

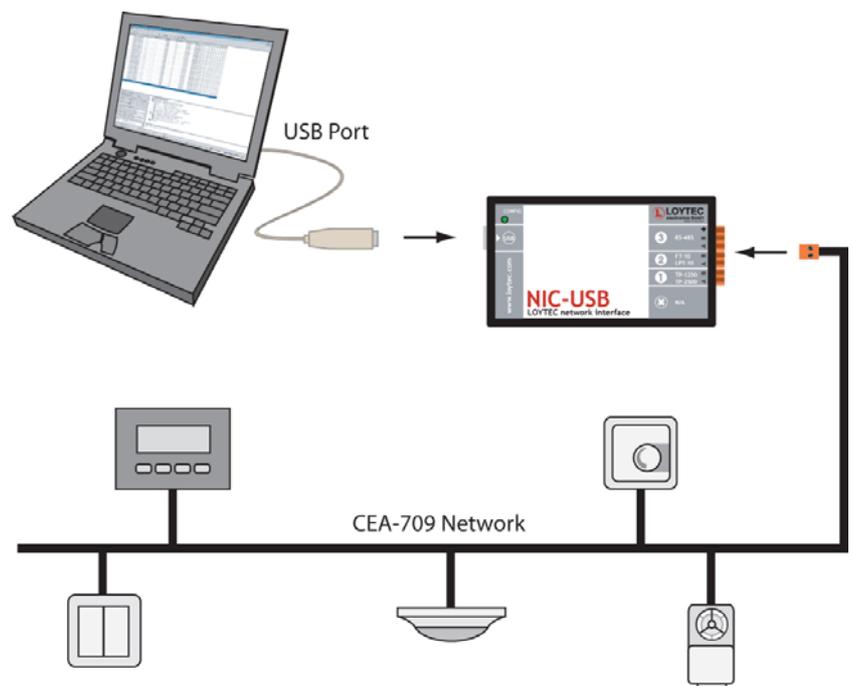
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# NIC™

LOYTEC Network Interfaces

# User Manual

LOYTEC electronics GmbH



Contact

LOYTEC  
Blumengasse 35  
A-1170 Vienna  
AUSTRIA/EUROPE  
support@loytec.com  
<http://www.loytec.com>

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# 1 Introduction

Thank you for purchasing a LOYTEC product. Please observe that this document applies to the **NIC709** and **NIC852** network interface series as well as the **LPA006**, **LPA-PP**, **LPA-USB** and **LPA-USBP** protocol analyzers from LOYTEC. Observe that some restrictions might apply to your network interface depending on the hardware type, see Chapter 10.

The NIC709 and NIC852 network interfaces for PCs offer a performance and versatility yet unrivaled in the industry. LOYTEC's network interface family includes devices for PCI and USB as well as Ethernet/IP. Each NIC709 network interface (except NIC709-IP) comes with three software selectable transceivers, supporting bit-rates from 300 bps to 2.5 Mbps. The NIC709-IP is equipped with either an FT or an XF-1250 interface. The NIC852 provides access to CEA852 / CNIP (Control Network over IP) networks. A LOYTEC NIC can be used to run powerful software like e.g. LPA (LOYTEC Protocol Analyzer), LSD (LOYTEC System Diagnostics Tool) as well as MIP<sup>TM</sup>/LDV and LNS<sup>TM</sup>/VNI 3.x applications like NL220<sup>TM</sup> or LonMaker<sup>TM</sup>. Please refer to Chapter 10 for a complete list of features and properties for each LOYTEC network interface.

This document describes in detail how to install and configure the LOYTEC Network Interfaces.

# 2 Installation for Windows Operating Systems

## 2.1 NIC709-PP (and LPA006 / LPA-PP)

The NIC-PP (NIC709-PP) works in **Windows 2000, Windows XP/2003, Windows Vista/2008 (32 bit), and Windows 7/2008R2 (32 bit)**. The NIC-PP does **not run on 64 bit versions of Windows**.

Just connect the NIC-PP to a printer port of your PC (LPT1 or LPT2), as depicted in Figure 1. The interface box must be powered with 9 to 24V DC / 300mA. A 230V or 120V power supply is included with the NIC709-PP package. Optionally you can use the Notebook Power Adapter L-NPA to power the NIC-PP via a PS2 port of your PC or notebook.

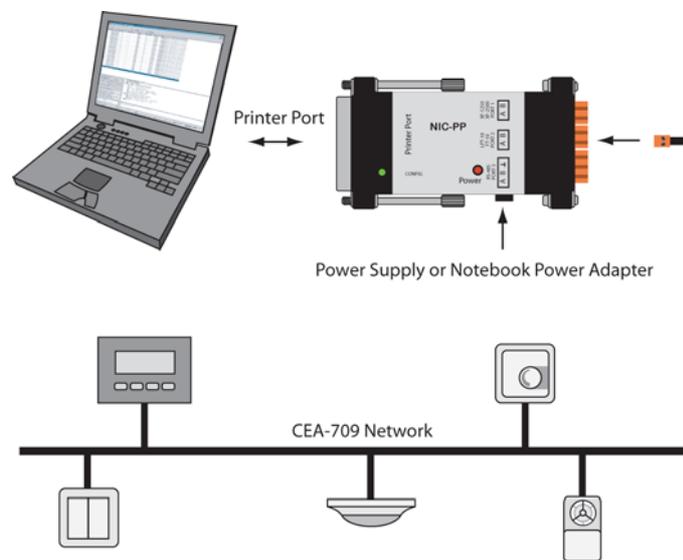


Figure 1: NIC-PP Hardware Installation

To install the software and drivers for the NIC-PP, please put the LOYTEC Software CD into your CDR/DVD drive and wait till the CD menu appears. If no menu appears please start 'setup.exe' from the CD manually. Click the button for NIC installation and follow the instructions. The Windows hardware assistant might request permission to install the drivers, which you must give to continue with the installation. Please observe that you must be logged in as Administrator or have administrator rights to install the drivers.

Before working with the NIC709-PP, you must explicitly enable the parallel port device within the LConfig tool (see Chapter 3), since all parallel port devices are disabled by default.

---

## 2.2 NIC709-PCI / NIC709-PCI100

The NIC709-PCI / NIC709-PCI100 network interface cards work in **Windows 2000**, **Windows XP/2003**, **Windows Vista/2008 (32/64 bit)**, **Windows 7/2008R2 (32/64 bit)** as well as **Linux**, see Chapter 9.

Before hardware installation, please install the NIC Network Interface Software. You must be logged in as Administrator or have administrator rights to install the software and drivers. Put the LOYTEC Software CD into your CDR/DVD drive and wait till the CD menu appears. If no menu appears please start 'setup.exe' from the CD manually. Click the button for NIC installation and follow the instructions. The Windows hardware assistant might request permission to install the drivers, which you must give to continue with the installation. Now switch off your PC and plug the NIC-PCI into an empty PCI slot as depicted in Figure 2.

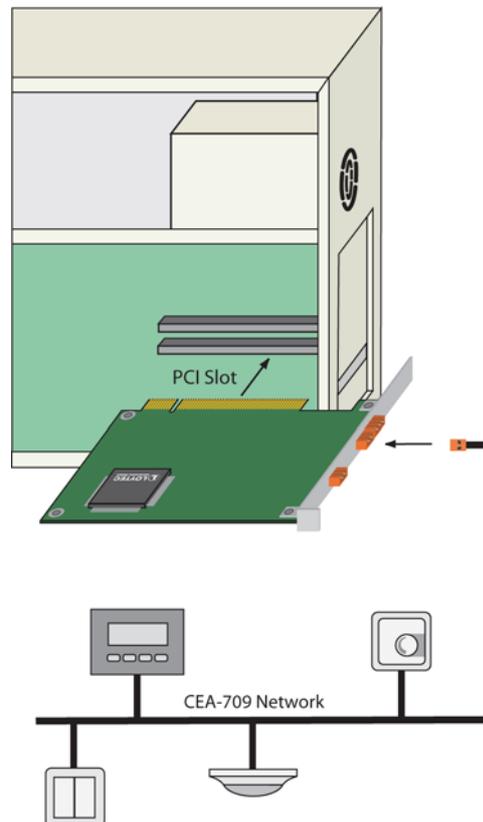


Figure 2: NIC-PCI Hardware Installation

Figure 3 shows how to connect TP-1250/2500, FT/LPT-10, or RS-485 networks to the NIC-PCI. Observe that the polarity of the signal connectors A and B of each transceiver does not matter. For RS-485, you additionally have to connect the ground signal of the bus.

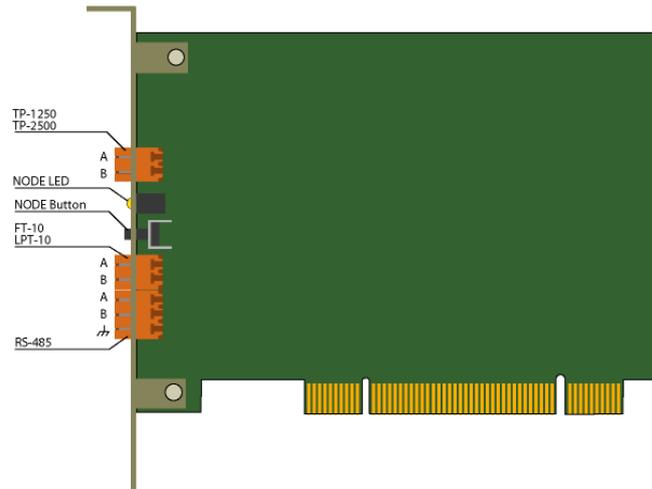


Figure 3: NIC-PCI Connectors

After hardware installation, please start the PC and wait till the Windows hardware assistant automatically completes the driver installation. In **Windows XP/2003** the hardware assistant will ask you some questions:

1. *Can Windows connect to Windows Update to search for software?* – Choose **'No, not this time'**, click **Next**.
2. *What do you want the Wizard to do?* – Choose **'Install the software automatically'**, click **Next** and finally **Finish**.

Driver installation may take a few minutes, so please be patient.

---

## 2.3 NIC709-USB / NIC709-USB100

The NIC709-USB network interface (old model) works in **Windows 2000, Windows XP/2003, Windows Vista/2008 (32 bit)**, and **Windows 7/2008R2 (32 bit)**. The NIC709-USB does **not run on 64 bit versions of Windows**. The NIC709-USB100 network interface works in **Windows 2000, Windows XP/2003, Windows Vista/2008 (32/64 bit)**, and **Windows 7/2008R2 (32/64 bit)**. See chapter 10 for information on how to distinguish the two NIC-USB models.

Before connecting the NIC-USB to your PC please install the NIC Network Interface Software. You must be logged in as Administrator or have administrator rights to install the software and drivers. Put the LOYTEC Software CD into your CDR/DVD drive and wait till the CD menu appears. If no menu appears please start 'setup.exe' from the CD manually. Click the button for NIC installation and follow the instructions. The Windows hardware assistant might request permission to install the drivers, which you must give to continue with the installation. After the installation, please disconnect all LOYTEC USB devices and reboot.

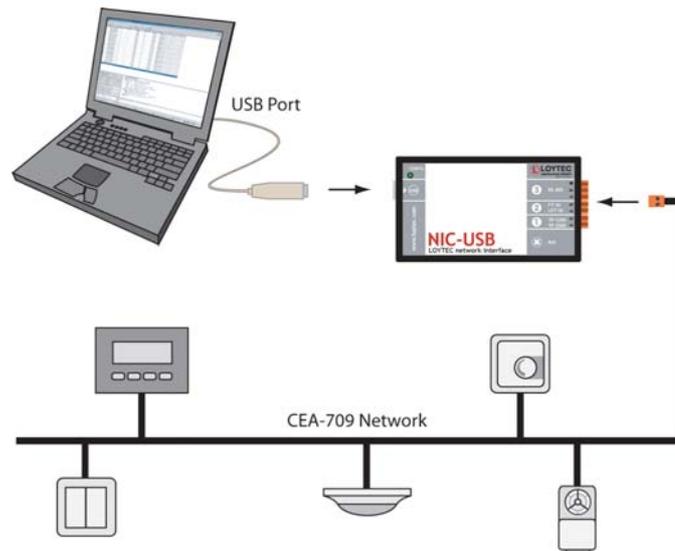


Figure 4: NIC-USB Hardware Installation

After reboot, plug in the NIC-USB as depicted in Figure 4. If no LOYTEC USB devices have yet been installed on your PC, please wait till the Windows hardware assistant automatically completes driver installation. In **Windows XP/2003** the hardware assistant will ask you some questions:

1. *Can Windows connect to Windows Update to search for software?* – Choose **'No, not this time'**, click **Next**.
2. *What do you want the Wizard to do?* – Choose **'Install the software automatically'**, click **Next** and finally **Finish**.

This procedure is executed twice, since two drivers must be installed for the NIC-USB. Driver installation may take a few minutes, so please be patient. If you have several free USB ports, it is recommended to repeat the procedure for all free ports since Windows XP/2003 might request driver installation again for a different port.

After the drivers are installed, the CONFIG LED on the NIC-USB network interface device should light up (or blink) a few seconds after the NIC-USB is connected to the USB port. Please do not start any software on the NIC before the CONFIG LED comes on. Make sure that the NIC-USB is not disconnected as long as any LOYTEC software is running. If you use an external USB hub, please make sure that it is an active Hub (with a separate power supply). If problems occur when operating the NIC-USB behind a USB Hub, please try connecting the NIC-USB directly to the PC.

It is not recommended to enter Standby or Hibernation mode as long as any software is running on the NIC-USB. However, Standby/Hibernation mode is supported for the NIC-USB. After resuming from Standby/Hibernation mode, please follow the instructions shown in the pop-up message box. Wait till the CONFIG LED on the NIC-USB lights up and click on 'Resume'. If the CONFIG LED should not light up after about one minute, unplug and re-plug the NIC-USB, wait again for the CONFIG LED, and click 'Resume'. Should the resume not work after that, you can again try to unplug and re-plug the NIC-USB.

---

## 2.4 NIC852

The NIC852 network interface works in **Windows 2000**, **Windows XP/2003**, **Windows Vista/2008**, and **Windows 7/2008R2**. Note that the **64 bit versions of Windows**

**Vista/2008** and **Windows 7/2008R2** are **not supported for older NIC852 USB key models**. Refer to chapter 10 on how to find out if your NIC852 USB key supports 64 bit versions of Windows.

Please install the NIC Network Interface Software first. You must be logged in as Administrator or have administrator rights to install the software and drivers. Put the LOYTEC Software CD into your CDR/DVD drive and wait till the CD menu appears. If no menu appears please start 'setup.exe' from the CD manually. Click the button for NIC installation and follow the instructions. The Windows hardware assistant might request permission to install the drivers, which you must give to continue with the installation. Finally, disconnect all LOYTEC USB devices and reboot. Refer to Sections 2.4.1 and 2.4.2 for more information on installation of the NIC852 according to the license type (USB key or software activation).

The actual connection to the CEA852 / CNIP (Control Network over IP) network is done via the Ethernet/IP port of the PC. Please refer to Chapter 7 for Personal Firewall Setup. By using a LOYTEC L-IP or other CEA709/IP router, remote CEA709 networks can easily be accessed using the NIC852. There are two basic use cases for the NIC852 in combination with L-IPs and other CNIP devices, described in Sections 2.4.3 and 2.4.4.

### 2.4.1 NIC852 with USB Key (Floating License)

If your NIC852 product includes a USB key, you have a floating NIC852 license you can use on any PC. Plug in the NIC852 USB key as depicted in Figure 5. If no LOYTEC USB devices have yet been installed on your PC, please wait till the Windows hardware assistant automatically completes driver installation.

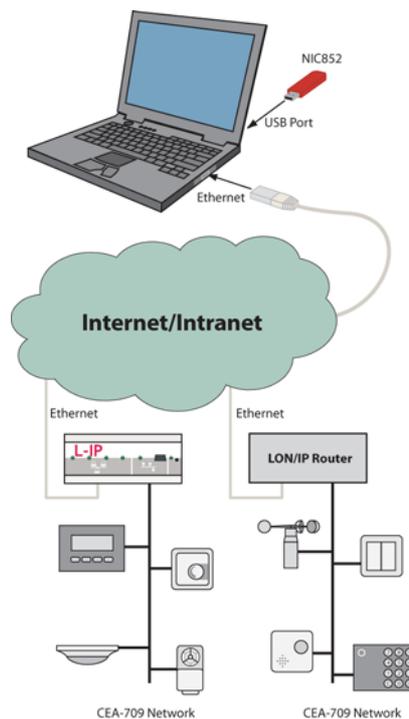


Figure 5: NIC852 Hardware Installation

In **Windows XP** the hardware assistant will ask you some questions:

1. *Can Windows connect to Windows Update to search for software?* – Choose '**No, not this time**', click **Next**.

2. *What do you want the Wizard to do?* – Choose **‘Install the software automatically’**, click **Next** and finally **Finish**.

This procedure is executed twice, since two drivers must be installed for the NIC852. Driver installation may take a few minutes, so please be patient. If you have several free USB ports, it is recommended to repeat the procedure for all free ports since Windows XP/2003 might request driver installation again for a different port.

Make sure that the NIC852 USB key is not disconnected and the PC does not enter Standby/Hibernation mode as long as any software is running on the NIC. If you use an external USB hub, please make sure that it is an active Hub (with a separate power supply). If problems occur when operating the NIC852 behind a USB Hub, please try connecting the NIC852 directly to the PC.

## 2.4.2 NIC852-SW (Software Activation)

The NIC852-SW is bound to a specific PC where it must be activated. Please refer to Chapter 8 on software activation of your NIC852-SW.

## 2.4.3 NIC852 as a Member of the CEA852 / CNIP channel

The standard use case for the NIC852 is to function as a member (node) on a CEA852 / CNIP channel (LonMark IP-852). On top of the NIC852, PC software like the LPA-IP protocol analyzer, the LSD tool, custom ORION applications, or MIP/LDV and LNS/VNI 3.x applications can be run, see Figure 6. In this case the LPA-IP-SW software would receive the complete traffic of the IP-852 (backbone) channel. The LSD tool or a custom ORION application would act as a node on the IP-852 channel just like a PC running an LNS/VNI application or an OPC server. Observe that by using Multiplexed Network Interface devices (see Chapter 6), several applications can be run in parallel on a single NIC852. Refer to Section 3.6 for a detailed description on how to integrate the NIC852 into an existing CEA852 channel.

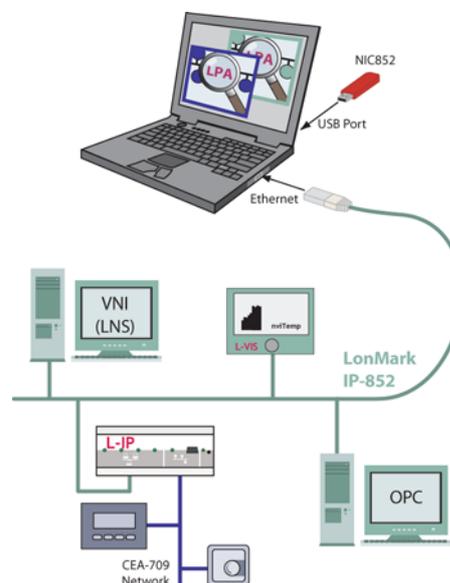


Figure 6: LPA-IP running on NIC852

## 2.4.4 Remote LPA

For information on the Remote LPA function, please refer to the LPA User Manual.

## 2.5 NIC709-IP (NIC709-IPxE / NIC709-IPxE100)

Please observe that the NIC software can be used for both the LOYTEC NIC-IP devices and all other LOYTEC and 3<sup>rd</sup> party devices which have the RNI functionality. Please refer to the user manual of your device as well as Section 3.8 in the latter case.

The NIC-IP (NIC709-IP) network interface works in **Windows 2000, Windows XP/2003, Windows Vista/2008 (32/64 bit), and Windows 7/2008R2 (32/64 bit)**.

It comes in two different enclosures, the NIC709-IPxE (old version) and the NIC709-IPxE100 (new version), see also Figure 12. The NIC709-IPxE interface box must be powered with 9 to 35 VDC or 12 to 24 VAC. The NIC709-IPxE100 interface box must be powered with 12 to 35 VDC or 12 to 24 VAC. Before connecting the NIC-IP please install the NIC Network Interface Software. You must be logged in as Administrator or have administrator rights to install the software and drivers. Put the LOYTEC Software CD into your CDR/DVD drive and wait till the CD menu appears. If no menu appears please start 'setup.exe' from the CD manually. Click the button for NIC installation and follow the instructions. The Windows hardware assistant might request permission to install the drivers, which you must give to continue with the installation. Further, please check [www.loytec.com](http://www.loytec.com) for the latest NIC-IP firmware release and upgrade your NIC-IP as explained in Section 2.5.3.4 or Section 3.8.2.

Since the NIC-IP is connected to the PC via an Ethernet/IP connection, you have to make sure that both your PC and the NIC-IP have valid IP addresses and are able to communicate with each other. There are several ways of providing such a connection, as described in the next sections. Observe that the IP configuration of the NIC709-IPxE100 can also be done using the console interface, see Section 2.5.3. Additionally, refer to Chapter 7 for Personal Firewall Setup.

## 2.5.1 NIC-IP Direct Connection

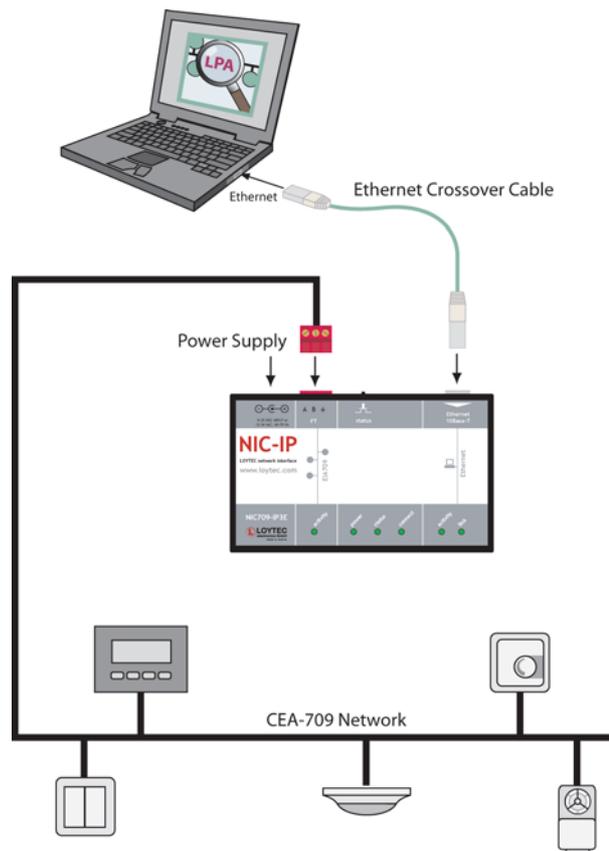


Figure 7: NIC-IP Direct Connection

The NIC-IP can be directly connected to a PC over an Ethernet crossover cable as shown in Figure 7 for the NIC709-IPxE enclosure (the same connectors exist on the NIC709-IPxE100 enclosure, see Figure 12). After connecting the NIC-IP, the PC's Ethernet adapter should automatically receive an 'Auto-IP' address. This will take approximately 1 min., so please be patient. Check if the Ethernet adapter has got a valid IP address by typing 'ipconfig' in a console (DOS) window. If your PC did not receive a valid IP address for the Ethernet adapter, please configure a static IP address in the TCP/IP property dialog of your Ethernet card, e.g.:

IP address **169.254.X.Y** / Subnet Mask **255.255.0.0**

where X.Y can be any combination between 0.1 and 255.254. Finally, you must set the IP configuration of the NIC-IP using the LConfig tool, see Section 3.8.1.

## 2.5.2 NIC-IP Internet Connection

Figure 8 shows how to use the NIC-IP in an Intranet or over the Internet. Note that although Figure 8 shows the NIC709-IPxE enclosure, the same connections must be made on the NIC709-IPxE100. First, the NIC-IP must be connected to the Intranet/Internet and the IP configuration of the NIC-IP must be set. Note that this can only be done by using the LConfig tool on a PC within the same IP broadcast domain (same subnet). After configuration, however, the NIC-IP can also be accessed remotely over the Internet (if an Internet connection is available). Please read Section 3.8.1 for detailed information on how to configure the NIC-IP.

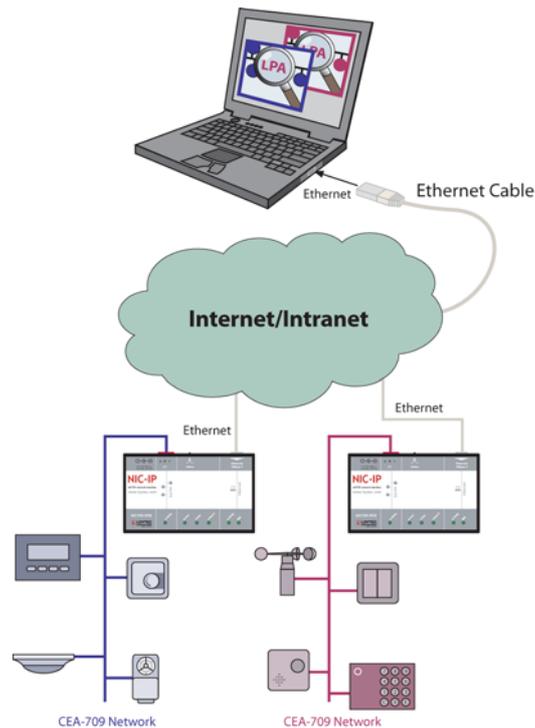


Figure 8: NIC-IP Internet/Intranet Connection

### 2.5.3 NIC-IP Console Interface

Observe that this section only applies to NIC709-IPxE100 enclosures (see right side of Figure 12). The NIC709-IPxE100 (NIC709-IP1E100 or NIC709-IP3E100) is equipped with a serial interface to display the results of the self test and allow configuration via a console menu. This is useful especially for configuring the IP address in the NIC-IP without already requiring a working Ethernet connection.

To use the serial interface, the console connector ('serial' in right side of Figure 12) of the NIC-IP can be connected to the RS-232 port of a PC. The PC can communicate with the NIC-IP using a standard terminal program with communication settings of 38,400 bps / 8 data bits / no parity / 1 stop bit. Use a standard null-modem-cable with full handshaking to connect the NIC-IP serial console interface to your PC.

#### 2.5.3.1 Self Test

Whenever the NIC-IP comes out of reset it performs a self test. The console output of a successful boot sequence on a NIC-IP reads as follows:

```

LOYTEC electronics GmbH
www.loytec.com

Testing Board ID (0)           Passed
Testing RAM                   Passed
Testing boot loader           Passed
Testing fallback image        Passed
Testing primary image         Passed
Testing Flash                 Passed

Loading primary image         Passed

Bootloader version 2
NIC-IP Primary Image loading...
Firmware version 2.0.0

Type bootshell to enter the boot shell...

Mounting file system         Passed
Starting TCP/IP networking    Passed
Detecting CEA-709 port 1 (FT-10) Passed
Starting RNI on CEA-709      Passed

NIC-IP(c)
LOYTEC electronics GmbH

Wed Sep 27 13:23:35 2006 - V2.0.0

```

### 2.5.3.2 Main Menu

After booting, the NIC-IP displays the following console menu:

```

Device Main Menu
=====

[1] Show device information
[2] Serial firmware upgrade
[3] System configuration
[5] IP configuration
[6] RNI configuration
[8] Reset configuration (factory defaults)
[9] Device statistics

[0] Reset device

```

The menu options are described in the following sections.

#### 2.5.3.3 Option 1 - Show device information

This menu item shows information on the NIC-IP and the current firmware:

```

Device Information
=====

Product:      NIC-IP
Product code: NIC709-IP3E100
Firmware:     NIC-IP Primary Image
Version:      2.0.0
Build date:   Wed Sep 27 13:23:35 2006
Serial number: 009501-80000001FC0E
Free memory:  14283K,469K
System temp:  41.7C
Supply volt:  12.0V

```

#### 2.5.3.4 Option 2 - Serial firmware upgrade

This menu item allows updating the NIC-IP firmware via the serial interface (console). Observe that the firmware can also be updated remotely over the Internet, see Section 3.8.2.

*Note!*

*The menu item [2] should never be selected manually. It is selected automatically by the software described in this section. If you select this option accidentally, you can return to*

the main menu by sending a break signal. In case your terminal program does not offer an option to send a break signal, the device must be reset to return to the main menu.

To download the firmware via the console interface, the NIC-IP must be connected to the RS-232 port of a PC (via its console interface) as described in Section 2.5.3. You will need the LOYTEC serial upgrade tool (LSU Tool), which can be downloaded from our homepage at [www.loytec.com](http://www.loytec.com).

Please make sure that the NIC-IP console shows the main menu. If not, navigate to the main menu or simply power-cycle the NIC-IP.

Double click on the '\*.dlc' file that comes with the new firmware package. This should start the LSU Tool and load the firmware image referenced in the '\*.dlc' file. Please note that the '\*.dlc' file and the '\*.dl' file must be stored in the same folder. The start window of the LSU tool is shown in Figure 9.

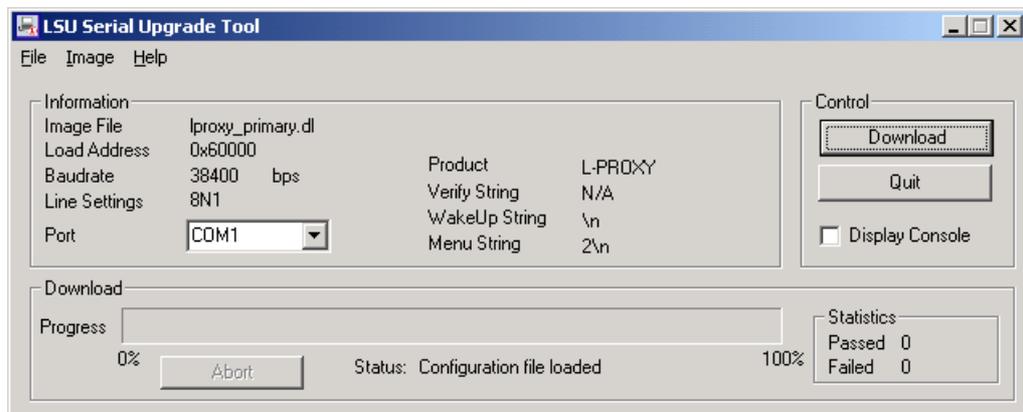


Figure 9: LSU Serial Upgrade Tool in Idle Mode

If the NIC-IP is not connected to COM1 you can change the port to COM2, COM3, or COM4. Press “Download” to start the download. A progress bar as shown in Figure 10 can be seen.

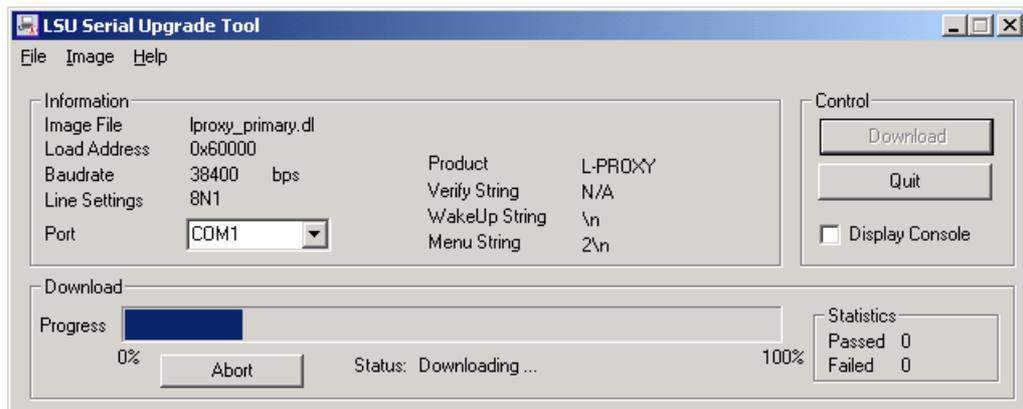


Figure 10: Progress Bar during Firmware Download

If the upgrade is successful, the following window appears (Figure 11).

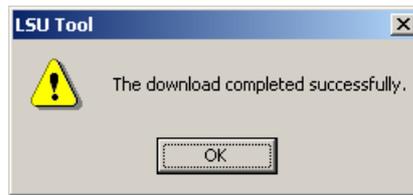


Figure 11: Successful Firmware Upgrade

Double check that the new firmware is executed by selecting 1 and pressing Enter in the console window. This will bring up the device information, which shows the current firmware version (see Section 2.5.3.3).

### 2.5.3.5 Option 3 - System configuration

The system configuration menu is reserved for future use.

### 2.5.3.6 Option 5 - IP configuration

This menu is used to setup the IP configuration of the NIC-IP. The IP configuration menu, when DHCP is disabled, is shown here:

```
IP Configuration Menu
=====

[1] DHCP                : disabled
[2] IP Address          : 192.168.12.104
[3] IP Netmask          : 255.255.192.0
[4] IP Gateway          : 192.168.1.1
[5] Hostname            : new
[6] Domainname         : <unset>
[7] DNS Servers        : <unset>
[9] MAC Address         : 00:0A:B0:01:0E:3F (factory default)
[b] Link Speed & Duplex : Auto Detect

[q] Quit without saving
[x] Exit and save
```

The IP configuration menu, when DHCP is enabled, is shown here:

```
IP Configuration Menu
=====

[1] DHCP                : enabled
    IP Address          : 192.168.12.104
    IP Netmask          : 255.255.192.0
    IP Gateway          : 192.168.1.1
[5] Hostname            : new
    Domainname         : <unset>
    DNS Servers        : <unset>
[9] MAC Address         : 00:0A:B0:01:0E:3F (factory default)
[b] Link Speed & Duplex : Auto Detect

[q] Quit without saving
[x] Exit and save
```

#### *Option [1] - DHCP*

Switches between manual entry of the IP address, netmask, and gateway address or automatic configuration from a DHCP server. If DHCP is disabled, one must enter the configuration data described in the following sections. If DHCP is enabled, please skip menu items [2] through [7].

#### *Option [2] - IP Address, [3] - IP Netmask, [4] - IP Gateway*

Please enter the IP address for the NIC-IP device, the netmask (e.g. 255.255.255.0), and the default gateway address.

#### *Option [5] - Hostname, [6] - Domainname*

“Hostname” and “Domainname” are optional entries and can be left empty. For some DHCP configurations it may be necessary to enter a hostname. Please contact your system administrator to get information on how to configure DHCP to acquire an IP address.

#### *Option [7] - DNS Servers*

You can configure up to 3 Domain Name Servers. Currently, these entries are not used.

#### *Option [9] - MAC Address*

The NIC-IP comes configured with a unique MAC address. This address can be changed in order to clone the MAC address of a different device. Please contact your system administrator to avoid MAC address conflicts. After selecting menu item [9], the following message appears:

```
Override factory MAC address (y/n):
```

Enter “y” to input a new MAC address or enter “n” to return to the factory default MAC address.

#### *Option [b] - Link Speed & Duplex*

If the NIC-IP is operated with a 10Mbit/s-only hub, the link speed should be switched from “Auto Detect” to “10Mbps/Half-Duplex”. With modern 100/10Mbit/s switches, this setting can be left as is.

```
Change Link Speed & Duplex
=====
```

```
[1] Auto Detect (default)
[2] 100Mbps/Full-Duplex
[3] 100Mbps/Half-Duplex
[4] 10Mbps/Full-Duplex
[5] 10Mbps/Half-Duplex
```

### 2.5.3.7 Option 6 - RNI configuration

This menu item allows setting up the remote network interface configuration of the NIC-IP. The RNI sub menu is shown here:

```
RNI Configuration Menu
=====
```

```
[2] RNI port           : 1628 (default)
[3] Device name       : test1
[4] MD5 authentication : on
[5] MD5 secret        : not displayed
[6] Location string   : Building_A

[q] Quit without saving
[x] Exit and save
```

#### *Option [2] - RNI port*

Port for PC – NIC-IP communication. If the NIC-IP resides behind a NAT router, UDP and TCP port forwarding to the NIC-IP must be enabled in the NAT router for the specified port (default 1628). If several NIC-IPs are located behind the NAT router, each NIC-IP must be configured with a different port and all ports must be forwarded accordingly in the NAT router. To switch back to the default port, simply enter 0 (or 1628).

#### *Option [3] - Device Name, [6] - Location String*

Name and Location of NIC-IP device. These strings can be used to identify the NIC-IP in the LConfig tool (see Section 3.8).

#### *Option [4] - MD5 authentication, [5] - MD5 secret*

If MD5 authentication is enabled, only PCs that have the correct ‘MD5 secret’ configured can access the NIC-IP. Using MD5 authentication is highly recommended when using a

NIC-IP remotely over the Internet. Observe that the MD5 secret is never shown in the console menu for security reasons.

### 2.5.3.8 Option 8 - Reset configuration (factory defaults)

This menu item allows resetting the device to its factory default state. The following menu appears:

```
Reset Configuration Menu
=====

[1] Reset everything to factory defaults
[3] Reset all passwords

[q] Quit
```

Select menu item [1] to reset the complete device to factory defaults. Observe that you can also reset to factory defaults using the status button, see Section 2.5.4.

Menu item [3] is reserved for future use.

### 2.5.3.9 Option 9 - Device statistics

This menu holds relevant information regarding the device statistics of the NIC-IP:

```
Statistics Menu
=====

[1] Show RNI statistics
[4] Show IP statistics

[q] Quit
```

Use this menu for debugging purpose only. There is no need to access this menu if the NIC-IP is running smoothly. Menu item [1] shows internal statistics of the NIC-IP. In menu item [4] - besides the IP statistics - any detected IP address conflicts are displayed. If the NIC-IP's IP address conflicts with a different host on the network, the following text is displayed:

```
WARNING: Conflicting IP address detected!
         IP address 10.125.123.95 also used by device with MAC address
         00 04 5A CC 10 41!
```

```
Clear IP conflict history (y/n):
```

As useful information, the MAC address of the conflicting host is shown. If the information about this conflict should be cleared, hit 'y'. If 'n' is selected, the conflict will show up again the next time this menu is entered.

### 2.5.3.10 Option 0 - Reset device

Use this menu item to reset the NIC-IP. Some configuration changes (such as IP settings) require a reset in order to take effect.

## 2.5.4 NIC-IP LEDs, Status Button, and Reset to Factory Defaults

Figure 12 shows the two different NIC-IP enclosures, the NIC709-IPxE (left side) and the NIC709-IPxE100 (right side).

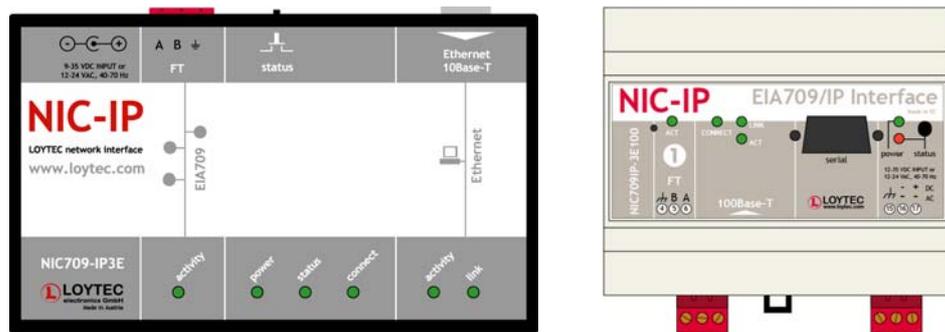


Figure 12: Enclosures of NIC709-IPxE (left side) and NIC709-IPxE100 (right side)

Both versions are equipped with the following LEDs (the name of the LED on the NIC709-IPxE100 enclosure is written in brackets):

*EIA709 activity (ACT FT):*

- flashes green when there is traffic on the CEA709 channel,
- flashes red on overload (high traffic),
- turns permanently red when CEA709 transceiver is defective or the wrong transceiver is selected for the NIC-IP.

*power (power):*

- comes on when the power supply is connected.

*status (status):*

- can be ignored. Does *not* indicate an error!

*connect (CONNECT):*

- stays orange until DHCP configuration has been received,
- turns green when a PC has an active connection to the NIC-IP,
- flashes green when there is traffic from or to the PC,
- turns red when an error was detected.

*Ethernet activity (ACT 100Base-T):*

- shows activity on the Ethernet connection.

*Ethernet link (LINK):*

- comes on when the NIC-IP is physically connected to a PC or an Ethernet switch/hub.

Additionally, when the EIA709 activity and the connect LED blink in different colors for a few seconds, a PC has ‘winked’ the NIC-IP, see Section 3.8.3.

The status button can be used to identify a NIC-IP in the LConfig tool, see Section 3.8.1. It is also used for resetting the NIC-IP to factory defaults: Keep the status button pressed, disconnect and reconnect the power supply. Release the status button as soon as both the EIA709 activity and the connect LEDs turn orange (after approx. 8 sec).

## 3 Network Interface Configuration - LConfig Tool

The LOYTEC Configuration tool (LConfig) is used to enable/disable and setup NIC709 and NIC852 network interface devices. It is installed as part of the NIC software package and can be started via the Windows Start menu from the 'LOYTEC Network Interfaces' program folder or by double-clicking the LOYTEC systray icon.

Observe that the following settings are Windows user specific:

- NIC852 configuration, see Section 3.6,
- NIC-IP assignments see Section 3.8,
- Transceiver selections see Chapter 4.

This means that when logging in as a different user, the settings must be done again. They must also be done again, when changing to service mode, see Section 3.2.1. When the LConfig tool is started, the dialog window shown in Figure 13 will appear.

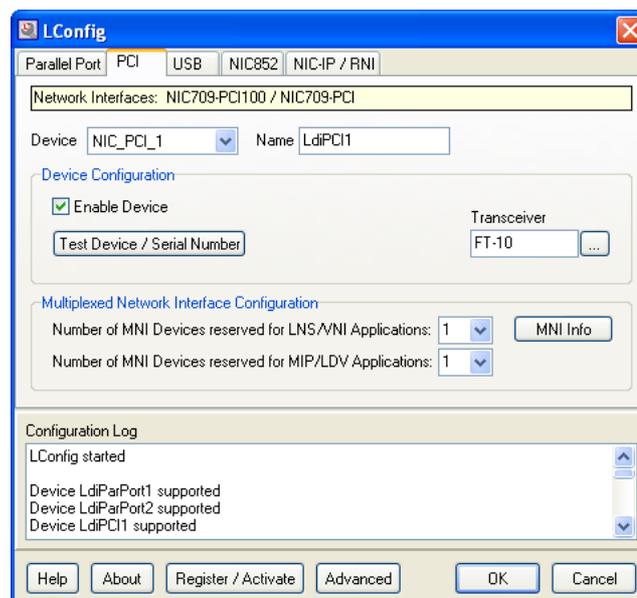


Figure 13: LConfig Main Dialog Window

The Configuration Log lists the supported devices and displays all configuration actions as well as warnings and errors that might occur during the configuration process. At the top of the window the network interface type can be chosen. For each type of network interface

different configuration options are available, as described in the next sections. If you need help on any function of the LConfig tool, just click on 'Help' in any LConfig dialog window.

---

## 3.1 Basic Interface and MNI Setup

In the 'Device'-field (see Figure 13) a specific network interface can be selected for configuration. Each device can be enabled or disabled with the 'Enable Device' checkbox. This is useful e.g. when only one parallel port is present in a PC (the other one can be disabled in this case). By clicking on 'Test Device / Serial Number' a short test of the device is performed and the serial number is displayed. Any detected problems or errors are reported and logged in the 'Configuration Log' window. If e.g. a driver is missing or an installed driver has the wrong version, a corresponding error message is shown indicating the problem. Please refer to Chapter 2 in this case.

For PCI, USB, NIC852, and NIC-IP devices, a 'Multiplexed Network Interface Configuration' panel is displayed. Here you can reserve a certain number of MNI devices for Legacy applications (LNS/VNI and MIP/LDV). By clicking on 'MNI Info', the number of MNI devices supported by the NIC as well as the corresponding Node IDs will be displayed. Please refer to Chapters 5 and 6 for more information on MNI devices and Legacy support.

On the right side of the LConfig-Tool window, the transceiver can be selected. Refer to Chapter 4 for details on transceiver selection.

---

## 3.2 Advanced Configuration

By clicking on 'Advanced' you can setup some advanced options of the Legacy Driver, see Figure 14.

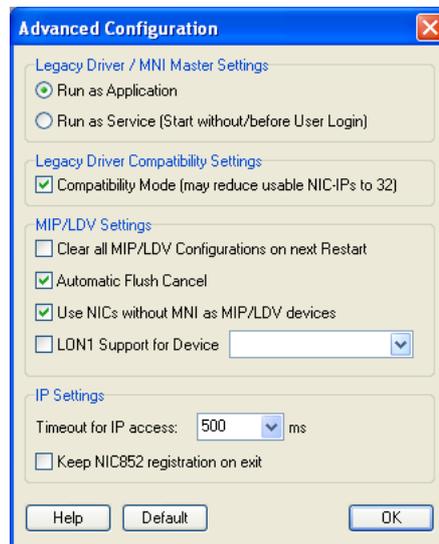


Figure 14: Advanced Configuration

### 3.2.1 Legacy Driver / MNI Master Settings

Here you can choose whether to run the Legacy Driver / MNI Master as a normal application or as a Service. After changing this option, the Legacy Driver is terminated and must be restarted manually via the start menu (this also automatically restarts the MNI Master).

*Note!*

*In Windows Vista/2008 and Windows 7/2008R2, the LOYTEC systray icon (see Chapter 5) will be hidden, as soon as the Legacy Driver is started as a Service, since no graphical user interface is allowed for services in these Windows Versions. In this case, all settings must be done in the LConfig tool, which can still be started from the Windows start menu.*

Running the Legacy Driver / MNI Master as a Service has the following advantages:

- Applications running on LOYTEC devices may also be started as Services (without the need of user login). This includes LNS/VNI applications like e.g. LNS™ Server as well as MIP/LDV and ORION applications.
- Faster startup of the Legacy Driver since it is already started before user login.

By clicking on 'Default' you can restore the default values.

### 3.2.2 Legacy Driver Compatibility Settings

The 'Compatibility Mode' refers to compatibility with older applications using drivers that are incompatible with the LOYTEC MIP driver. This applies e.g. to the Nero CD Software below Version 8. Please observe that when enabling the compatibility mode, the number of usable NIC-IP devices may be restricted to 32.

### 3.2.3 MIP/LDV Settings

'Clear all MIP/LDV Configurations on next Restart' resets the MIP/LDV configuration of all network interfaces after the next restart of the NIC Legacy Driver. This includes all transceiver settings as well as the address configuration of the node (domain table, address table, network variable binding information).

'Automatic Flush Cancel': If this option is set, the MIP driver automatically leaves the flush mode after it is opened or after a reset of the device.

'Use NICs without MNI as MIP/LDV devices': If this option is set, older LOYTEC Network Interfaces without MNI devices (see Chapter 6) can be used in MIP/LDV applications. If the option is not set, these NICs can be used in LNS/VNI applications.

'LON1 Support for Device ...': If this option is set, the MIP driver offers an additional device named 'LON1'. In the field next to this option, the network interface assigned to 'LON1' can be chosen. This feature was introduced for compatibility with older MIP/LDV applications which automatically open the 'LON1' driver without checking the registry for available driver names first. When enabling this feature, please make sure that you do not have installed any other driver software which also uses the driver name 'LON1'. Note that you must reboot your PC after changing this option.

By clicking on 'Default' you can restore the default values.

### 3.2.4 IP Settings

In the field 'Timeout for IP access' you can setup a timeout value for IP access of remote devices such as NIC-IPs and L-IPs. Raising this value can improve the communication over a slow IP connection. Observe that higher values may lead to long delays when starting applications that scan through all available network interfaces (e.g. LPA, LSD Tool).

'Keep NIC852 registration on exit' means that applications running on a NIC852 will not automatically un-register from the configuration server when they are closed. This has the following advantage: If the same applications are restarted later, the configuration server is not necessary anymore for allowing communication with other channel members. If the configuration server is e.g. defective or temporarily off-line, the communication between

the PC and all other channel members will still work. Note however, that enabling this option might lead to increased traffic on the CEA852 channel.

By clicking on 'Default' you can restore the default values.

### 3.3 Parallel Port (Printer Port) Configuration

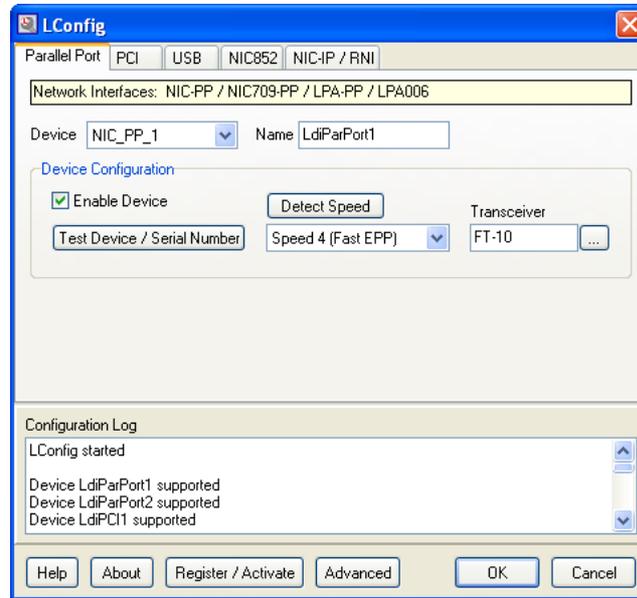


Figure 15: Parallel Port Configuration

Note that this tab will not be available for 64 bit versions of Windows, see Section 2.1. LOYTEC parallel port devices (NIC-PP) are connected to one of the two parallel ports (printer ports) of the PC. Hence, two devices are available: NIC\_PP\_1 and NIC\_PP\_2. Observe that the printer ports must be configured to port address 0x378 (LPT1) and 0x278 (LPT2) in order to work with LOYTEC devices. Usually these settings can be changed in the BIOS of the PC for the built-in printer ports. Further the printer port must be configured as 'EPP' or 'PS2' in the BIOS. By clicking on 'Detect Speed' in the LConfig tool (see Figure 15), the appropriate communication speed between the PC and the parallel port device is determined. If an error message is displayed you can try to go through the following steps:

- Make sure the device (e.g. NIC-PP) is connected to the printer port.
- Make sure the power supply or L-NPA (Notebook Power Adapter) is connected to the device.
- Connect the device directly to your printer port (without using a cable).
- Restart the PC and choose 'EPP' in your BIOS.
- Restart the PC and choose 'PS2' or 'bi-directional' in your BIOS.
- Try to use a different parallel port (LPT2) if installed.
- Try to select a lower speed manually (field 'Speed') and click on 'Test Device'.

If the device is detected and tested successfully and there are still problems within the used software (e.g. LPA) please also select a lower speed manually.

### 3.4 PCI Configuration

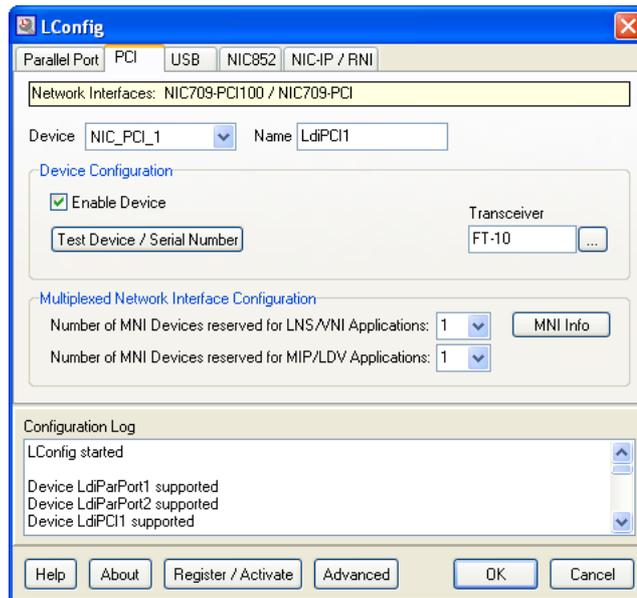


Figure 16: PCI Configuration

Up to 8 LOYTEC NIC-PCI cards (NIC709-PCI or NIC709-PCI100) can be installed in a PC (NIC\_PCI\_1 ... NIC\_PCI\_8). The corresponding network interface devices can be enabled/disabled and tested in the LConfig tool.

### 3.5 USB Configuration

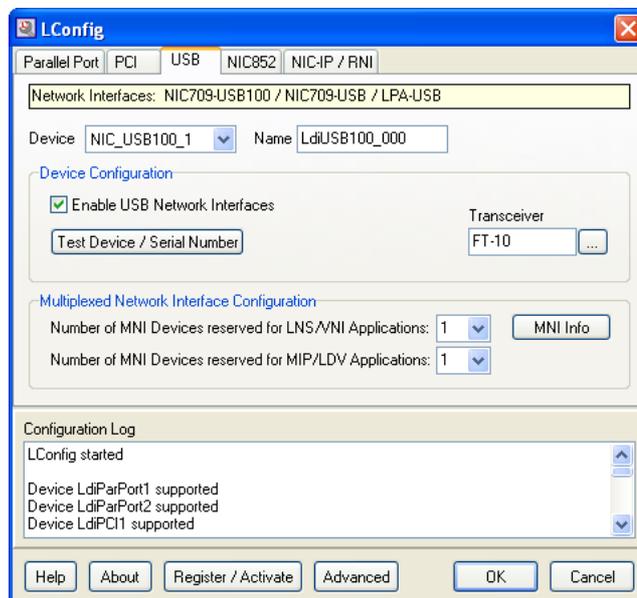


Figure 17: USB Configuration

Up to 8 LOYTEC NIC709-USB100 devices (NIC\_USB100\_1 ... NIC\_USB100\_8) and 8 NIC709-USB devices (NIC\_USB\_1 ... NIC\_USB\_8, only in 32 bit versions of Windows) can be installed. All USB devices can be enabled or disabled by clicking on 'Enable USB Network Interfaces'. Observe that a NIC852 USB Key also occupies one USB device when it is connected to the PC.

## 3.6 NIC852 (CNIP) Configuration

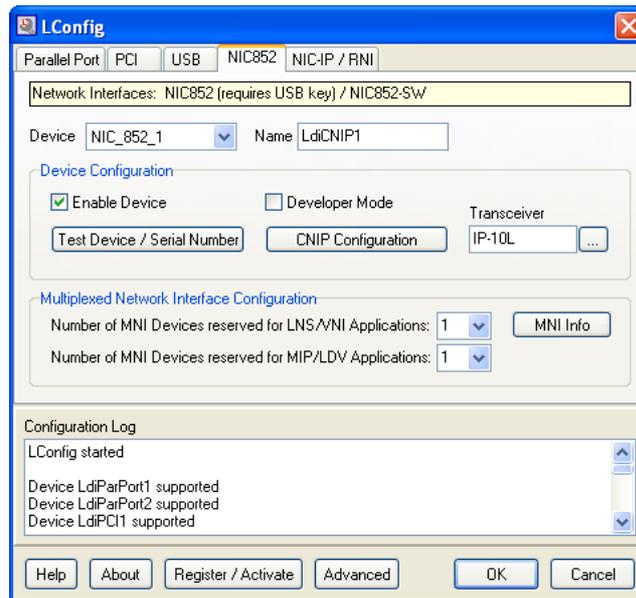


Figure 18: NIC852 Configuration

Up to 8 NIC852 devices can be used simultaneously in one PC. This means that up to 8 LOYTEC USB keys can be connected (or up to 8 NIC852-SW can be activated) and the PC can be a channel member in up to 8 different CEA852 channels at a time (NIC\_852\_1 ... NIC\_852\_8).

All settings done here are Windows user specific. This means that when logging in as a different user, the settings must be done again. They must also be done again, when changing to service mode, see Section 3.2.1.

### 3.6.1 Address Settings

Before working with the NIC852 network interface in a CEA852 (CNIP) network, the PC must become a member of the CEA852 channel. At first click on 'CNIP Configuration' in the NIC852 section of the LConfig tool (see Figure 18). The CNIP configuration dialog as shown in Figure 19 will appear. Using the buttons 'Load' and 'Save' you can load a NIC852 configuration from a file or save the current configuration to a file (\*.n8a).

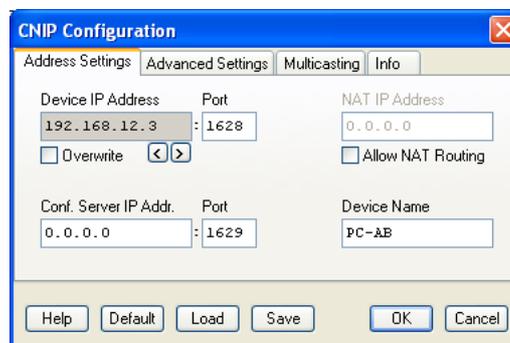


Figure 19: CNIP Configuration, Address Settings

In the field 'Device IP Address' the IP address of your PC should be displayed. If the PC has several IP addresses, please choose one address to be assigned to the CNIP device using the buttons '<' and '>'. If the correct IP address of your PC is not displayed, you can choose to overwrite the IP address by enabling the checkbox 'Overwrite'. In the 'Port' field

you can enter the configuration client port number as set in the configuration server. Usually this is the default port number 1628 and does not need to be changed. The IP address of the configuration server must be entered in the field 'Conf. Server IP Addr.'. The default port number of the configuration server is 1629 and usually does not need to be changed.

If your PC is located behind a NAT (Network Address Translation) router and the CEA852 (CNIP) channel is located on the public side of the router, the checkbox 'Allow NAT Routing' must be enabled and the public address of the NAT router must be set in the field 'NAT IP Address'. Further, in the NAT router, UDP and TCP port forwarding to the PC running the NIC852 must be setup for the configuration client port number (usually 1628). Please refer to the documentation of your NAT router or contact your system administrator for making these settings. Note that if several CEA852 channel members (L-IPs, NIC852s, or other CEA852 nodes) reside behind a NAT router, each member must be configured with a different configuration client port number. The port-forwarding of the NAT router must be setup accordingly for each of these ports.

In the field 'Device Name' the name of the CEA852 channel member as stored in the configuration server can be set. By clicking on 'Default', the default values shown in Figure 19 will be restored.

### 3.6.2 Advanced Settings

In the 'Advanced Settings' section of the CNIP configuration dialog you can set the escrow and aggregation timeout as well as the MD5 authentication key, see Figure 20.

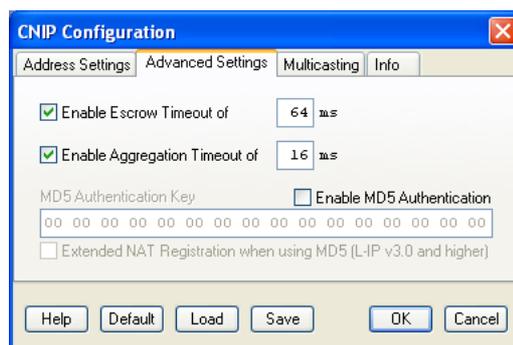


Figure 20: CNIP Configuration, Advanced Settings

The escrow timeout is a CNIP channel property that specifies the amount of time the device will wait for an out-of-sequence IP packet to arrive. This parameter is important in WANs like the Internet where packets pass many routers that can change the order in which packets arrive at the destination node. The default value is 64 ms.

Aggregation (or packet bunching) is a technique that collects multiple CEA709 packets into a single larger CNIP packet. The aggregation timeout defines the time period in ms in which the transmitting device collects the CEA709 packets before it transmits the CNIP packet over the CNIP channel. Note, that aggregation adds a delay to the transactions but dramatically improves the throughput of your CNIP channel. The default value is 16 ms.

MD5 authentication is a method to verify the authenticity of the sending device. Only devices that have MD5 enabled and use the same MD5 authentication key can share information with each other. If the configuration server has MD5 enabled only devices that have MD5 enabled and use the same MD5 authentication key as the configuration server can join the logical CNIP channel. If the channel you want to join is MD5 authenticated please enable MD5 authentication and enter the MD5 authentication key. 'Extended NAT Registration...' should be switched on, if MD5 authentication is used with an L-IP

configuration server with firmware version 3.0 or higher. In all other cases, this option must be switched off.

By clicking on 'Default', the default values shown in Figure 20 will be restored.

### 3.6.3 Multicasting

In the 'Multicasting' section of the CNIP configuration dialog you can setup a multicast address, see Figure 21.

Using multicasting with L-IP and NIC852 devices can greatly improve the data throughput in some configurations. Please refer to the L-IP manual for more information on the multicasting functionality.

By default, multicasting is disabled, see Figure 21.

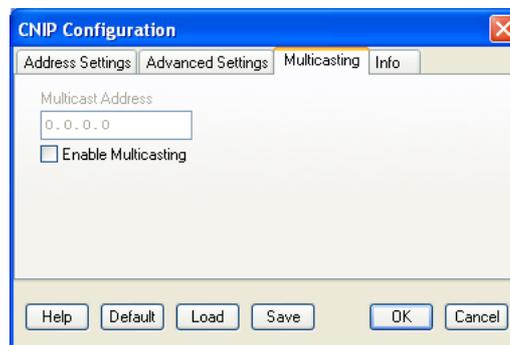


Figure 21: CNIP Configuration, Multicasting

### 3.6.4 Additional Information

In the 'Info' section of the CNIP configuration dialog, additional information about the SNTP settings and the channel timeout can be observed, see Figure 22.

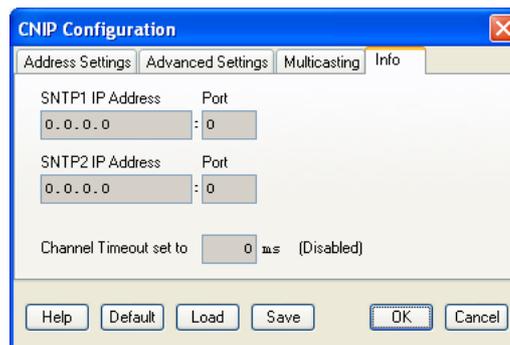


Figure 22: CNIP Configuration, Additional Information

The SNTP servers are used for time synchronization of the channel members. The channel timeout indicates how old a packet can be before it is discarded. This information is set channel-wide in the configuration server and can therefore not be changed here.

### 3.6.5 Becoming a Channel Member and Testing the Connection

After configuring the CNIP device as described in the previous sections click on 'OK' in the CNIP configuration dialog. The next step is to add the PC as a channel member in the configuration server of the CEA852 (CNIP) channel. Please check the documentation of your configuration server on how to add a channel member. If the configuration server runs

on a LOYTEC L-IP and the 'auto member' feature is enabled in the L-IP, the PC should automatically be added when the configuration server is contacted for the first time. However, this can only work if the configuration server IP address is setup correctly as described in Section 3.6.1. To check if the PC can contact the configuration server and is accepted as a channel member, please click on 'Test Device / Serial Number'.

### 3.7 Remote LPA Assignment

The Remote LPA Assignment function is now only available within the LPA-IP-SW software. Please refer to the LPA User Manual for more information.

### 3.8 NIC-IP / RNI Assignment and Configuration

Observe that this section deals with all Remote Network Interfaces (RNIs) with LOYTEC's NIC-IP functionality. This includes e.g. NIC709-IPs, L-Vis and LINX devices with NIC-IP function, 3<sup>rd</sup> party devices with NIC-IP function, etc.

All settings done here are Windows user specific. This means that when logging in as a different user, the settings must be done again. They must also be done again, when changing to service mode, see Section 3.2.1.

Prior to using a NIC-IP, it must be configured and assigned to a logical device (NIC\_IP\_001 ... NIC\_IP\_512). Click on 'Assignment & Config.' in the NIC-IP section of the LConfig tool (see Figure 23) to start the device discovery process. The NIC-IP / RNI assignment and configuration dialog window as shown in Figure 24 will appear.

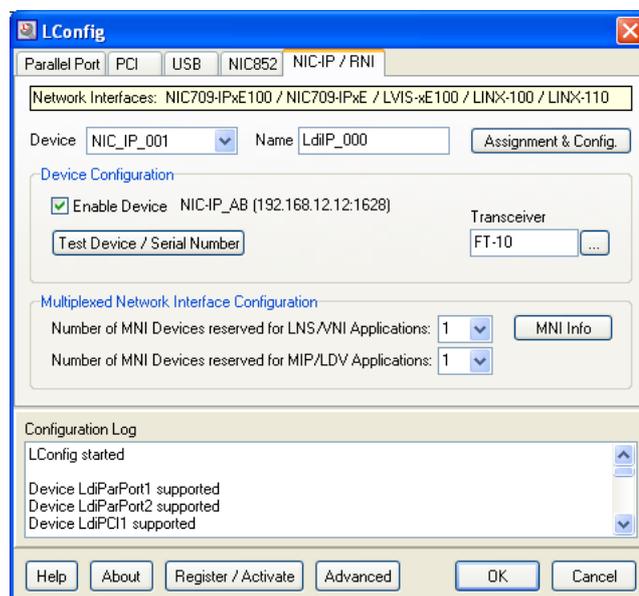


Figure 23: NIC-IP Configuration

In the device table all discovered NIC-IPs will be displayed. Non-NIC-IP devices as well as devices that cannot be contacted will be displayed gray. NIC-IPs that are un-configured or not configured correctly are displayed red. Use the checkbox 'Show All Devices' to decide whether to see all remote devices or NIC-IPs only. During device discovery, already discovered NIC-IPs can be configured and assigned right away. It is not necessary to wait for the completion of the discovery process since this can be a lengthy procedure.

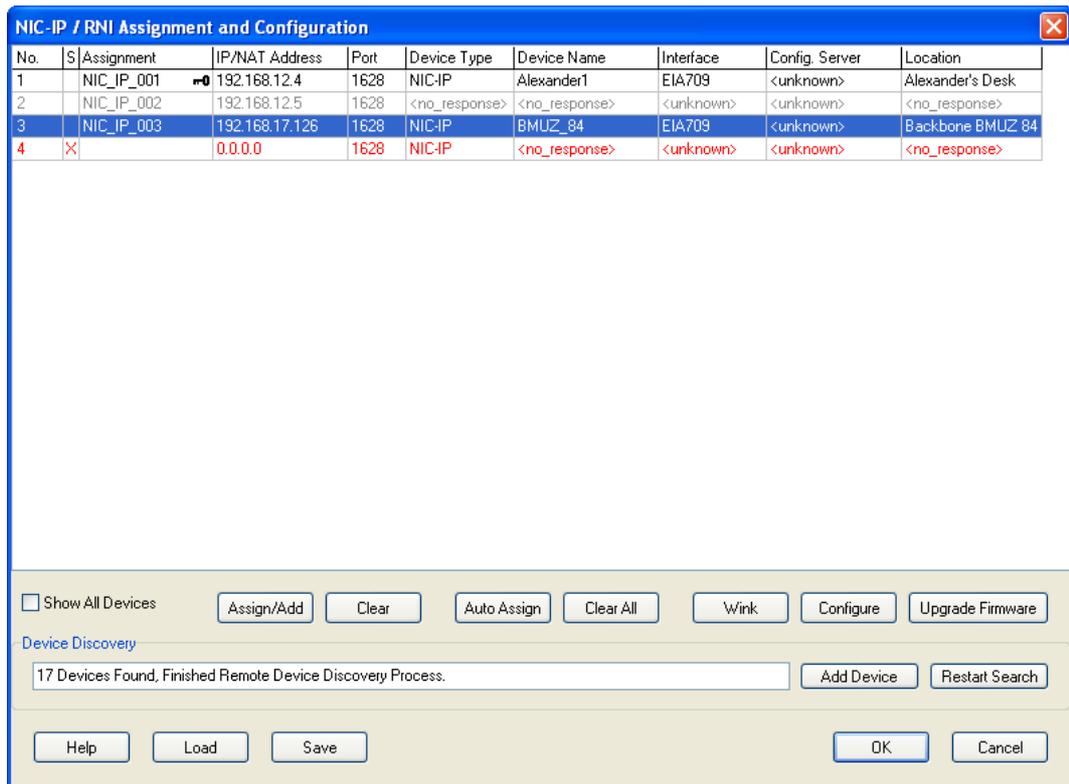


Figure 24: NIC-IP / RNI Assignment and Configuration

### 3.8.1 Configure NIC-IPs

To configure a NIC-IP, please select the corresponding device in the device table and click on 'Configure'. To make sure to configure the correct device, you can press the status button on the NIC-IP beforehand, which will be indicated by an 'X' in the column 'S' (status button) and by a message in the 'Device Discovery' field, see Figure 24. Note that this only works if the NIC-IP and the PC are in the same IP-subnet. The NIC-IP configuration window is shown in Figure 25.

In the 'Basic Configuration' panel you can set the NIC-IP's name and location string as well as (optionally) an MD5 authentication key. If MD5 authentication is enabled, only PCs that have the correct MD5 authentication key configured can access the NIC-IP. Using MD5 authentication is highly recommended when using a NIC-IP remotely over the Internet. Note that the 'Basic Configuration' panel is only available when the NIC-IP has a correct IP configuration.

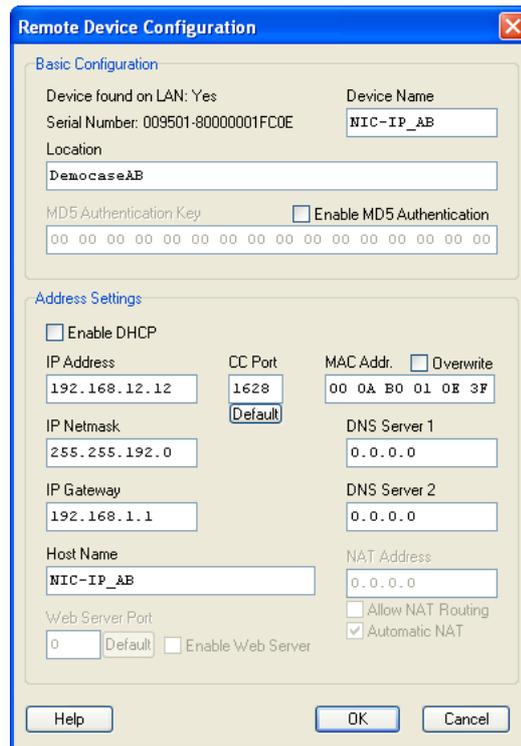


Figure 25: NIC-IP Configuration

In the ‘Address Settings’ panel you must set the IP configuration of the NIC-IP. Note that this section is only available when the PC running the LConfig tool is in the same broadcast domain (same subnet) as the NIC-IP. If a DHCP server is running, you can enable DHCP (set by default) to automatically configure the NIC-IP. The ‘Host Name’ field can be configured if the DHCP server requires a valid host name from devices requesting an IP configuration. If no DHCP service is available, you must disable DHCP and manually set the IP configuration:

- |                     |     |   |
|---------------------|-----|---|
| <i>IP Address</i>   | ... | Local IP address of NIC-IP.   |
| <i>CC Port</i>      | ... | Port for PC – NIC-IP communication. If the NIC-IP resides behind a NAT router, UDP and TCP port forwarding to the NIC-IP must be enabled in the NAT router for the specified port (default 1628). If several NIC-IPs are located behind the NAT router, each NIC-IP must be configured with a different port and all ports must be forwarded accordingly in the NAT router. |
| <i>IP Netmask</i>   | ... | Netmask of NIC-IP’s subnet  |
| <i>IP Gateway</i>   | ... | Gateway address for the subnet. When the NIC-IP resides behind a NAT router, the gateway address must usually be set to the local address of the NAT router. If no gateway is present, just enter ‘0.0.0.0’.  |
| <i>MAC Address</i>  | ... | can be overwritten via ‘Overwrite’ checkbox. It is not recommended to overwrite the MAC address.  |
| <i>DNS Server 1</i> | ... | does not need to be configured (set to ‘0.0.0.0’).  |
| <i>DNS Server 2</i> | ... | does not need to be configured (set to ‘0.0.0.0’).  |
| <i>NAT Address</i>  | ... | does not need to be configured.   |

*Web Server Port* ... does not need to be configured (not available on NIC-IP).

If the NIC-IP is connected to the PC via an Ethernet crossover cable, the following settings must be made:

*IP Address* ... different from the PC's IP address but within the same subnet

*Port* ... 1628

*IP Netmask* ... same as PC's Netmask

*IP Gateway* ... 0.0.0.0

If e.g. the PC has got the static IP setup described in see Section 2.5.1, the following settings must be made in the NIC-IP when using a crossover cable:

*IP Address* **169.254.X.Y** / *Port* **1628** / *IP Netmask* **255.255.0.0** / *IP Gateway* **0.0.0.0**

In this case, X.Y can be set to any combination between 0.1 and 255.254 but must be different from the PC's IP address. By clicking on 'OK' the new configuration is written to the NIC-IP. Note that changing the IP configuration can result in connection loss to the NIC-IP. However, when the PC is located in the same subnet as the NIC-IP, the NIC-IP will always be discovered and displayed in the device table, regardless of its IP configuration.

### 3.8.2 Upgrade NIC-IP Firmware

By clicking on 'Upgrade Firmware' in the 'NIC-IP / RNI Assignment and Configuration' window (Figure 24), you can easily upgrade the selected NIC-IP, even remotely over the Internet. The upgrade dialog is shown in Figure 26.

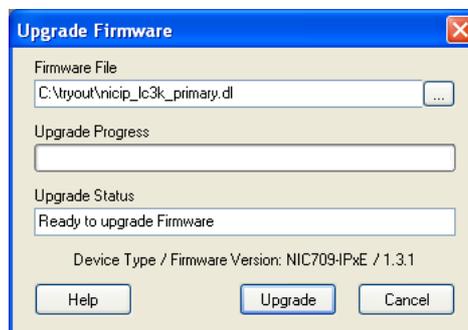


Figure 26: Upgrade NIC-IP Firmware

At the bottom of the form, the NIC-IP type (NIC709-IPxE or NIC709-IPxE100) and the current firmware version is displayed. By clicking on '.' you can choose a file (\*.dl) containing the new firmware (matching the displayed NIC-IP type). Start the upgrade process by clicking on 'Upgrade'. If an error occurs during the upgrade process, the current firmware is restored automatically. If the upgrade was successful, the new firmware version is displayed.

### 3.8.3 Assign NIC-IPs

To assign a NIC-IP to a logical device, please select the corresponding line of the device table (Figure 24) and click on 'Assign/Add' or just double-click on the device to assign. To add a device not present in the device table, also click on 'Assign/Add'. The dialog box shown in Figure 27 will appear.

The screenshot shows a dialog box titled "Assign/Add Device". It contains the following fields and controls:

- IP or NAT Address:** 192.168.24.250
- Port:** 1628
- MD5 Authentication Key:** 01 23 45 67 89 AB CD EF 01 23 45 67 89 AB CD EF
- Enable MD5 Authentication:**
- Get Info:** Button
- Device Type:** NIC-IP
- Device Name:** Joerg Test
- Interface:** EIA709
- Configuration Server:** <unknown>
- Location:** (empty field)
- NIC\_IP\_001:** Dropdown menu
- Assign:** Button
- Cancel:** Button

Figure 27: Assign/Add NIC-IP

You can change the IP address and port manually in the fields 'IP or NAT Address' and 'Port'. When the NIC-IP is located behind a NAT router, you must enter the public IP address of the NAT router. If MD5 is enabled in the NIC-IP, you must check 'Enable MD5 Authentication' and enter the correct 16 Bytes 'MD5 Authentication Key'.

**If you have forgotten the MD5 key for your NIC-IP, reset the NIC-IP to factory defaults (see Section 2.5.4) or change the MD5 settings via the console menu (see Section 2.5.3.7).**

MD5 authentication is indicated by a small key symbol in the 'Assignment' column of the device list, see Figure 24. Before assigning the device you can click on 'Get Info' to check the device name, type, interface list, and location. Finally, select a logical device (NIC\_IP\_001 ... NIC\_IP\_512) and click on 'Assign' to assign the device.

To automatically assign all currently discovered devices, click on 'Auto Assign' in the NIC-IP Assignment and Configuration dialog (Figure 24). You can sort the discovered devices first by clicking on a specific column header in the device table. The assignments can be cleared, loaded and saved using the buttons 'Clear', 'Clear All', 'Load', and 'Save'. By clicking on 'Wink' you can cause the selected NIC-IP to blink with some LEDs in different colors, see also Section 2.5.4. This can be used to locate a specific NIC-IP in the network.

## 4 Network Interface and Transceiver Selection

Each application running on a LOYTEC network interface must specify the name of the LOYTEC device it intends to use. Depending on the application some sort of network interface selection dialog will be presented to the user. In LOYTEC applications (e.g. LPA Protocol Analyzer), there are two modes of network interface selection: 'Standard Mode' and 'Expert Mode'. In standard mode, each network interface can be used by several applications, depending on the number of MNI devices available on the network interface. In expert mode, all available MNI devices are displayed along with the physical network interfaces and can be chosen explicitly. Chapter 6 describes the differences between using the physical network interface and using an MNI device. Please also refer to the documentation of the corresponding application (LPA) for more information on interface selection.

All LOYTEC network interfaces (except the NIC709-IP) are equipped with multiple transceivers. Note that the transceiver settings are Windows user specific. This means that when logging in as a different user, the settings must be done again. They must also be done again, when changing to service mode, see Section 3.2.1.

The transceiver for each network interface can be chosen in the context menu of the LOYTEC systray icon (see Chapter 5), the LConfig tool (see field 'Transceiver' in Figure 13), or directly in the application (e.g. LPA or LSD Tool). Figure 28 shows the transceiver selection dialog window for the NIC709 network interface series. Here you can set the transceiver port, transceiver type, and bit-rate of the network interface. For each of the three ports a transceiver can be chosen and the corresponding bit-rate will be displayed. You have to select one of the ports as currently active by clicking on the small button on the left side. By clicking on the button 'Test' you can test if the network interface works correctly. For the RS-485 transceivers (Port 3) you can also try automatic bit-rate detection. After clicking on 'Detect' the network is searched for traffic using different bit-rates. The correct bit-rate can only be detected if packets are received during the detection process.

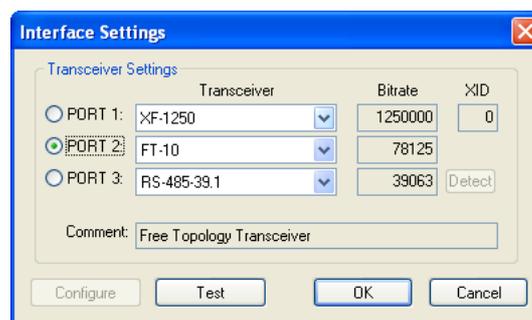


Figure 28: NIC709 Transceiver Selection

Figure 29 shows the transceiver selection dialog window for the NIC852 network interface series. Here you can only choose between IP-10L (Local Area Network) and IP-10W (Wide Area Network).

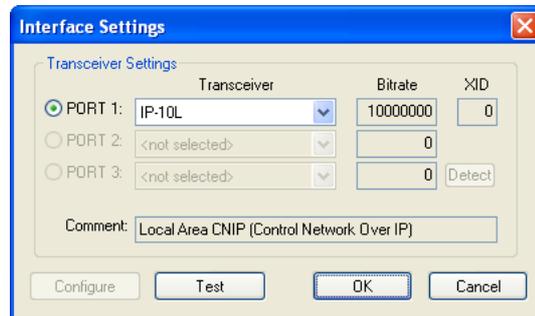


Figure 29: NIC852 Transceiver Selection

## 5 Legacy Support for MIP/LDV and LNS/VNI 3.x

For the support of MIP/LDV and LNS/VNI 3.x applications like LonMaker™, a NIC Legacy Driver is installed along with the NIC software package. The driver is also needed for MNI support, see Chapter 6. You should see a LOYTEC icon  in the system tray of your Windows task bar. If no LOYTEC icon appears in the system tray, please select 'NIC Legacy Driver' in the section 'LOYTEC Network Interfaces' of your Windows start menu.

*Note!*

*In Windows Vista/2008 and Windows 7/2008R2, the LOYTEC systray icon will be hidden, as soon as the Legacy Driver is started as a Service, since no graphical user interface is allowed for services in these Windows Versions. In this case, all settings must be done in the LConfig tool (see Chapter 3), which can still be started from the Windows start menu.*

To configure the NIC Legacy Support, right-click on the LOYTEC systray icon as shown in Figure 30.

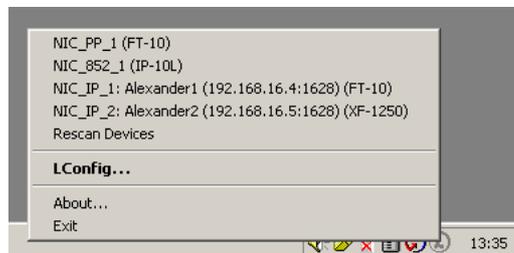


Figure 30: Legacy Settings

All found LOYTEC network interfaces are shown at the top of the menu. The selected transceiver for each network interface is displayed in parentheses. By selecting 'Rescan Devices' you can search for new network interfaces. To change the transceiver of a network interface, select the corresponding menu item. This will invoke the transceiver selection dialog. Please refer to Chapter 4 for more information on transceiver selection.

When starting a MIP/LDV or LNS/VNI 3.x application, all LOYTEC network interfaces should appear in the network interface dialog of the application. Figure 31 shows the corresponding dialog for LonMaker™ as an example for an LNS/VNI application. Figure 32 shows the dialog for NLUti™ Node Utility as an example for a MIP/LDV application.

*Note!*

*LNS applications require **OpenLDV™ Version 3.4** or higher to work correctly with LOYTEC Network Interfaces.*

For network interfaces that support MNI (Chapter 6), a certain number of MNI devices, as configured in the LConfig tool, see Section 3.1, will be displayed for the network interface. By default, two MNI devices will be available, e.g. 'NIC\_USB100\_1\_000' and

'NIC\_USB100\_1\_001\_LDV'. Observe that the device names for MIP/LDV applications have an 'LDV' tag at the end, whereas the device names for LNS/VNI do not. Make sure you select the appropriate device.

Generally it is recommended to always use the same MNI device for all LNS/VNI applications (e.g. 'NIC\_USB100\_1\_000'). An exception is the NIC852, where a unique MNI device must be used for each database opened simultaneously (e.g. 'NIC\_852\_1\_000' for the first and 'NIC\_852\_1\_001' for the second database). For this purpose, you must of course reserve more than one LNS/VNI device in the LConfig tool, see Section 3.1.

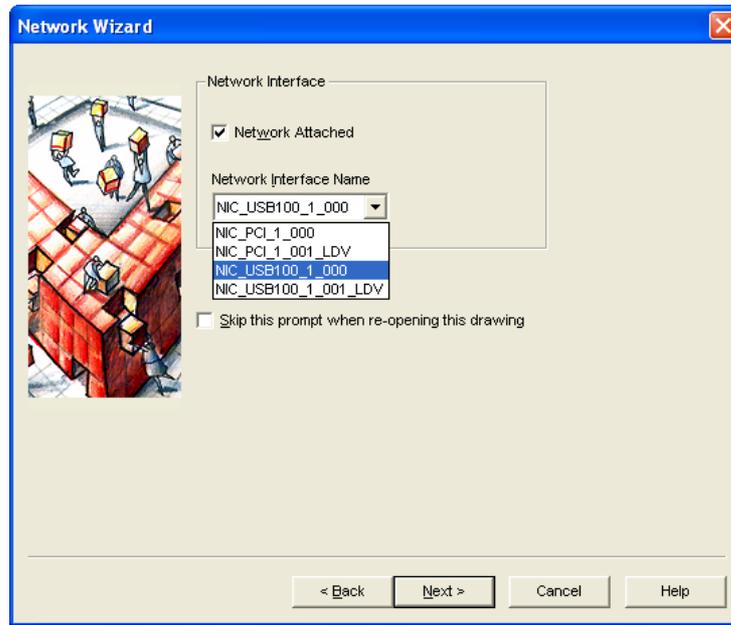


Figure 31: LonMaker™ Network Interface Selection



Figure 32: NLUtil™ Network Interface Selection

After the application has started, the LOYTEC systray icon should be rendered in color, indicating that the connection between the legacy application and the LOYTEC network interface is active. When the mouse cursor is moved over the systray icon, the legacy application state ('<n> active' or 'no activity') as well as all errors that might have occurred are displayed as depicted in Figure 33.



Figure 33: One Active Legacy Application

In case of errors, run the LConfig tool (see Chapter 3) and test the corresponding network interface. The LConfig tool can be started by double-clicking the LOYTEC systray icon or selecting 'LConfig...' in the system tray menu (Figure 30).

## 6 Multiplexed Network Interfaces

The NIC-PCI, NIC-USB, NIC-IP, and NIC852 network interfaces can be used in a 'Multiplexed Network Interface' mode. For NIC-PCI and NIC-USB, please check in the LConfig tool, if your interface already supports MNI (see Section 3.1).

If MNI is supported by your NIC, the physical network interface is represented by 8 Multiplexed Network Interfaces (MNI devices). This means that you can start up to 8 different applications running on the same physical network interface at a time. These 'virtual interfaces' behave like 8 individual nodes on a 'virtual channel' connected to the physical channel via the physical network interface, as depicted in Figure 34.

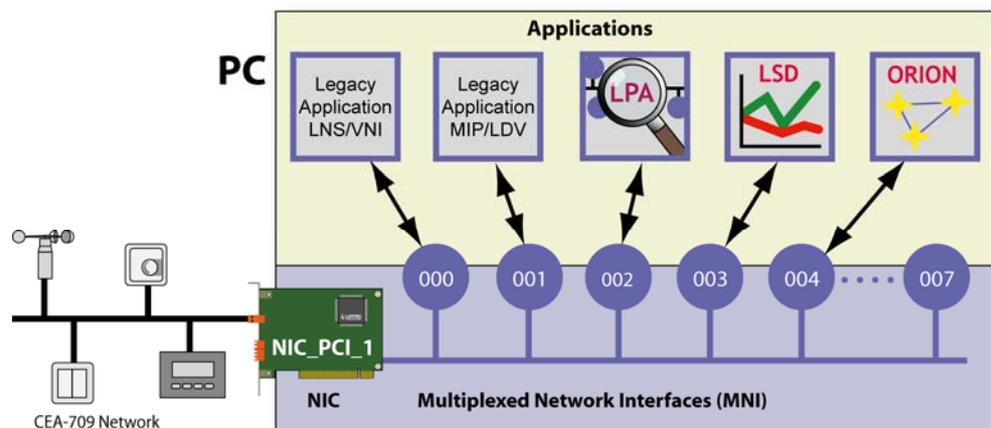


Figure 34: Multiplexed Network Interfaces (MNI Devices)

You could e.g. run the LPA software, the LSD tool, a custom ORION application, an LNS/VNI 3.x application, and a MIP/LDV application at the same time using only one NIC709-PCI network interface. When using the 'Standard Mode' in the network interface selection dialog of LOYTEC software (see Chapter 4), MNI devices are automatically used if supported by the network interface. This way, both the LPA and the LSD software can e.g. run on the same network interface 'NIC\_PCI\_1'. In 'Expert Mode', the physical network interface (e.g. 'NIC\_PCI\_1') as well as all corresponding MNI devices ('NIC\_PCI\_1\_000', 'NIC\_PCI\_1\_001', 'NIC\_PCI\_1\_002', etc.) are displayed and can be selected explicitly. In MIP/LDV and LNS/VNI applications, a certain number of 'reserved' MNI devices is displayed for each network interface, see Section 3.1 and Chapter 5. Following is a list of differences between physical devices and MNI devices:

- All MNI devices share the same serial number (equal to the serial number of the physical network interface) but have different, unique Node IDs. It is guaranteed that a certain MNI device (e.g. 'NIC\_PCI\_1\_002') always gets assigned the same Node ID.

- If the physical device is already occupied, the MNI devices for that physical device are not available and vice versa.
- LPA time stamps are calculated in software when logging from an MNI device (rather than generated in hardware when logging from the physical device) and therefore have a lower resolution.

Other than that, the behavior of an MNI device is exactly the same as of a physical network interface. It is completely transparent to the application if the underlying network interface is multiplexed or not. Please note that the NIC Legacy Driver (see Chapter 5) must be running to enable MNI devices.

# 7 Personal Firewall Setup

If you have installed a Personal Firewall on your PC (e.g. Windows XP SP2 Firewall), and a requester of the firewall pops up during LOYTEC software is used, all requested access should be granted. Let the firewall create permanent rules for granting access to LOYTEC applications automatically, if possible. If the firewall can only be configured manually, the following settings must be made to ensure that the LOYTEC Network Interface software works correctly:

Enable all incoming and outgoing UDP and TCP connections for the following applications:

- Legacy Driver (LegacyDrv.exe)
- LConfig tool (LConfig.exe)
- MNI Master (MniMaster.exe)
- Vni Server (VNISERVER.exe)

If you have installed the LPA or LSD Tool software or you are running a custom ORION application that utilizes NIC852 or NIC-IP network interfaces, the same settings must be made for the corresponding applications (e.g. LPA.exe, LSDTool.exe).

# 8 Registration and Activation

## 8.1 Software Registration

When purchasing a LOYTEC software product (e.g. LPA), you will receive a Product Registration Code. Please start the LConfig tool, click on 'Register / Activate', and type in the registration code that comes with your software package as shown at the top of Figure 35.

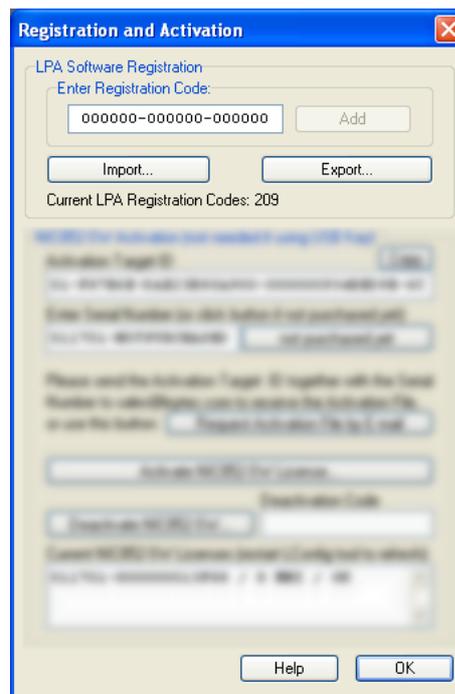


Figure 35: Software Registration

Click on 'Add' and then on 'OK'. If you want to register several LOYTEC products at a time, just enter all registration codes as described. You can also export your set of registration codes to a file and import it in all subsequent installations. Please observe that you must have administrator rights to enter registration codes within the LConfig tool.

Upgrading the MNI devices of your network interface (see Chapter 6) is also done via a Registration Code. In this case, the corresponding network interface must be connected when entering the Registration Code. As soon as the NIC is upgraded, the Upgrade Registration Code is not needed anymore for subsequent installations, since the corresponding data is stored locally in the network interface.

## 8.2 Product Activation

When purchasing a LOYTEC product, which must be activated (e.g. NIC852-SW), you will have to go through the following steps for activation:

- Start the LConfig Tool, click on 'Register / Activate'. The dialog as shown in Figure 36 will open.
- If you have already purchased a NIC852-SW license, please enter your Serial Number (shipped with the NIC852-SW product) and click on 'Request Activation File by E-mail'. Alternatively, write an e-mail to sales@loytec.com with both the Activation Target ID and your Serial Number in the subject.
- If you have not yet purchased a NIC852-SW license, you can still send the e-mail as described in the previous point. Just click 'not purchased yet' before generating the email or indicate the missing Serial Number in the e-mail body.
- You will receive a LOYTEC Activation file, which you import by clicking on 'Activate NIC852-SW License...'
- Click on 'OK', close the LConfig tool with 'OK' and re-open the LConfig tool.
- Configure the new NIC852 as described in Section 3.6.

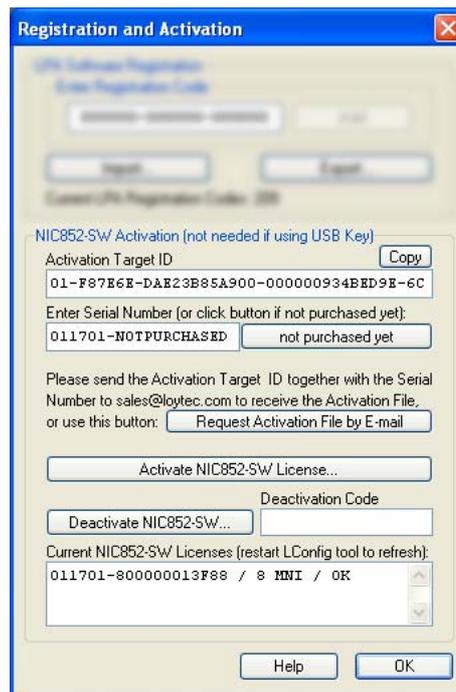


Figure 36: Product Activation

# 9 Installation for Linux Operating Systems

The NIC-PCI (NIC709-PCI) network interfaces work in **Linux Kernel 2.6**. Just plug the NIC-PCI into an empty PCI slot of your PC. The PCI card does not need any further hardware setup. Please observe that you must be logged in as root to install the software. Further, the 'udev' device manager must be installed. To install the kernel module:

- Copy the file `ldipci.ko` from the folder 'NIC/Linux/Driver' to the folder on your Linux PC '`/lib/modules/2.6.20.3/kernel/drivers/char/`' (assuming the installed Kernel is 2.6.20.3).
- Copy the file `010_ldipci.rules` from the folder 'NIC/Linux/Driver' to the folder on your Linux PC '`/etc/udev/rules.d/`'.
- Restart the PC *or* type the commands '`rmmod ldipci`' (only if older kernel module is already installed), '`depmod`' and '`modprobe -s -k ldipci`'.

For a description on how to use the ORION Stack with Linux, refer to the '`NIC_Developers_Manual.pdf`' in the folder 'NIC/Doc'.

# 10 NIC Product Comparison

The following table compares all important features and properties of the different LOYTEC Network Interfaces:

Property	NIC709-PP	NIC709-USB	NIC709-PCI	NIC709-IP	NIC852
Runs on 32 bit Windows Systems	Yes	Yes	Yes	Yes	Yes
Runs on 64 bit Windows Systems	No	Only new Models **	Yes	Yes	Only new Models ***
Runs ORION applications	Yes	Yes	Yes	Yes	Yes
Runs LNS/VNI 3.x applications	Yes	Yes	Yes	Yes	Yes
Runs MIP/LDV applications	Yes	Yes	Yes	Yes	Yes
Runs 8 applications in parallel (MNI)	No	Yes	Yes	Yes	Yes
LPA Software available	discontinued	LPA-SW	LPA-SW	LPA-SW, LPA-IP-SW *	LPA-IP-SW
LSD Software available	Yes	Yes	Yes	Yes	Yes
Can be used remotely over the Internet	No	No	No	Yes	Connects to CEA-852
PC connection	Printer port (PS2 or EPP mode)	USB (1.1 / 2.0)	PCI	Ethernet	USB (1.1 / 2.0) and Ethernet
Transceiver	FT, RS-485, TP-1250	FT, RS-485, TP-1250	FT, RS-485, TP-1250	IP3E(100): FT IP1E(100): TP-1250	IP-852 (Ethernet)

\* In combination with NIC852

\*\* The NIC-USB must be labeled "NIC709-USB100" (on the USB side) resp. have a serial number starting with "0102XX-" or higher (printed on the back) to work with Windows 64 bit systems.

\*\*\* The NIC852 must have a serial number (printed on the USB key) starting with "0105XX-" or higher to work with Windows 64 bit systems.

Observe that depending on the version of your NIC-PCI or NIC-USB hardware, your NIC might not have MNI capabilities. You can check for MNI functionality in the LConfig tool, see Section 3.1. Further, if your hardware is labeled 'LPA006' or 'LPA-PP', it can only be used as an LPA protocol analyzer, no other software will run on this interface. However, the LPA-USB hardware is equivalent to the NIC-USB hardware and can therefore also be used as a generic network interface (apart from possible lack of MNI capabilities).

# 11 Specifications

## 11.1 NIC709-PP (LPA006 / LPA-PP / NIC-PP)

Power supply	9-24 VDC
Current consumption	160 mA @ 12 VDC
Dimensions (LxWxH)	105x55x20 mm
Operating temperature range	0°C - 40°C
PC connector	D-Sub 25 pins
Power connector	1.3 mm, polarity insensitive
Network connector TP-XF1250/TP-XF2500	Weidmüller product number 159736
Network connector FT-10/LPT-10	Weidmüller product number 159736
Network connector TP-RS485	Weidmüller product number 159737
Bit rates	300 bps - 2.5 Mbps
Network sensitivity	TP-XF1250: 600 mVpp TP-XF2500: 1200 mVpp
Printer port	Enhanced Parallel Port (EPP) or bi-directional

## 11.2 NIC709-PCI

Power supply	via PCI bus
Current consumption	250 mA
Dimensions (LxWxH)	135x96x20 mm
Operating temperature range	0°C - 40°C
PC connector	PCI slot, 5 V
Network connector TP-XF1250/TP-XF2500 (NIC709-PCI only)	Weidmüller product number 159736
Network connector PLT-22 (NIC709-PCIP only)	PLT-Coupler
Network connector FT-10/LPT-10	Weidmüller product number 159736
Network connector TP-RS485	Weidmüller product number 159737
Bit rates	300 bps - 2.5 Mbps
Network sensitivity	TP-XF1250: 600 mVpp (NIC709-PCI only) TP-XF2500: 1200 mVpp (NIC709-PCI only)

## 11.3 NIC709-PCI100

Power supply	via PCI bus
Current consumption	250 mA
Dimensions (LxWxH)	135x96x20 mm
Operating temperature range	5°C - 50°C
PC connector	PCI slot, 3.3V or 5V
Network connector TP-XF1250/TP-XF2500	Weidmüller product number 159736
Network connector FT-10/LPT-10	Weidmüller product number 159736
Network connector TP-RS485	Weidmüller product number 159737
Bit rates	300 bps - 2.5 Mbps
Network sensitivity	TP-XF1250: 600 mVpp (NIC709-PCI only) TP-XF2500: 1200 mVpp (NIC709-PCI only)

## 11.4 NIC709-USB / NIC709-USB100 (and LPA-USB)

Power supply	via USB
Current consumption	< 130 mA
Dimensions (LxWxH)	115x68x23 mm
Operating temperature range	0°C - 40°C
PC connector	USB 1.1 or 2.0
Network connector TP-XF1250/TP-XF2500 (NIC709-USB only)	Weidmüller product number 159736
Network connector PLT-22 (NIC709-USB only)	PLT-Coupler
Network connector FT-10/LPT-10	Weidmüller product number 159736
Network connector TP-RS485	Weidmüller product number 159737
Bit rates	300 bps - 2.5 Mbps
Network sensitivity	TP-XF1250: 600 mVpp (NIC709-USB only) TP-XF2500: 1200 mVpp (NIC709-USB only)

## 11.5 NIC709-IPxE

Power supply	9-35 VDC / 12-24 VAC, 40-70 Hz
Current consumption	300 mA @ 12 VDC
Dimensions (LxWxH)	145x91x28 mm
Operating temperature range	0°C - 40°C
PC connector	Ethernet 10Base-T
Network sensitivity	TP-XF1250: 600 mVpp (NIC709-IP1E only) TP-XF2500: 1200 mVpp (NIC709-IP1E only)

## 11.6 NIC709-IPxE100

Power supply	12-35 VDC / 12-24 VAC, 40-70 Hz
Power consumption	2 Watt typ.
Dimensions (LxWxH)	105x85x60 mm
Operating temperature range	5°C - 50°C
PC connector	Ethernet 100Base-T
Network sensitivity	TP-XF1250: 600 mVpp (NIC709-IP1E100 only)

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## 11.7 NIC852 (USB Key)

Power supply	via USB
Current consumption	< 50 mA
Dimensions (LxWxH)	65x18x8 mm
Operating temperature range	0°C - 40°C
PC connector	USB 1.1 or 2.0

# 12 Revision History

Date	Version	Author	Description
21.05.2002	1.4.5	AB	Initial Version.
26.07.2002	1.4.6	AB	Minor Corrections.
13.06.2003	2.1	AB	Added Section 2.4 NIC852. Added Chapter 3 Network Interface Configuration - LConfig Tool. Added Chapter 4 Network Interface and Transceiver Selection. Added Chapter 5 Legacy Support. Added Chapter 6 Multiplexed Network Interfaces.
29.01.2004	2.2	AB	Changes in Chapter 2 regarding driver installation. Added Section 2.5 NIC709-IP. Added MNI configuration in Section 3.1. Changed Section 3.7 regarding user interface for L-IP assignment. Added Section 3.8 NIC-IP / RNI Assignment and Configuration. Added 'Standard Mode' and 'Expert Mode' in Chapter 4. Added MIP/LDV and LOYTEC NIC Support driver in Chapter 5. Added 'Standard Mode' and 'Expert Mode' in Chapter 6. Added notes on MNI Upgrade in Chapter 8.
25.03.2004	2.3	AB	Added Section 3.2 Advanced Configuration. Added Chapter 7 Personal Firewall Setup. Added Chapter 10 NIC Product Comparison.
13.05.2004	2.3.2	AB	Changes in Section 2.5.4 regarding LEDs.
17.01.2005	2.4	AB	Easier installation procedure due to new automatic driver installer, Chapter 2. Changes in Section 2.3: Standby/Hibernation Support for Win2000/XP. Added information on LEDs in Section 2.5.4. Changed Section 3.6.1: Multiple CEA852 devices behind NAT router. Added 'Extended NAT...' option in Section 3.6.2. Added Section 3.6.3 Multicasting. Added 'Host Name' field in Section 3.8.1. Added Notes on older LOYTEC network interfaces, see Chapter 10.
04.04.2005	2.5	AB	NIC Software can be started as Service, see Section 3.2.1.
20.06.2005	2.6	AB	Changes in Chapter 3 regarding user login.
19.10.2006	2.6.4	AB	Added NIC709-IPxE100 device in Section 2.5. Added Section 2.5.3 NIC-IP Console Interface. Added Section 11.6 NIC709-IPxE100.
07.03.2007	2.7	AB	Supported Operating Systems are now Win2000/XP/2003.

Date	Version	Author	Description
			<p>Added NIC709-USB100 device in Section 2.3.</p> <p>Added Section 3.2.4 IP Settings.</p> <p>Updated Chapters 10 and 11.</p> <p>Linux Kernel 2.6 is now supported, see Chapter 9.</p>
20.07.2007	2.8	AB	<p>Transceiver selection in LConfig Tool, see Section 3.1 and Chapter 4.</p> <p>Added new option for NIC852, see Section 3.2.4.</p> <p>Added NIC709-PCI100 device in Section 2.2.</p> <p>Up to 512 L-IPs can now be assigned, see Section 3.7.</p> <p>Up to 512 NIC-IPs can now be assigned, see Section 3.8.</p>
14.01.2008	3.0	AB	<p>Changed the standard term 'EIA' into 'CEA'.</p> <p>Added 'LONI' support, see Section 3.2.3.</p> <p>Added Load / Save function in NIC852 configuration, see Section 3.6.1.</p> <p>Remote LPA (L-IP) assignment removed, see Sections 2.4.4 and 3.7.</p> <p>Added NIC-IP support for L-Vis and 3<sup>rd</sup> party devices, see Section 3.8.</p> <p>Added notes on user specific settings in Chapter 3.</p>
11.08.2008	3.1	AB	<p>Added NIC852-SW, see Sections 2.4.2 and 8.2.</p> <p>Added separate setup of MIP/LDV and LNS/VNI devices, see Section 3.1.</p> <p>Added Legacy Driver Compatibility Settings, see Section 3.2.2.</p> <p>Vast simplification of Chapter 5 due to complete rework of LNS/VNI driver.</p>
12.12.2008	3.2	AB	<p>Added MIP/LDV option for older NICs, see Section 3.2.3</p>
15.09.2009	3.3	AB	<p>Minor Corrections.</p>
29.01.2010	4.0	AB	<p>Windows Vista/2008 (32/64 bit) and Windows 7/2008R2 (32/64 bit) are now supported.</p>
06.08.2010	4.1	AB	<p>Support of new Remote LOYTEC devices.</p>