup Utility to configure the card, the file storage will automatically be handled by the application. The cifX Setup Utility is delivered with the cifX Windows driver installation and can be found in the driver installation directory or in the system control panel.

The following table describes the different subdirectory levels:

Subdirectory	Description
<INSTALLDIR>	Installation directory of the cifX device driver for Windows®, containing the second stage PCI boot loader and the cifX driver tools Note: This directory must contain the second stage PCI bootloader (e.g. NETX100-BSL.bin)
<Device Nr.>_<Serial Nr.> Slot_<1..9>	Device and serial number of the device or slot number if the device provides a rotary switch. If the slot number is 0 the device and serial number is always used to identify the device. Note: This directory must contain the rcX base firmware, if loadable modules are used.
Channel<#>	Channel specific files (loadable modules, monolithic firmware files, fieldbus database files) Note: Currently only channel 0 is supported

Table 8: Firmware and configuration file storage

Sample file structure for a cifX device with device number 1250100 and serial number 20217:

```
+ <INSTALLDIR>
|
|-- NETX100-BSL.BIN (second stage PCI bootloader)
|
|--+ 1250100_20217
|   |--+ Channel0
|       |-- cifXdps.nxf
|       |-- config.nxd
|   |--+ Channel1
|   |--+ Channel2
|   |--+ Channel3
|   |--+ Channel4
|   |--+ Channel5
```

Sample file structure for a cifX device identified by Slot number 2 and loadable module support:

```
+ <InstallDir>
|
|-- NETX100-BSL.BIN (second stage PCI bootloader)
|
|--+ Slot_2
|   |--+ Channel0
|       |-- nx100dpm.nxo (loadable module)
|       |-- config.nxd (fieldbus database)
|   |--+ Channel1
|   |--+ Channel2
|   |--+ Channel3
|   |--+ Channel4
|   |--+ Channel5
|
|-- cifXrcX.nxf (rcX base firmware)
```

2.6 Driver startup

The driver behaves like any other real-time INtime application and can be started via the INtime Explorer or placed in the `autostart` of the kernel. There are different command line parameters available described in the following table.

Option	Type	Description
Conf	String	Name of the registry file to load The referenced file is an export of the cifX Windows driver's registry key.
Log	String	Filename of the log file to write debug information
stage2	String	File containing the cifX Second stage loader (Normally defined in registry)
Poll	DWORD	Time in milliseconds [ms] to poll the card for change of state information
Trace	DWORD	Trace level for debug outputs
Inst	DWORD	Bit mask of board instances to activate. Each bit represents a board.
Ntrans	DWORD	Number of transaction buffers to reserve
Ncbs	DWORD	Number of control buffers to reserve
Prio	DWORD	Priority of the cifX service thread (default=128)

Table 9: INtime Driver - Command line options

Example startup

```
cifxdrv.rta log=C:\cifxdrv.log poll=500 trace=255
```

2.6.1 Configure the driver for automatic startup

Usually the driver should start together with the INtime kernel. This chapter describes how to add the driver to the kernel start-up procedure.

- Open INtime *Autoload* application

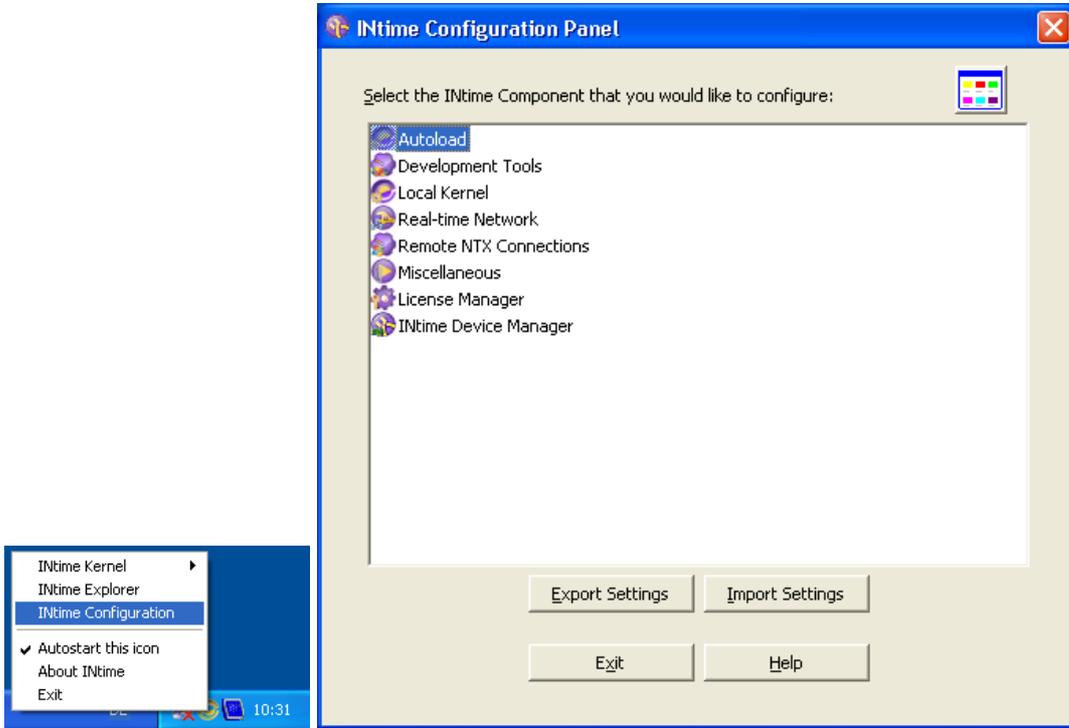


Figure 10: INtime Autoload Configuration (start)

- Click **Add** to define a start-up entry for the cifX Driver

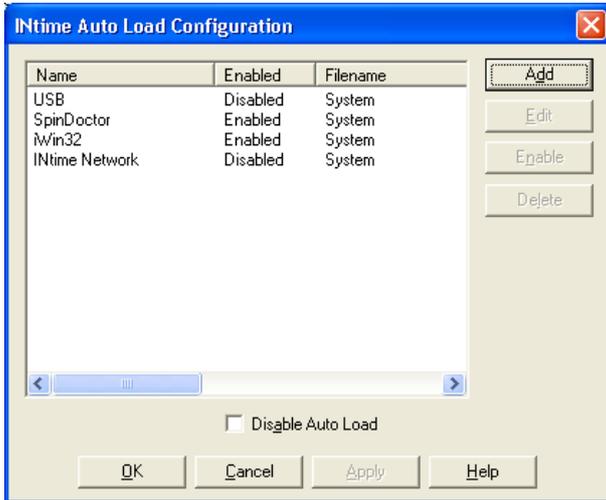


Figure 11: INtime Autoload Configuration (list)

- Fill in all needed information and your start-up parameters (see section *Driver startup* on page 21 for a description of the start-up options).

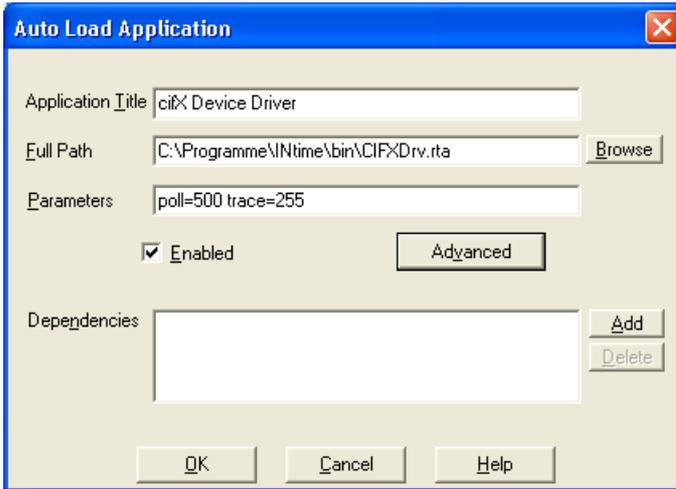


Figure 12: INtime Autoload Configuration (add cifX entry)

- Make sure your entry is enabled

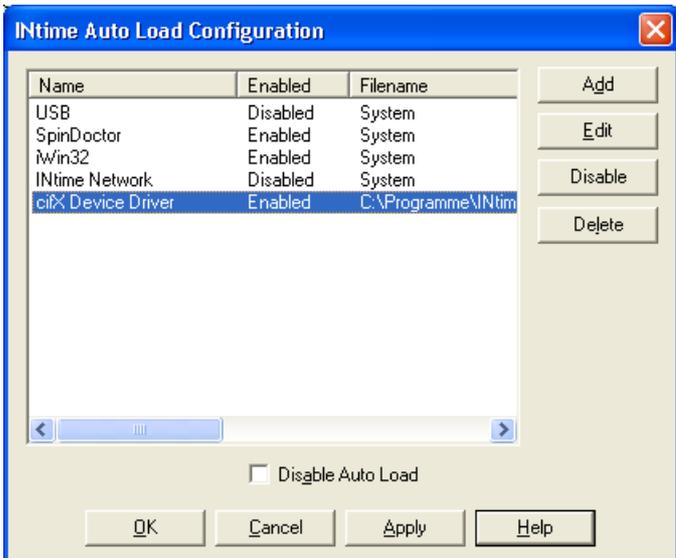


Figure 13: INtime Auto Load Configuration (list with cifX entry)

2.6.2 Configuration with a local registry file

To allow a configuration without accessing the registry, it is possible to pass a file that contains the registry contents for the driver and let the driver read the configuration from this file. See "conf" start-up parameter.

You can either write an own registry file or export the settings from an existing cifX Windows driver installation.

To export the registry, process the following steps:

- Start registry editor **regedit.exe**
- Select the key `HKLM\SYSTEM\CurrentControlSet\Services\CIFxDrv`
- Export the registry by selecting **Export** from the file menu

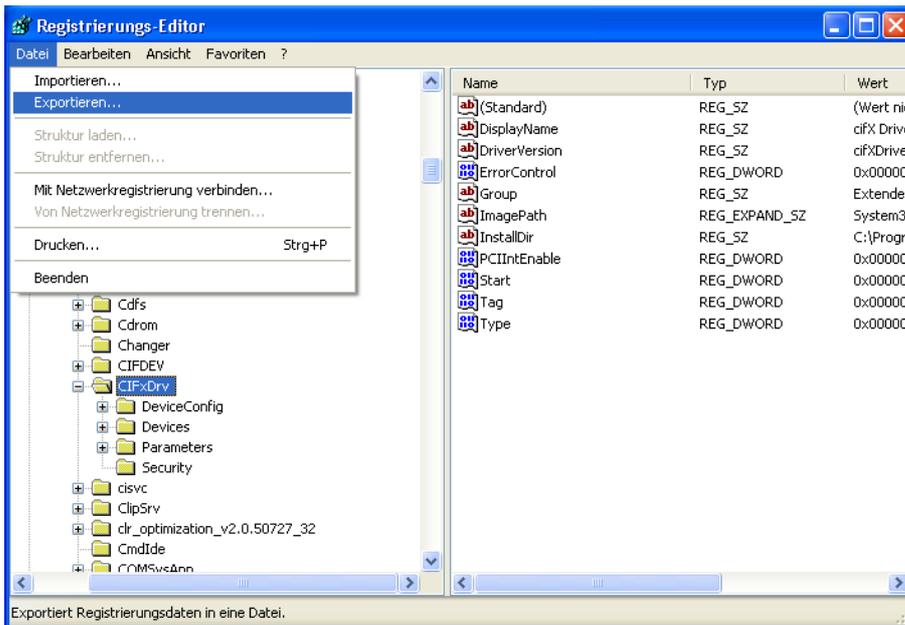


Figure 14: Export cifX Windows registry entries

Sample export file

```
Windows Registry Editor Version 5.00
```

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv]
"InstallDir"="C:\\Programme\\cifX Device Driver"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100]

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217]
"Alias"="ECS"
"InterruptEnable"=dword:00000000
"DMAEnable"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel0]
"ModuleCount"=dword:00000001
"Module0"="ecscifx.nxf"
"ConfigCount"=dword:00000001
"Config0"="config.nxd"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel1]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel2]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel3]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel4]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\DeviceConfig\1250100\20217\Channel5]
"ModuleCount"=dword:00000000
"ConfigCount"=dword:00000000

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\Parameters]
"TraceLevel"=dword:0000000f

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CIFxDrv\Parameters\NX-PCA-PCI]
"DPM_8_Bit"=dword:5431f962
"DPM_16_Bit"=dword:4073f8e2
"DPM_32_Bit"=dword:40824122
```

2.7 Assign a firmware / configuration file

Firmware and configuration files must be downloaded on every start-up (power-up) of a PC, because PC cards cifX do not have Flash memory on board to store files. The driver loads these files during the start-up phase, but requires these files to load them into the PC card cifX.

The settings are stored per device as described in section *Driver registry settings* on page 16. These settings can be created and changed with the cifX Setup utility, coming with the Windows cifX device driver or manually by editing the registry.

2.7.1 Using the cifX Setup Utility

The application is installed into the cifX driver installation directory (usually `.\Program files\cifX Device Driver`) and will also be inserted into the Windows control panel.

- Start the cifX Setup utility

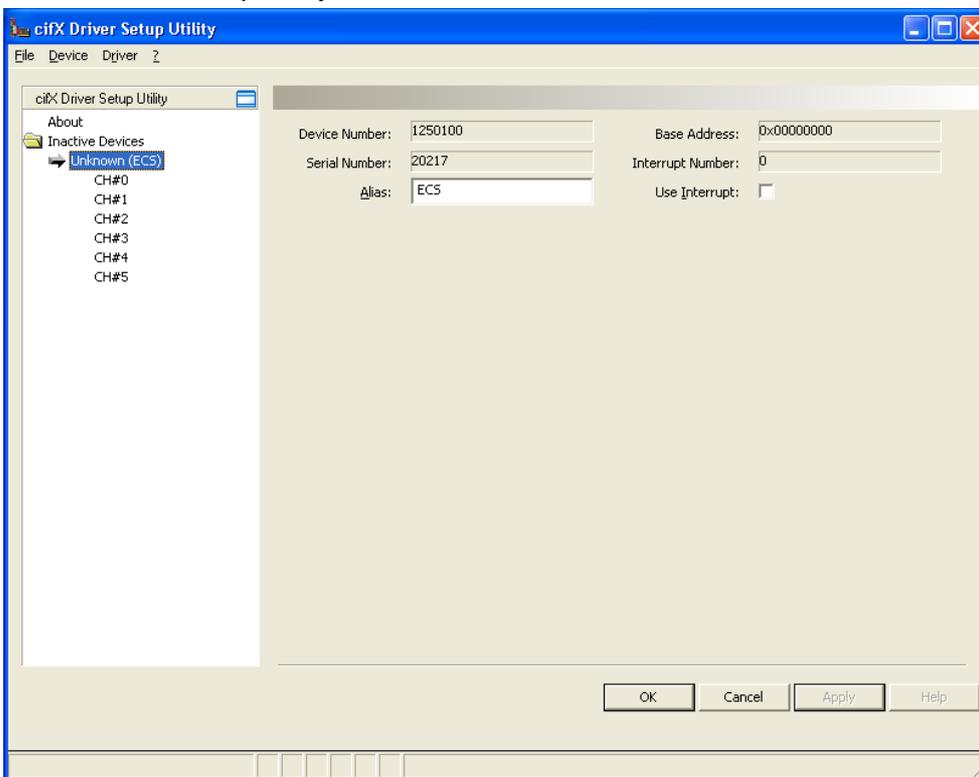


Figure 15: cifX Setup Utility

- Configure the device by setting all needed parameters in the device tree and define the files which should be loaded to the PC card.

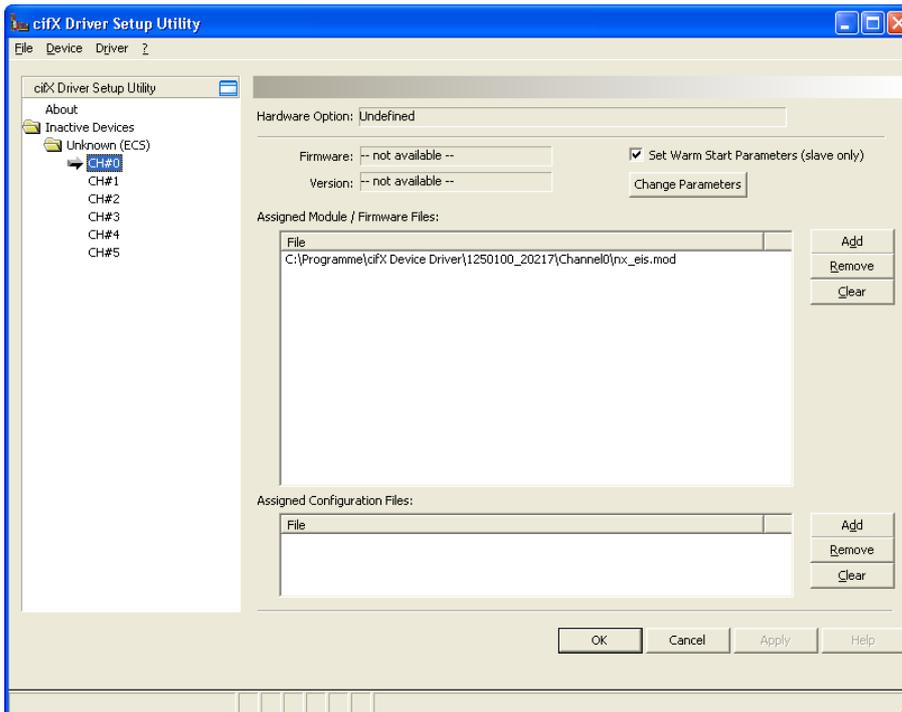


Figure 16: cifX Setup Utility - Firmware/configuration dialog

Note: To configure devices with the cifX Setup Utility, they must have been once under the control of the Windows Device Driver. If a new PC card is inserted and directly passed to INtime, without installing the Windows cifX Device Driver for first, this card will not appear in the device list.

NOTE: If there is no driver running (cifX Windows / cifX INtime), the tool will only show **Inactive Devices**.

2.7.2 Manually via registry

The cifX Setup Utility is a front end for the registry changes. All devices can also be set up by changing the registry manually and copying the files into to device storage.

Note: If the configuration is changed manually the driver must be reloaded before the changes become active.

Refer to section *Driver registry settings* on page 16 for setting up the registry manually.

3 Using SYCON.net to configure the fieldbus system

The Hilscher fieldbus hardware will be configured by a Windows application called SYCON.net. SYCON.net is based on the FDT/DTM concept and generates the configuration files for the hardware. It is also able to update the firmware for a specific card.

Note: Please refer to the SYCON.net manual on how to create a fieldbus configuration for a cifX hardware.

Note: Because of the separation between the Windows and INtime environment, SYCON.net is not able to directly download and store a firmware / configuration by default. Therefore the cifX32DLL.dll from the Windows cifX driver (located in the `.\Windows\System32` directory) must be replaced with the INtime version of this DLL.

Please use the following steps to create a configuration:

- Install SYCON.net
- Start SYCON.net and create a configuration
- Store the SYCON.net configuration project and export the configuration from SYCON.net into a database file.

Use either the cifX Setup Utility to place the firmware and configuration files into the cards file storage or copy the files manually into the cards file storage.

Now start/restart the cifXINtime driver. This will load the firmware and configuration into the PC card cifX.

Open SYCON.net and open the configuration project. Now you should be able to connect to the hardware and run the SYCON.net diagnostics.

OR

- If available connect SYCON.net to a PC card cifX and download the configuration. This will automatically store the files in the cards file storage and restarts the device.

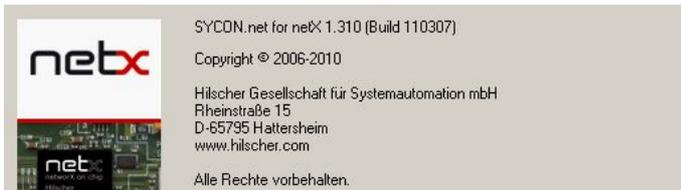
3.1 Patch the SYCON.net installation

Due to compatibility issues with SYCON.net and the cifX INtime driver a firmware or configuration download will cause a fatal crash of the SYCON.net application (see screenshot below)!

An unhandled win32 exception occurred in ODMV3.exe [3548].

This issue can be fixed by applying a special patch to the SYCON.net application. Check your SYCON.net application to find out if the patch is necessary.

SYCON.net V1.3.5.0 and higher do not need to be patched.



For older versions a step by step instruction to apply the patch is described below:

1. Navigate to the folder <Common Files Path>\Hilscher\ODMV3 (e.g. C:\Program Files\Common Files\Hilscher\ODMV3, This path only exists if SYCON.net is installed on your local machine). The file *ODMCifXDriver.dll* located in this folder may have to be replaced by a newer version.
2. In order to check the version of the *ODMCifXDriver.dll*, open the file properties and select the version tab. If the version is equal or higher than 1.101.1.9801 your SYCON.net installation is up-to-date - you do not need to apply the patch. Otherwise proceed with next step.



3. Make sure that the ODMV3 service is not running. Right click the ODMV3 tray icon found in the tray bar of your windows machine and select **Service > Stop**.



4. Navigate to the folder *Hotfix\SYCON.net* on the cifX INtime driver CD
5. Replace your local version of *ODMCifXDriver.dll* with the one delivered on CD
6. The ODMV3 service will be restarted with the next access via SYCON.net. Firmware and configuration files download will now work properly!

4 Programming with the cifX INtime Driver

The cifX INtime driver offers the same CIFX API interface like the cifX Windows driver. Therefore use the *CIFX API - Application Programming Interface* manual. This manual describes the driver functions (CIFX API), error codes and shows some program examples.

The installation CD also includes an `Example` directory with INtime specific examples.

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