

User Manual

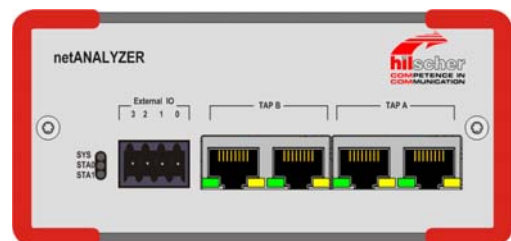
netANALYZER NANL-C500-RE and NANL-B500-RE Analyzer Card NANL-C500-RE, Analyzer Device NANL-B500-RE and netANALYZER Software

Installation, Operation and Hardware Description

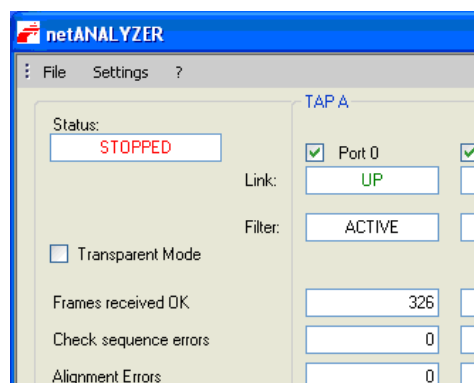
Card NANL-C500-RE



Device NANL-B500-RE



Software



Hilscher Gesellschaft für Systemautomation mbH

www.hilscher.com

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1 Introduction

1.1 About the User Manual

This user manual contains an installation description for the netANALYZER card NANL-C500-RE and for the netANALYZER device NANL-B500-RE under Windows® 2000, Windows® XP, Windows® Vista, Windows® 7 and about the operation and hardware for each of these devices.

1.1.1 List of Revisions

Index	Date	Hard / Software	Chapter	Revisions
1	26 Oct. 2007	NANL-C500-RE Rev. 3, netANALYZER Rev. 1.0.0.0	all	created
2	17.04.08	NANL-C500-RE Rev. 3, netANALYZER Rev. 1.1.0.0	1.2 1.3 3.1 4 5.1 5.2 5.3	Section ‚Contents of the Product CD‘ actualized, Section ‚Reference on Hardware and Software‘ actualized, Section ‚Analyzer Card NANL-C500-RE‘ actualized, Section ‚Getting Started and how to use NANL-C500-RE‘ actualized, Section ‚Data Capturing‘ actualized, Section ‚Timing Analysis‘ added, Section ‚Information to Analysis‘ revised.
3	18.06.08	NANL-C500-RE Rev. 3, netANALYZER Rev. 1.1.0.0	4.7.4 8 11	Section ‚Performing File Settings‘ actualized, Chapter ‚LED‘ actualized, Chapter ‚Glossary‘ actualized.
4	09.12.08	netANALYZER Rev. 1.2.0.0	1.3 4.2.1 4.3 4.7 4.8.2 4.8.4 5.1.2.1	Section ‚Reference on Hardware and Software‘ updated, Section ‚Notes to the NANL-C500-RE Card Operation‘, note added Section ‚How getting started NANL-C500-RE Card‘ added Section ‚Installing Wireshark netANALYZER Plugin‘ added Section ‚netANALYZER – Main Window‘ updated Section ‚Performing File Settings‘ information added Section ‚Starting Capturing‘ information added
5	09.02.10	netANALYZER Rev. 1.3.0.0	All, 2, 5.1, 5.2, 5.4, 5.6,5.7, 5.9, 5.10, 6, 7, 8, 9, 11, 12,	Revised and completed: - completed for Windows 2000/Vista/ 7, - added: Device NANL B500-RE, new software, driver and plugin versions, - added: description new directory structure CD and information on the documentation, - New features of the user interface of the netANALYZER software: Main frame netANALYZER e. g. „Transparent Mode“, - chapter ‚Safety‘ actualized, - section <i>System Requirements</i> : Hints added. - section <i>Preconditions for Installation and Operation</i> actualized, - sections <i>Starting NANL-C500-RE Card or NANL-B500-RE, Installing Software from CD, Installing NANL-C500-RE and NANL-B500-RE, Wireshark netANALYZER Plugin, netANALYZER Software</i> revised, actualized, completed, chapters <i>Analysis Methods, Troubleshooting, LED, Technical Data, Glossary, Contacts</i> revised, actualized, completed.
6	08.03.10	netANALYZER Rev. 1.3.0.0, (NANL-C500-RE Rev. 4, NANL-B500-RE Rev. 1)	1.4, 5.3, 5.4, 5.5, 5.6, 5.10, 6	Information to the hardware update added in the sections: <i>Reference on Hardware, Driver and Software, Instructions for Installation and Operation and Starting NANL-C500-RE Card or NANL-B500-RE, Hardware Update (existing Hardware Installation)</i> , Corrections in section/chapter: <i>Installing Software from CD, netANALYZER Software, Analysis Methods</i> .
7	22.03.10	netANALYZER Rev. 1.3.0.0, (NANL-C500-RE Rev. 4, NANL-B500-RE Rev. 1)	2.8.1, 5.4, 5.7.2.1, 5.7.4, 3, 5.2, 9.1, 9.2	Note device destruction / 24 V power supply added, in the sections: <i>Device Destruction by exceeding allowed Supply or Signaling Voltage, Starting NANL-C500-RE Card or NANL-B500-RE, Device Destruction by exceeding allowed Supply or Signaling Voltage, Connecting Analyzer Device NANL-B500-RE to the Notebook</i> , term for „input/Output“ changed and note added, that only the inputs are configured; in chapter <i>Device Drawings and Connections</i> ; Section <i>Preconditions for Installation and Operation</i> completed, Section <i>Analyzer Card NANL-C500-RE</i> revised, Section <i>Analyzer Device NANL-B500-RE</i> added.

Table 1: List of Revisions

1.2 Legal Notes

1.2.1 Copyright

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We reserve the right to change our products and their specification as well as related user manuals, accompanying texts and documentation at all times and without advance notice, without obligation to report the change. Changes will be included in future manuals and do not constitute any obligations. There is no entitlement to revisions of delivered documents. The manual delivered with the product applies.

Hilscher Gesellschaft für Systemautomation mbH is not liable under any circumstances for direct, indirect, incidental or follow-on damage or loss of earnings resulting from the use of the information contained in this publication.

1.2.3 Exclusion of Liability

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It is strictly prohibited to use the software in the following areas:

- for military purposes or in weapon systems;
- for the design, construction, maintenance or operation of nuclear facilities;
- in air traffic control systems, air traffic or air traffic communication systems;
- in life support systems;
- in systems in which failures in the software could lead to personal injury or injuries leading to death.

We inform you that the software was not developed for use in dangerous environments requiring fail-proof control mechanisms. Use of the software in such an environment occurs at your own risk. No liability is assumed for damages or losses due to unauthorized use.

1.2.4 Warranty

Although the hardware and software was developed with utmost care and tested intensively, Hilscher Gesellschaft für Systemautomation mbH does not guarantee its suitability for any purpose not confirmed in writing. It cannot be guaranteed that the hardware and software will meet your requirements, that the use of the software operates without interruption and that the software is free of errors. No guarantee is made regarding infringements, violations of patents, rights of ownership or the freedom from interference by third parties. No additional guarantees or assurances are made regarding marketability, freedom of defect of title, integration or usability for certain purposes unless they are required in accordance with the law and cannot be limited. Warranty claims are limited to the right to claim rectification.

1.2.5 Export Regulations

The delivered product (including the technical data) is subject to export or import laws as well as the associated regulations of different countries, in particular those of Germany and the USA. The software may not be exported to countries where this is prohibited by the United States Export Administration Act and its additional provisions. You are obligated to comply with the regulations at your personal responsibility. We wish to inform you that you may require permission from state authorities to export, re-export or import the product.

1.2.6 Registered Trademarks

Windows® 2000, Windows® XP, Windows® Vista, Windows® 7 are registered trademarks of the Microsoft Corporation.

1.3 Conventions in this Manual

Operation instructions, a result of an operation step or notes are marked as follows:

Operation Instructions:

➤ <instruction>

Or

1. <instruction>

2. <instruction>

Results:

↻ <result>

Notes:



Important: <important note>



Note: <note>



<note, were to find further information>

1.4 Reference on Hardware, Driver and Software



Note: The listed hardware revisions netANALYZER NANL-C500-RE and NANL-B500-RE, the driver version for the netANALYZER driver or the version of the netANALYZER software functionally belong together. For existing hardware installation apply the netANALYZER hardware update (for the NXANL 50-RE hardware revisions 2 and 3) and then update the driver and the software.

1.4.1 Hardware

Name	Card or Device Type	Part No.	Hardware Revision	Hardware Update
Analyzer Card NXANL 50-RE	NXANL 50-RE	7.310.100	2	Update NXANL 50-RE Revision 3
Analyzer Card NXANL 50-RE	NXANL 50-RE	7.310.100	3	Update NXANL 50-RE Revision 3
Analyzer Card NANL-C500-RE	NANL-C500-RE	7.310.100	4	-
Analyzer Device NANL-B500-RE	NANL-B500-RE	7.311.100	1	-

Table 2: Reference on Hardware

1.4.2 Software

Software	Software Version
netANALYZER Setup: netAnalyzer.msi	1.3.0.0

Table 3: Reference on Software

Wireshark netANALYZER Plugin	Windows® 2000, Windows® XP, Windows® Vista, Windows® 7
netanalyzer.dll	32-Bit
netanalyzer_x64.dll	64-Bit

Table 4: Reference on Software – Plugin

1.4.3 Driver

Driver Setup	Windows® 2000, Windows® XP, Windows® Vista, Windows® 7
netANALYZER Driver X86.msi	32-Bit
netANALYZER Driver X64.msi	64-Bit

Table 5: Reference on Driver

1.5 Contents of the Product CD

The netANALYZER Installation CD for the netANALYZER card NANL-C500-RE and for the netANALYZER device NANL-B500-RE contains:

- The netANALYZER setup file
- The netANALYZER Driver file for 32-bit and for 64-bit
- The Wireshark netANALYZER Plugin file for 32-bit and for 64-bit
- The documentation (netANALYZER User and Driver Manual)
- 2 Examples for Application Programming Interface (API)

1.5.1 Directory Structure of the CD

All manuals on this CD are delivered in the Adobe Acrobat® Reader format (PDF).

Directory Name	Description
Adobe Flash Player	Adobe Flash Player installation program
Documentation	Documentation in the Acrobat® Reader Format (PDF)
Driver	netANALYZER Driver for Windows® 2000, Windows® XP, Windows® Vista, Windows® 7
Examples	2 Programming examples for the Application Programming Interface (API) for the netANALYZER card NANL-C500-RE and for the netANALYZER device NANL-B500-RE
Plugin	Wireshark netANALYZER Plugin files: netanalyzer.dll, netanalyzer_x64.dll
Software	netANALYZER-Setup: netAnalyzer.msi Wireshark netANALYZER Plugin-Setup: WiresharkPlugin.msi
Update NXANL 50-RE Revision 3	netANALYZER hardware update for the hardware-revisions 2 and 3: netANALYZER_hw_update.iso

Table 6: Directory Structure of the CD

1.5.2 Documentations netANALYZER

The following documentation overview gives information, for which items you can find further information in which manual.

Manual	Contents	Document name
User Manual netANALYZER NANL-C500-RE and NANL-B500-RE Analyzer Card NANL-C500-RE, Analyzer Device NANL-B500-RE and netANALYZER Software	Installation, Operation and Hardware Description	netANALYZER_Benutzerhandbuch_de.pdf
Driver Manual netANALYZER API, Windows 2000/XP/Vista/7, V1.3	Description of the netANALYZER API	netANALYZER API Windows 2000 XP Vista 7 DRV 02 EN.pdf (English Version)

Table 7: Documentations netANALYZER



All these documents are available on the CD delivered with the device underneath the directory **Documentation**, in Adobe Acrobat® Reader format (PDF).

2 Safety

2.1 General Note

The user manual, the accompanying texts and the documentation are written for the use of the products by educated personnel. When using the products, all safety instructions and all valid legal regulations have to be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended Use

The netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE described in this User Manual each work as a passive Ethernet Analyzer in RT-Ethernet systems. The netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE analyze the data in a communication link and capture the incoming Ethernet frames.

2.3 Personnel Qualification

The netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE must only be installed, configured and removed by qualified personnel. Job-specific technical skills for people professionally working with electricity must be present concerning the following topics:

- Safety and health at work
- Mounting and connecting of electrical equipment
- Measurement and Analysis of electrical functions and systems
- Evaluation of the safety of electrical systems and equipment
- Installing and Configuring IT systems

2.4 Commitment to read and understand the Manual



Important! Read and understand all instructions in this manual before installation or use of your device to avoid injury.

2.5 References Safety

- [1] ANSI Z535.6-2006 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials
- [2] IEC 60950-1, Information technology equipment - Safety - Part 1: General requirements, (IEC 60950-1:2005, modified); German Edition EN 60950-1:2006
- [3] EN 61340-5-1 and EN 61340-5-2 as well as IEC 61340-5-1 and IEC 61340-5-2

2.6 Labeling of Safety Instructions

The safety instructions are pinpointed particularly. The instructions are highlighted with a specific safety symbol, a warning triangle and a signal word according to the degree of endangerment. Inside the note the danger is exactly named. Instructions to a property damage message do not contain a warning triangle.








Symbol	Symbol (USA)	Sort of Warning or Principle
		Warning of Personal Injury
		Warning of Lethal Electrical Shock
		Warning of danger by electrical current
		Warning of damages by electrostatic discharge
		Principle: Disconnect the power plug
		Principle: Mandatory read Manual

Table 8: Safety Symbols and Sort of Warning or Principle

Signal Word	Meaning
DANGER	Indicates a direct hazard with high risk, which will have as consequence death or grievous bodily harm if it isn't avoided.
WARNING	Indicates a possible hazard with medium risk, which will have as consequence death or (grievous) bodily harm if it isn't avoided.
CAUTION	Indicates a minor hazard with medium risk, which could have as consequence simple battery if it isn't avoided.
NOTICE	Indicates a Property Damage Message.
Note	Indicates an important note in the manual.





Signal Word (USA)	Meaning (USA)
	Indicates a Hazardous Situation Which, if not Avoided, will Result in Death or Serious Injury.
	Indicates a Hazardous Situation Which, if not Avoided, could Result in Death or Serious Injury.
	Indicates a Hazardous Situation Which, if not Avoided, may Result in Minor or Moderate Injury.
	Indicates a Property Damage Message.
Note	Indicates an Important Note in the Manual.

Table 9: Signal Words

In this document the safety instructions and property damage messages are designed according both to the international used safety conventions as well as to the ANSI standard, refer to reference safety [1].

2.7 Safety Instructions

To ensure your own personal safety and to avoid personal injury, you necessarily must read, understand and follow the following and all other safety instructions in this guide.

2.7.1 Electrical Shock Hazard

NANL-C500-RE Card:



DANGER!



Lethal Electrical Shock caused by parts with more than 50V!

- HAZARDOUS VOLTAGE inside of the PC.
 - Therefore first disconnect the power plug of the PC.
 - Make sure, that the power supply is off at the PC.
 - Open the PC cabinet and install or remove the NANL-C500-RE card only after disconnecting power.
-

USA:



⚠ DANGER



Lethal Electrical Shock caused by parts with more than 50V!

- HAZARDOUS VOLTAGE inside of the PC.
 - Therefore first disconnect the power plug of the PC.
 - Make sure, that the power supply is off at the PC.
 - Open the PC cabinet and install or remove the NANL-C500-RE card only after disconnecting power.
-

An electrical shock is the result of a current flowing through the human body. The resulting effect depends on the intensity and duration of the current and on its path through the body. Currents in the range of approximately ½ mA can cause effects in persons with good health, and indirectly cause injuries resulting from startle responses. Higher currents can cause more direct effects, such as burns, muscle spasms, or ventricular fibrillation.

In dry conditions permanent voltages up to approximately 42.4 V peak or 60 V DC are not considered as dangerous, if the contact area is equivalent to a human hand.

Reference Safety [2]

2.8 Property Damage Messages

To avoid property damage respectively device destruction to the card and to your system, you necessarily must read, understand and follow the following and all other property damage messages in this guide.

2.8.1 Device Destruction by exceeding allowed Supply or Signaling Voltage

The NANL-C500-RE card may not be powered by a 5V power supply! The NANL-C500-RE card may only be powered by a 3.3 V power supply. The use of a higher supply voltage than 3.3 V may result in severe damage to the NANL-C500-RE card!

The NANL-B500-RE device may only be powered by a power supply in the range of 18-30 V. The use of a higher supply voltage than 30 V may result in severe damage to the NANL-B500-RE device!



NOTICE

Device Destruction!

NANL-C500-RE Card:

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.

NANL-B500-RE Device:

- The voltage applied at the NANL-B500-RE device must not exceed 30 V, otherwise the device may be destroyed.
- Connect only one 24 V DC power supply to the device. If the device is connected to both power connectors (0V/+24V/PE and +24V) simultaneously, this may lead to damage to the used power supply units!

NANL-C500-RE Card and NANL-B500-RE Device:

- All I/O signal pins at the NANL-C500-RE card and at the NANL-B500-RE tolerate only 3.3 V signaling voltage!
- Operation with 5 V signaling voltage may lead to severe damage to the NANL-C500-RE card or to the NANL-B500-RE device!

USA:



NOTICE

Device Destruction!

NANL-C500-RE Card:

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.

NANL-B500-RE Device:

- The voltage applied at the NANL-B500-RE device must not exceed 30 V, otherwise the device may be destroyed.
- Connect only one 24 V DC power supply to the device. If the device is connected to both power connectors (0V/+24V/PE and +24V) simultaneously, this may lead to damage to the used power supply units!

NANL-C500-RE Card and NANL-B500-RE Device:

- All I/O signal pins at the NANL-C500-RE card and at the NANL-B500-RE tolerate only 3.3 V signaling voltage!
- Operation with 5 V signaling voltage may lead to severe damage to the NANL-C500-RE card or to the NANL-B500-RE device!

2.8.2 Electrostatically sensitive Devices

NANL-C500-RE-Karte:

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.



NOTICE

Electrostatically sensitive Devices

This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Follow guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
 - Wear an approved grounding wriststrap.
 - Do not touch connectors or pins on component boards.
 - Do not touch circuit components inside the equipment.
 - If available, use a static-safe workstation.
 - When not in use, store the equipment in appropriate static-safe packaging.
-

USA:



NOTICE

Electrostatically sensitive Devices

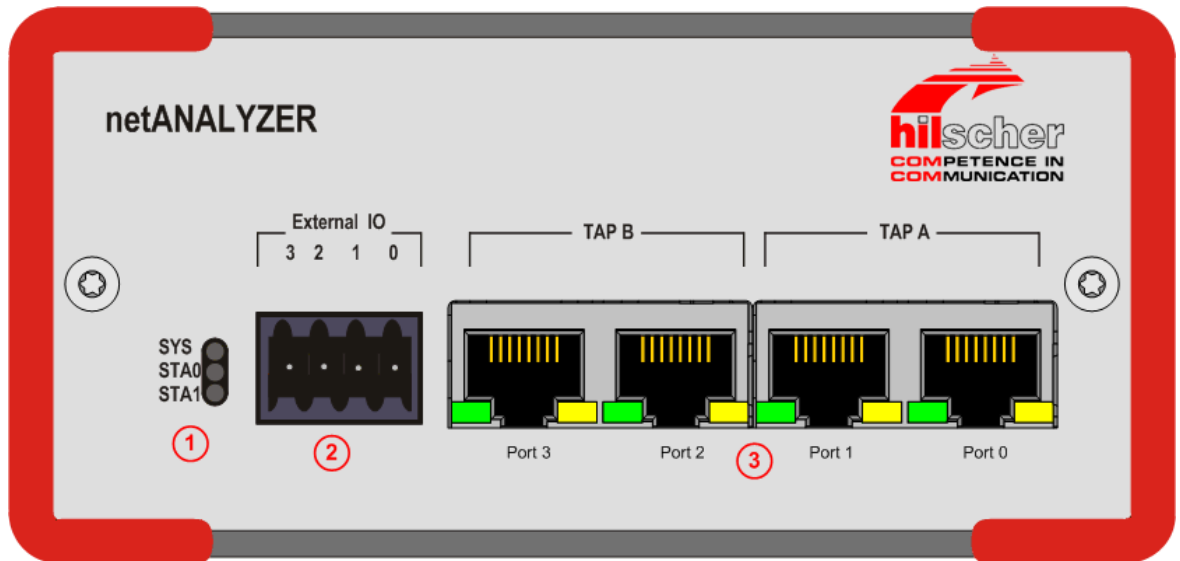
This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Follow guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
 - Wear an approved grounding wriststrap.
 - Do not touch connectors or pins on component boards.
 - Do not touch circuit components inside the equipment.
 - If available, use a static-safe workstation.
 - When not in use, store the equipment in appropriate static-safe packaging.
-

Reference Safety [2]

3 Device Drawings and Connections

3.1 Device Drawing NANL-B500-RE



- 1** **SYS**
System LED
(yellow/green)
STA 0, STA1
Status LED
(red/green)

- 2** **External Interface
Input/Output Signals**
(4 digital Inputs/Outputs)

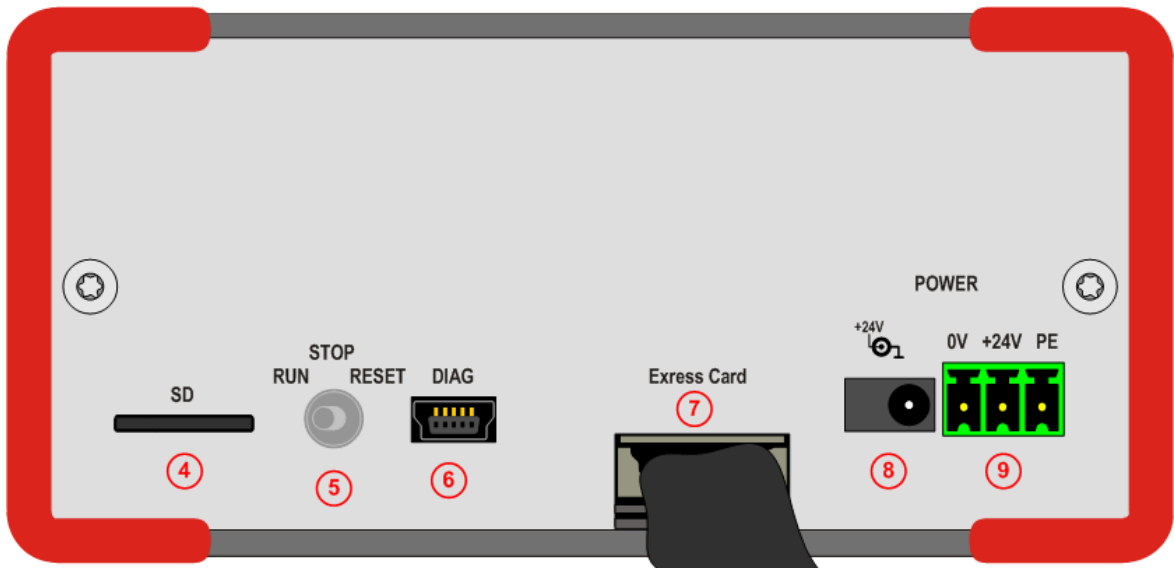
- 3** **RJ45 Sockets**
4 Ports: Port 0 to Port 3,
2 Communication Channels:
TAP B, TAP A)

Note: To analyze the data transfer of a communication line between two devices, these devices must be connected to the same TAP (Test Application Point).

Note: The 4 digital inputs / outputs of the external interface input / output signals are configured by the software only as inputs.

Figure 1: Device Drawing NANL-B500-RE (Front Side)

The meaning of the yellow and green LED at the RJ45 socket depends from the loaded firmware. See chapter *LED* on page 103.



- ④ **Micro SD Card Slot***
- ⑤ **Switch***
(RUN / STOP / RESET)
* for future use only

- ⑥ **Mini B USB Plug***
(5-pin)
- ⑦ **Cable to ExpressCard**

- ⑧ **24V Voltage Supply**
Combicon: 0V/+24V/PE
- ⑨ alternatively
Female Connector +24V

Figure 2: Device Drawing NANL-B500-RE (Reverse Side)

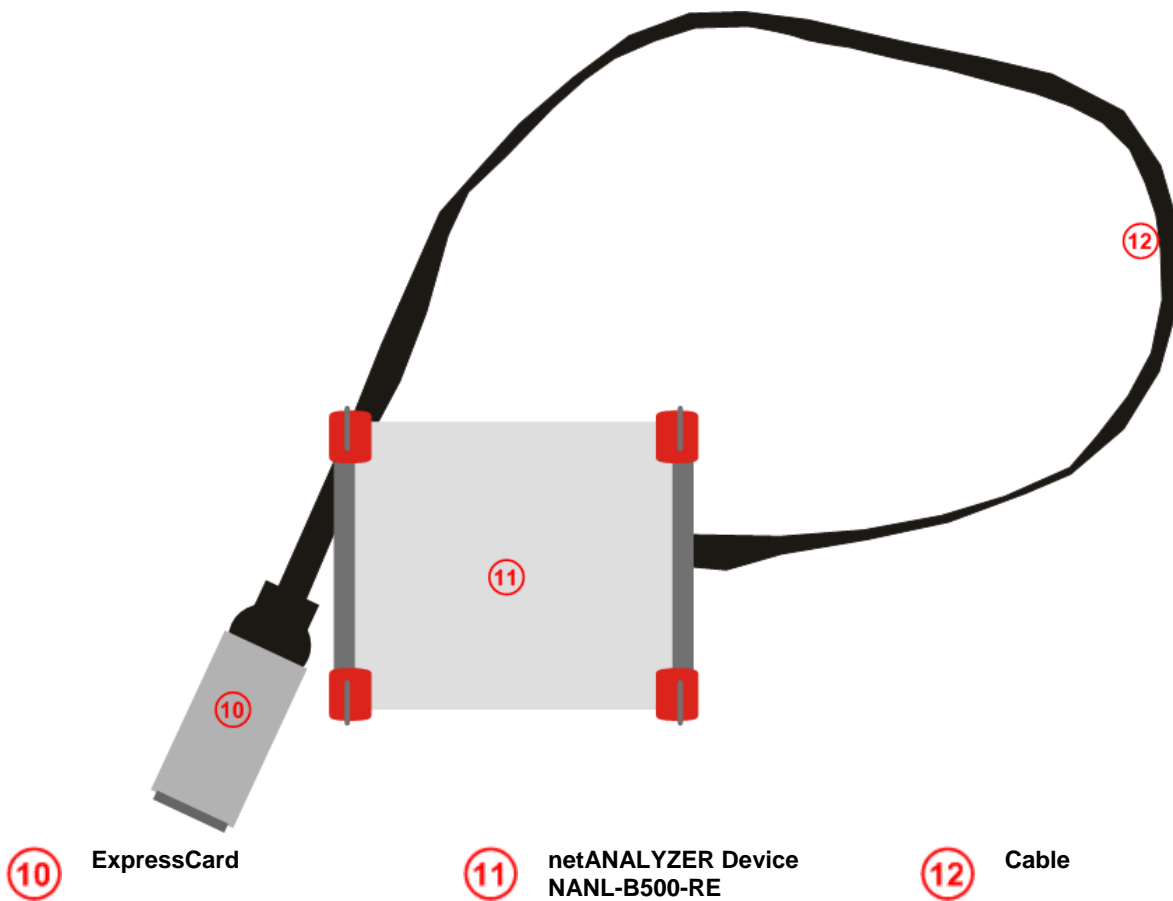
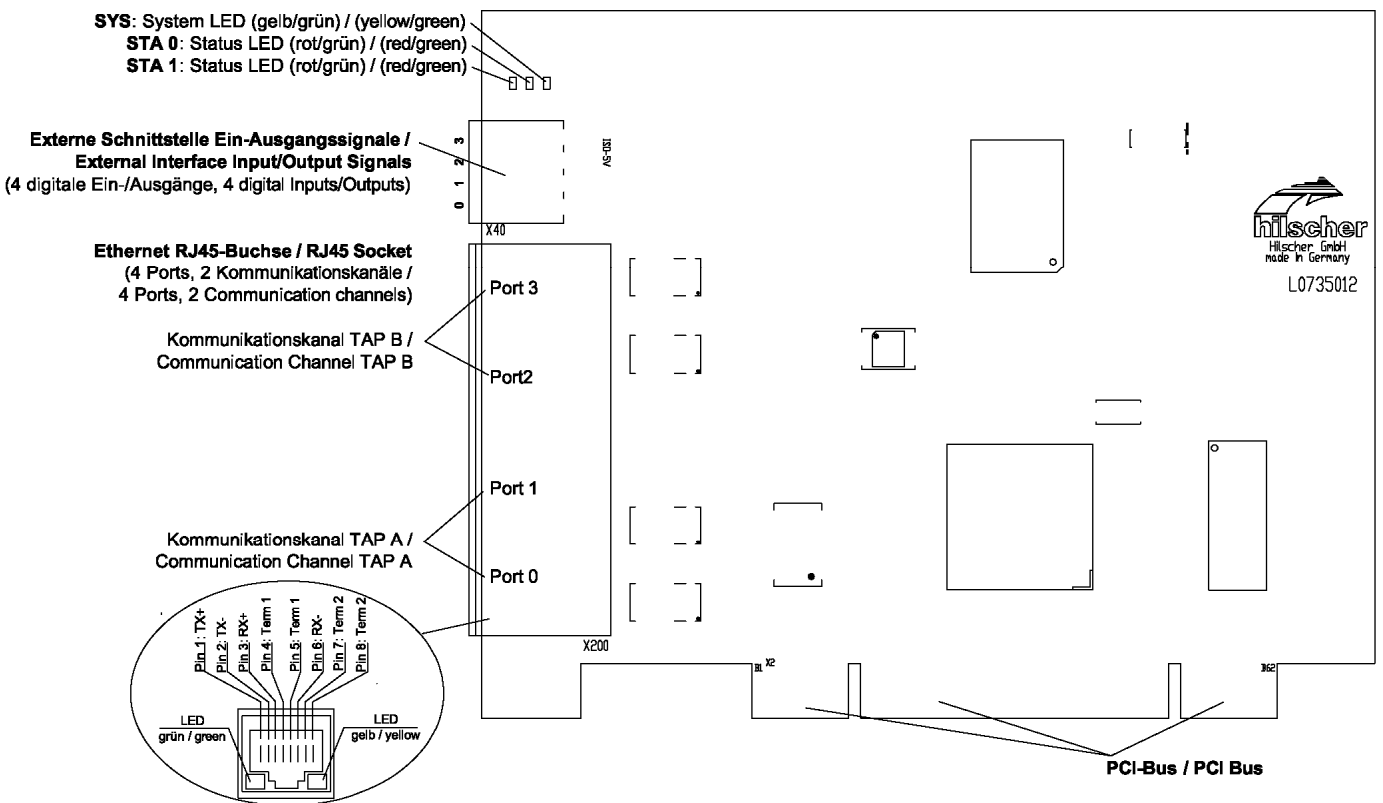


Figure 3: Device Drawing NANL-B500-RE (with ExpressCard)

3.2 Device Drawing NANL-C500-RE



Note: To analyze the data transfer of a communication line between two devices, these devices must be connected to the same TAP (Test Application Point).

Note: The 4 digital inputs / outputs of the external interface input / output signals are configured by the software only as inputs.

Figure 4: Device Drawing NANL-C500-RE

The meaning of the yellow and green LED at the RJ45 socket depends from the loaded firmware. See chapter *LED* on page 103.

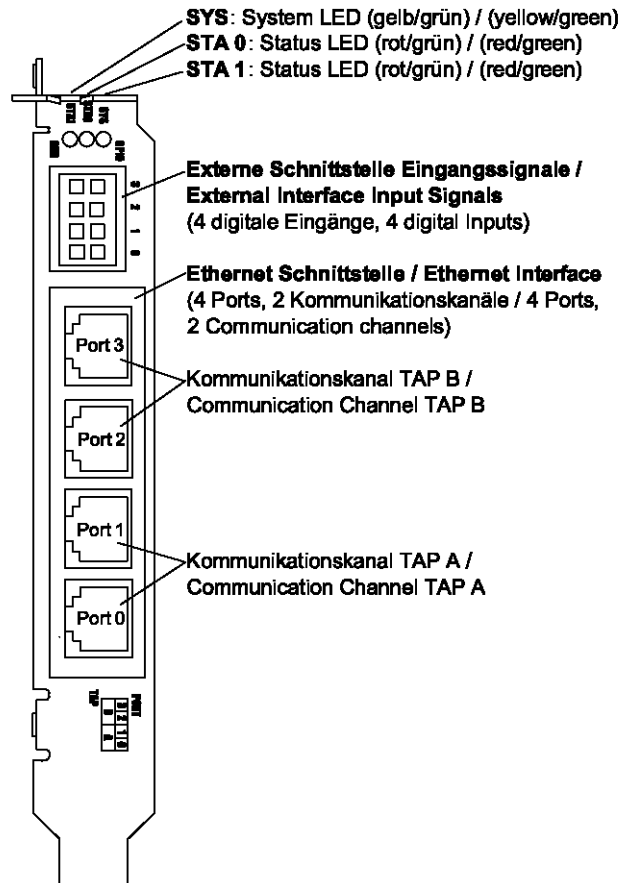


Figure 5: Slot Plate NANL-C500-RE

3.3 Ethernet Interface

For the Ethernet interface use RJ45 plugs and twisted pair cable of category 5 (CAT5) or higher, which consists of 4 twisted cores and has a maximum transmission rate of 100 MBit/s (CAT5).

3.3.1 Ethernet pinning at the RJ45 Socket

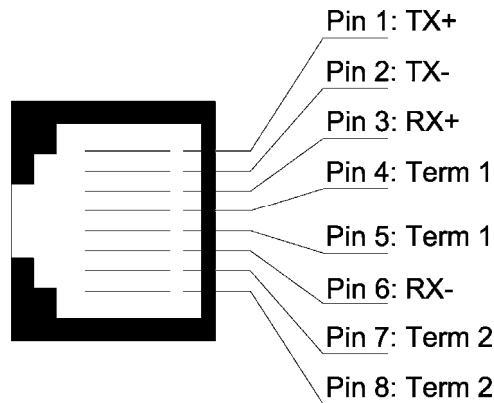


Figure 6: Ethernet pinning at the RJ45 Socket

Pin	Signal	Meaning
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	Term 1	Connected to each other and terminated to PE through RC circuit*
5	Term 1	
6	RX-	Receive Data -
7	Term 2	Connected to each other and terminated to PE through RC circuit*
8	Term 2	
* Bob Smith Termination		

Table 10: Ethernet pinning at the RJ45 Socket

3.3.2 Data of the Ethernet Connection

Medium	2 x 2 Twisted-Pair cupric cable, CAT5 (100 MBit/s)
Length of cable	max. 100 m
Reception Rate	10 MBit/s / 100 MBit/s

Table 11: Data of the Ethernet Connection

3.4 External Interface Input/Output Signals



Device Destruction!

- All I/O signal pins at the NANL-C500-RE card and at the NANL-B500-RE tolerate only 3.3 V signaling voltage!
- Operation with 5 V signaling voltage may lead to severe damage to the NANL-C500-RE card or to the NANL-B500-RE device!

USA:



Device Destruction!

- All I/O signal pins at the NANL-C500-RE card and at the NANL-B500-RE tolerate only 3.3 V signaling voltage!
- Operation with 5 V signaling voltage may lead to severe damage to the NANL-C500-RE card or to the NANL-B500-RE device!



Note: The 4 digital inputs / outputs of the external interface input / output signals are configured by the software only as inputs.

Connector external Interface Input/Output Signals / (4 digital inputs/outputs):

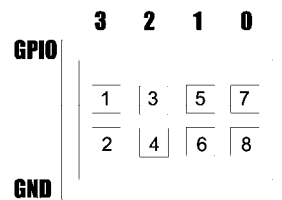


Figure 7: Connector external Interface Input/Output Signals, X40

Pin	Signal	Pin	Signal
2	GND	1	3
4	GND	3	2
6	GND	5	1
8	GND	7	0

Table 12: Pin out, X40

3.4.1 Connection Cable for Input Signals

To access to the digital input signals (GPIO), use a cable, which does not exceed the following parameters / values.

Parameter	Value
Min. conductor cross section	0,2 mm ²
Max. conductor cross section	1 mm ²
Max. cable length	5 m
Shielding	Shielded cables

Table 13: Connection Cable for Input Signals

4 Description and Requirements

4.1 NANL-C500-RE and NANL-B500-RE

The netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE work as a passive component in Real-Time Ethernet systems to record and analyze the data traffic.

By use of the netANALYZER software **netANALYZER** the modes listed hereafter can be used:

Data-Capturing Mode

In the data-capturing mode (Capture Data), the data are recorded to the hard disk of the PC.

For further information refer to section *Recording and analyzing Data Traffic* beginning from page 28.

For data capturing two operating modes are provides:

- **Ethernet Mode** (Standard Capturing)

In the **Ethernet Mode** standard Ethernet telegrams are captured.

- **Transparent Mode**

In the **Transparent Mode** standard Ethernet telegrams are captured, which include the preamble and the SFD (=Start of Frame Delimiter).

For further information refer to section *Transparent Mode* beginning from page 101.

Timing Analysis Mode

In the timing analysis mode (Timing Analysis), no frame data are stored, only the time stamp of individual frames are analyzed. Any data recording is performed.

For further information refer to section *Timing Analysis* beginning from page 91.

4.1.1 Recording and analyzing Data Traffic

For devices with two Ethernet channels the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE capture the Ethernet frames and adds the time stamps to them. Therefore the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE must be connected over two patch cables from one of the TAP to the Ethernet device connections.

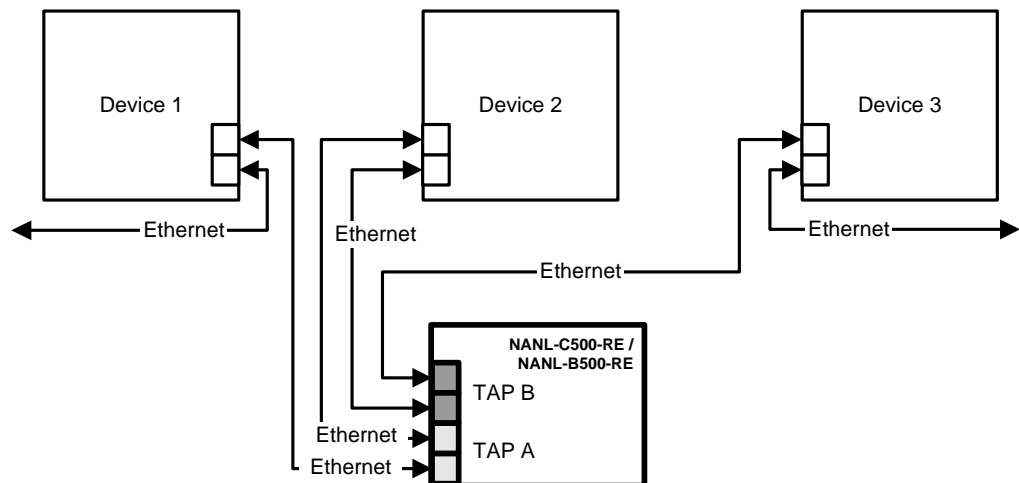


Figure 8: Typical Application (Use Case 2) - The communication between a device and its connection partners in a network should be analyzed

The data capturing must be configured and started via the **netANALYZER** software.

This way the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE and the **netANALYZER** software capture the data packets of the communication line, transmit the data packets and save them on the hard disk.

On the netANALYZER card NANL-C500-RE or at the netANALYZER device NANL-B500-RE two TAP (Test Access Point) are integrated so that two communication channels are operational.

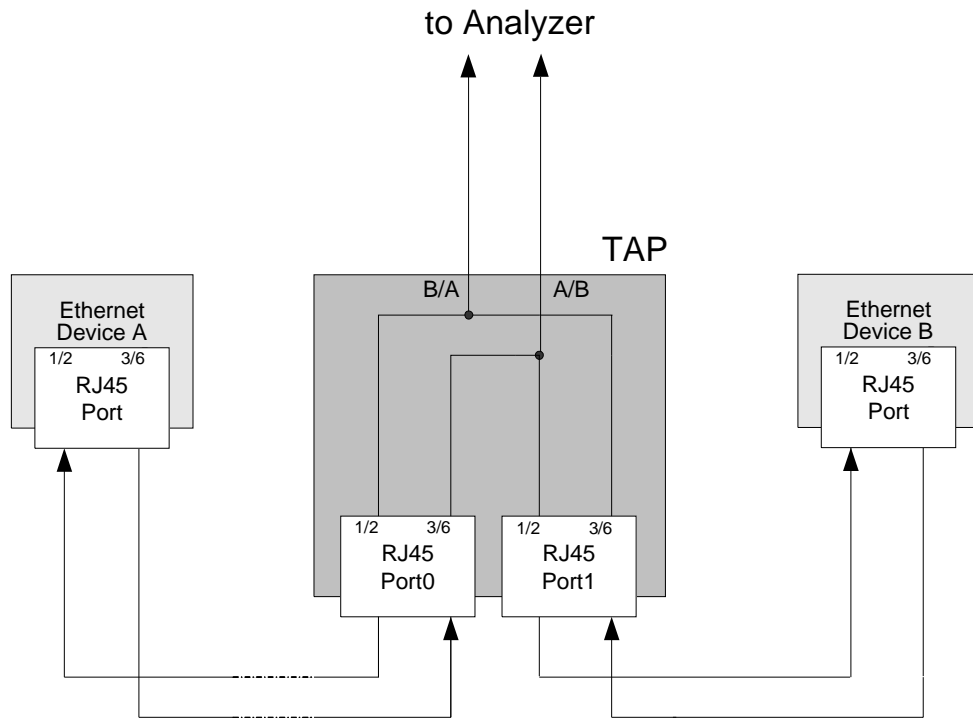


Figure 9: Example representation physical TAP

In combination with the driver and the firmware the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE store the data via DMA on the hard disk of the PC. There the **netANALYZER** software then converts the stored binary files (*.hea) in the open WinPcap format (*.pcap), which can be analyzed e. g. with Wireshark.

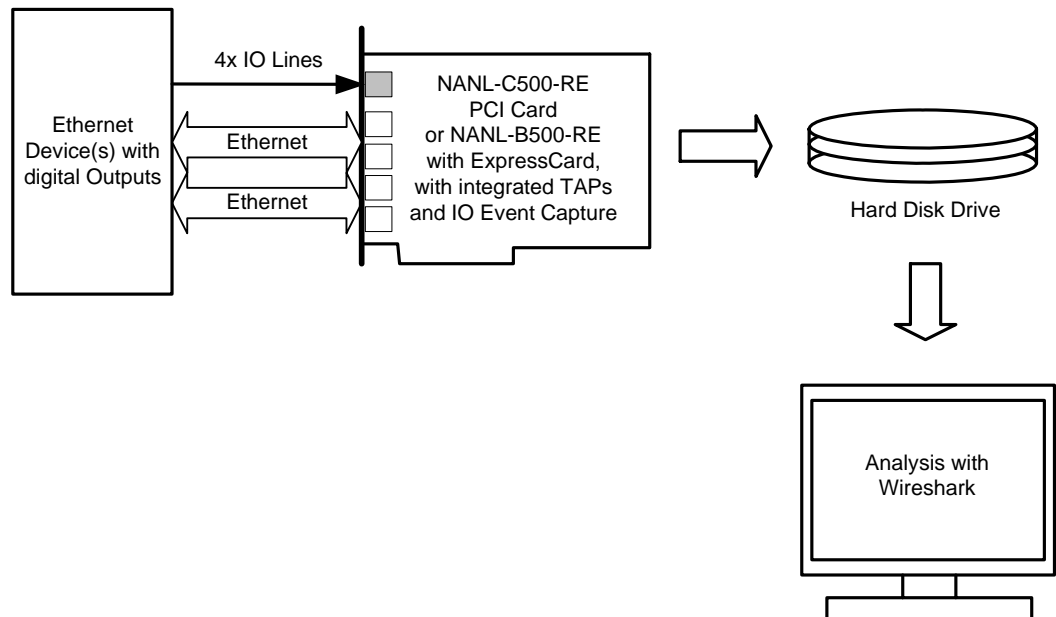


Figure 10: Typical Analyzer Application with the Capturing of the Ethernet Data Transfer and IO Events

Additionally, events of up to four digital inputs can be captured. At the four digital inputs the input signals produce a special Ethernet frame in the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE. This frame is not on the line, but is created for evaluation purposes.



Note: For the GPIO events in Wireshark a pseudo Ethernet frame is shown (MAC Address 00:02: A2: FF: FF: FF, Ether Type = 0x88ff), this is not a true Ethernet frame, but is inserted as wildcard in the firmware. Then this frame is decoded as GPIO event e. g. with Wireshark.

5 Start and use NANL-C500-RE or NANL-B500-RE

To start and use the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE refer to the following sections.

5.1 System Requirements and Accessories

System Requirements:

1. Operating System:
 - Windows® 2000, SP4, (32-bit Version),
 - Windows® XP Professional, SP3, (32-bit and 64-bit Version),
 - Windows® Vista, (32-bit and 64-bit Version),
 - Windows® 7, (32-bit and 64-bit Version).
2. PC with the following specification:
 - Intel compatible CPU, approx. 2 GHz or faster,
 - 1 GB RAM or more,
 - CD or DVDROM,
 - SVGA 1024x768 16bit colors or better,
 - 20 MB free hard drive space for the netANALYZER software,
 - Free hard drive space for data capturing (minimum 1GB).

Type of Card	PCI Connector
NANL-C500-RE	PCI slot (3.3 V)
NANL-B500-RE	ExpressCard Slot (for notebook)

Table 14: PCI Connector for NANL-C500-RE cards or NANL-B500-RE

Accessories:

1. Two patch cable (Ethernet)
2. The maximum allowed cable length for the 24V power supply is 3 meters.



Note: The maximum allowed total length of the Ethernet cable via which the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE within the Ethernet system are connected via a TAP to the devices in the system is 100 meters.

5.2 Preconditions for Installation and Operation

For operation of the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE and of the **netANALYZER** software the following in preconditions must be fulfilled:

Preconditions for Installation:

1. The program Microsoft .NET Framework Version 2.0* must be installed.
2. For the installation under Windows® 2000 the **Windows Installer 3.1*** must be installed.

Preconditions for Operation:

1. To display the captured data, a network monitoring program must be installed, which supports the WinPcap format, as e. g. Wireshark*.
2. The **netANALYZER** software V 1.3.0.0 must be installed. This includes the **netANALYZER** software, the Analyzer driver and the Analyzer firmware "Ethernet-Analyzer".

*For further information to the mentioned programs refer to the *Glossary* on page 109.

5.3 Instructions for Installation and Operation

You must read and obey the following instructions for installation and operation of your netANALYZER card NANL-C500-RE or your netANALYZER device NANL-B500-RE to guarantee proper installation and an error-free operation of your device.


Note 	Description
Updates for existing Hardware Installation	For existing hardware installation apply the netANALYZER hardware update (for the NXANL 50-RE hardware revisions 2 and 3) and then update the driver and the software. For more information refer to section <i>Hardware Update (existing Hardware Installation)</i> on page 35.
Note the Installation Sequence	The installation sequence : <ol style="list-style-type: none"> 1. Insert CD 2. Install software 3. Mount NANL-C500-RE or connect NANL-B500-RE must be obeyed. Otherwise, there will be incorrect registry entries. This in turn leads to disturbances in subsequent installation of software updates.
Installing Wireshark netANALYZER Plugin manually	The Wireshark netANALYZER plugin must be installed to allow displaying the netANALYZER port number and error codes for every telegram in Wireshark. The plugin is only installed during the installation of the netANALYZER software from CD, if Wireshark is installed already on the PC, otherwise the plugin must be installed manually. Before installing the current plugin, the manually installed plugin of the netANALYZER versions 1.0-1.2 must be deinstalled. Also the 64-bit and the 32-bit Wireshark netANALYZER plugin are not compatible. Each of them must be deinstalled before the other plugin can be installed. For more information refer to section <i>Wireshark netANALYZER Plugin</i> on page 67.
Optimum Operation if view Participants at PCI or PCI Express Bus	The capturing feature of the NANL-C500-RE card or the NANL-B500-RE device works under heavy load optimally only if the number of participants in the communications PCI bus or PCI Express bus is minimized. It is advantageous if the NANL-C500-RE card is the only PCI card in the PC or if the NANL-B500-RE device is the only ExpressCard at the notebook.
Inserting Analyzer Card into the Communication Link	To analyze the data transfer of a communication line between two devices, these devices must be connected to the same TAP (Test Access Port).
Activating Wireshark GPIO Dissector	GPIO events of the NANL-C500-RE card or of the NANL-B500-RE device card are decoded by Wireshark beginning with version 1.0.0. If after Wireshark installation the "Hilscher-netANALYZER-GPIO event" is not displayed, the appropriate protocol must be activated in Wireshark once. For more information refer to section <i>Activating Wireshark GPIO Dissector</i> on page 64.
Do not unplug the ExpressCard during the Device Operation	During device operation do not unplug the ExpressCard of the netANALYZER device NANL-B500-RE from the ExpressCard slot at the Notebook. Otherwise data capturing is stopped and an error message is displayed, as the device is not any more detected at the notebook.

Table 15: Instructions for Installation and Operation

5.4 Starting NANL-C500-RE Card or NANL-B500-RE

The following table provides an overview of the steps how to start the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE.

No	Step	Short Description	For detailed information see section	Page
Preconditions				
1	Preconditions for Operation and Instructions for Installation and Operation	Read the Preconditions for Operation and the Instructions for Installation and Operation.	<i>Preconditions for Installation and Operation, Instructions for Installation and Operation</i>	32, 33
Installation				
1	Hardware Update (for existing hardware installation)	For existing hardware installation (for the NXANL 50-RE hardware revisions 2 and 3) apply the netANALYZER hardware update.	<i>Hardware Update (existing Hardware Installation)</i>	35
2	Installing software from CD	Install the setup for the netANALYZER software from CD. 1. Insert CD 2. Install software	<i>Installing Software from CD</i>	37
3	Mounting the netANALYZER card into the PC Or Connect the netANALYZER device to the notebook.	3. Mount NANL-C500-RE card Read the corresponding safety instructions. Mount the netANALYZER card NANL-C500-RE into the PC. Or 3. Connect the NANL-B500-RE device Connect the netANALYZER device NANL-B500-RE d to the notebook. Important: Connect only one 24 V DC power supply to the device.	<i>Safety Instructions</i> <i>Mounting Analyzer Card NANL-C500-RE to the PC</i> <i>Connecting Analyzer Device NANL-B500-RE to the Notebook</i>	54 57 58
4	Inserting analyzer card or device in the communication link	Insert the NANL-C500-RE card or the NANL-B500-RE device into the communication link to be analyzed.	<i>Inserting Analyzer Card into the Communication Link</i>	59
5	Activating Wireshark GPIO Dissector	4. Activating Wireshark GPIO Dissector	<i>Activating Wireshark GPIO Dissector</i>	64
6	Performing File Settings	Set file name and capturing path for the capturing process.	<i>Performing File Settings</i>	79
Data Capturing				
1	Starting Data Capturing	Start the capturing process of the received Ethernet frames.	<i>Starting Data Capturing</i>	87
2	Converting binary Files into WinPcap Format	Convert binary files *.hea into WinPcap format *.pcap.	<i>Converting Binary Files into WinPcap Format</i>	88
3	Displaying Analysis Data	Display analysis data of the Ethernet Frames using e. g. Wireshark	<i>See help of the used network monitoring program.</i>	-
Timing Analysis				
1	Presettings	Enter title, select port, configure axis and histogram settings	<i>Timing Analysis</i>	91
2	Data Evaluation	Measuring value and histogram evaluation	<i>Timing Analysis</i>	91

Table 16: Getting started NANL-C500-RE Card or NANL-B500-RE

5.5 Hardware Update (existing Hardware Installation)

For existing hardware installation for the NXANL 50-RE hardware revisions 2 and 3 you must apply the netANALYZER hardware update and then update the driver and the software.

Therefore proceed as described below:

1. Burn an ISO image of the netANALYZER Hardware Update on a CD.
 - Burn the file *Update NXANL 50-RE Revision 3\netANALYZER_hw_update.iso* from the netANALYZER installation CD (product CD) as ISO image on a CD.
2. Boot the PC with the existing hardware installation.
3. Put the CD with the ISO image of the netANALYZER hardware update into the CD-ROM drive of this PC.
 - The system of the PC boots and after a short time the following text is displayed at the screen:

```
-----  
This is an update CD for netANALYZER Rev 2 an Rev 3 card which do not work  
under Windows Vista and Windows 7.  
  
This happens due to an invalid subvendor ID provided by the cards on the PCI  
bus. Please call "netanalyzer-update" to start the update procedure.  
-----  
user@netANALYZER-update: ~$
```

4. Start the Hardware Update.
 - Therefore enter `netanalyzer-updater`.

```
user@netANALYZER-update: ~$netanalyzer-updater
```

- Press **Enter**.
- The hardware update utility searches for Hilscher devices and then for netANALYZER devices.

➤ The following text is displayed at the screen:

```
Initializing drivers: Done
Search Hilscher Devices: Done
Found Hilscher Devices
-----
Bus| Dev |Func | Phys Addr. | Vendor | Device | SubVendor | SubDevice | DevClass
[Werte der Liste der Geräte]
-----
Do you want to continue with the update? (y/n)
```

5. Continue the Hardware Update.

➤ Therefore enter `y`.

```
Do you want to continue with the update? (y/n)y
```

➤ Press **Enter**.

➤ The following text is displayed at the screen:

```
Please reboot your computer now, to activate the changes!
user@netANALYZER-update: ~$
```

6. Reboot the PC with the existing hardware installation.

➤ The hardware update is finished.

7. Now actualize the netANALYZER driver and the netANALYZER software, as described under section *How to install the Software* from page 38 on.

5.6 Installing Software from CD

5.6.1 Components and Options

The Software installation includes the following components:

- netANALYZER Software **netANALYZER**
- netANALYZER Driver
- Wireshark netANALYZER Plugin
- Documentation
- Examples

The software installation from CD contains the following possibilities:

(1.) Full Install

Installs the netANALYZER software, the netANALYZER Driver and the Wireshark Plugin.

(2.) netANALYZER Software Install

Installs only the netANALYZER software.

(3.) netANALYZER Driver Install

Installs only the netANALYZER Driver.

(4.) Wireshark Plugin Install

Installs only the Wireshark Plugin.

5.6.2 How to install the Software



Important! Before installing the software any existing old versions of the netANALYZER software and the netANALYZER driver must be uninstalled.

To install the software proceed as described hereafter:

1. Close all programs!
2. Enter the netANALYZER Installation CD in the local CD ROM drive.
- The start screen of the autostart menu is displayed with the following options:

netANALYZER

Full Install: netANALYZER Software, Driver and Wireshark Plugin

Install netANALYZER Software only

Install netANALYZER Driver only

Install Wireshark Plugin only

Documentation

Examples

Figure 11: Options Autostart Menu of the netANALYZER Installation CD: Options netANALYZER Software

3. Select netANALYZER of the autostart menu.



Note: Under Windows® XP you need administration rights for the installation!

4. Select scope of installation:

The autostart menu offers four installation options:

- (1.) Full Install
 - (2.) Install netANALYZER Software only
 - (3.) Install netANALYZER Driver only
 - (4.) Install Wireshark netANALYZER Plugin only
5. Follow to the instructions at the screen.

(1.) Full Install

- Select **Full Install: netANALYZER Software, Driver and Wireshark Plugin**, if the full scope of installation is required.
- ↻ The following installations are started now sequentially:
 - netANALYZER Software **netANALYZER**
 - netANALYZER Driver
 - Wireshark netANALYZER Plugin
- Follow to the instructions at the screen.

(2.) Install netANALYZER Software only

- Select **Install netANALYZER Software only**, if only the netANALYZER Software installation is required.
- ↻ The following installation is started:
 - netANALYZER Software **netANALYZER**.
- Follow to the instructions at the screen.

(3.) Install netANALYZER Driver only

- Select **Install netANALYZER Driver only**, if only the netANALYZER Driver installation is required.
- The following installation is started:
 - netANALYZER Driver.
- Follow to the instructions at the screen.

(4.) Install Wireshark netANALYZER Plugin only

- Select **Install Wireshark Plugin only**, if only the Wireshark netANALYZER Plugin installation is required.
- The following installation is started:
 - Wireshark netANALYZER Plugin
- Follow to the instructions at the screen.

5.6.2.1 Installation netANALYZER Software

This section describes the installation procedure of the netANALYZER Software, if the following options are selected in the autostart menu:

- **Full Install: netANALYZER Software, Driver and Wireshark Plugin**

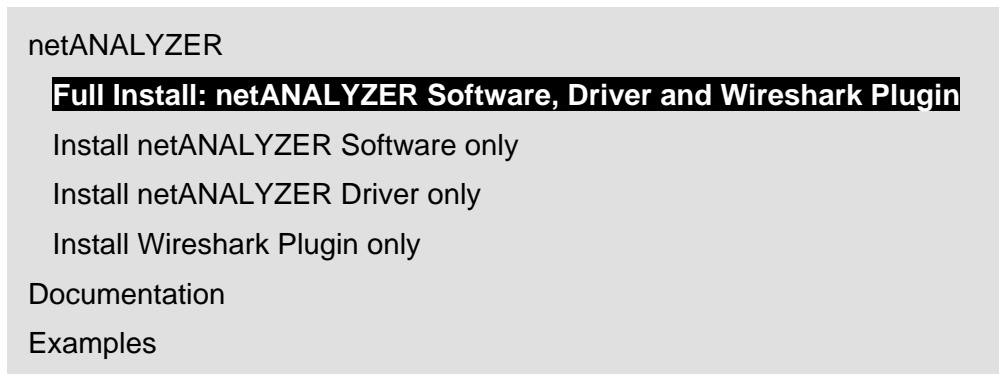


Figure 12: Options Autostart Menu of the netANALYZER Installation CD: Installation of the netANALYZER Software via „Full Install“

or

- **Install netANALYZER Software only**

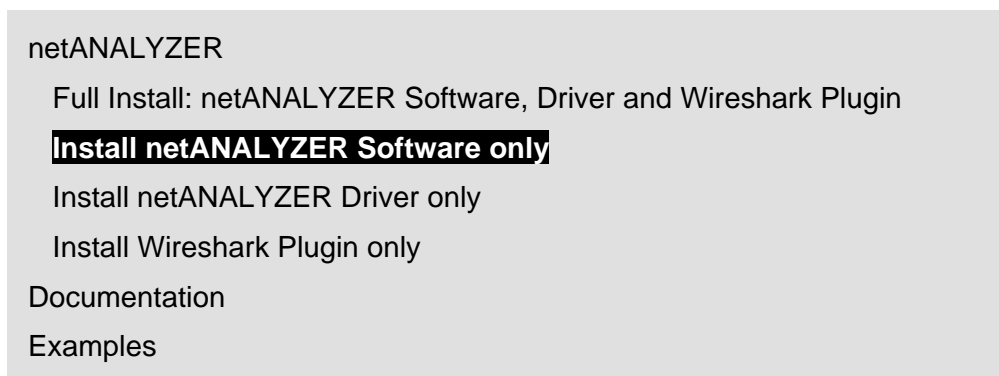


Figure 13: Options Autostart Menu of the netANALYZER Installation CD: Installation of the netANALYZER Software via „Install netANALYZER Software only“

➤ The installation is started:



Figure 14: netANALYZER Setup Wizard: Start Screen

➤ The screen **Welcome to the netANALYZER Setup Wizard** is displayed:

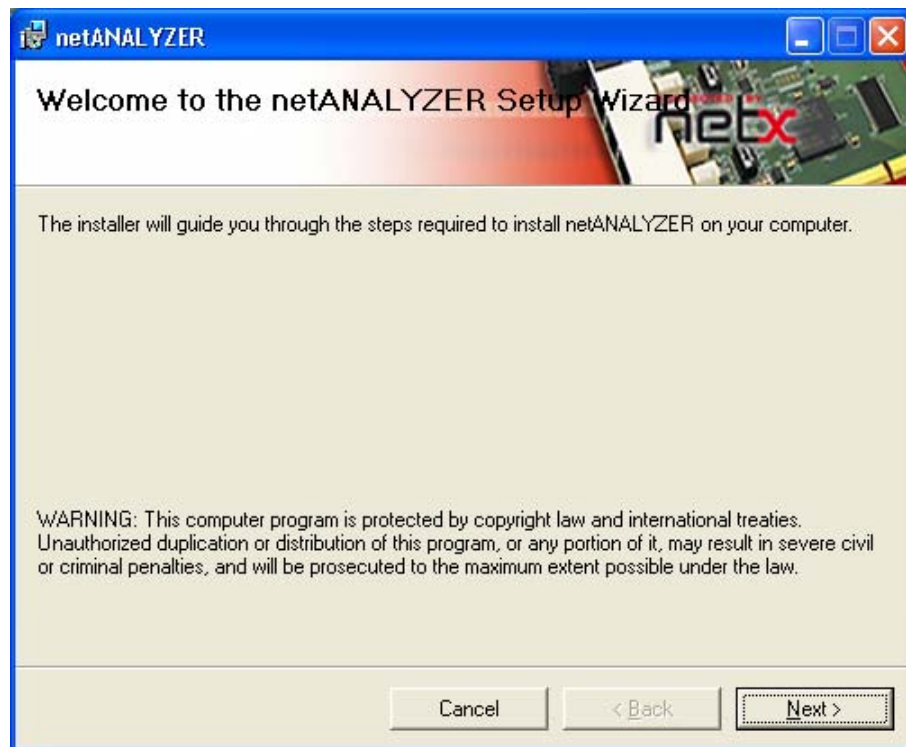


Figure 15: netANALYZER Setup Wizard: The Installer guides you through the Setup.

➤ Click to **Next**.

➤ The screen **License Agreement** is displayed:

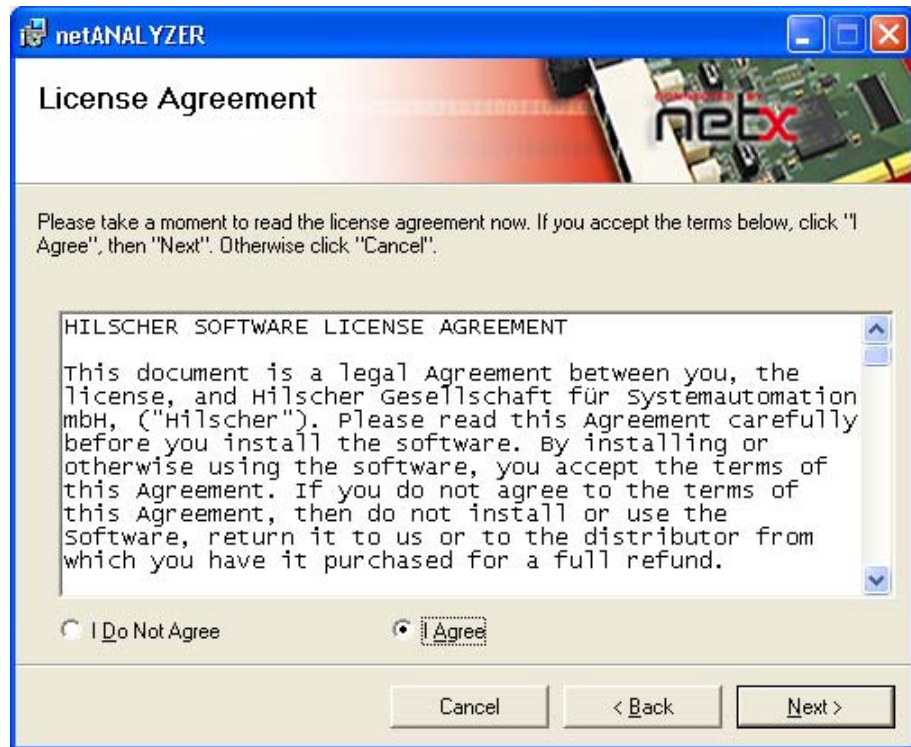


Figure 16: netANALYZER Setup Wizard: Hilscher Software License Agreement

- Click to **I Agree**.
- The screen **Select Installation Folder** is displayed:

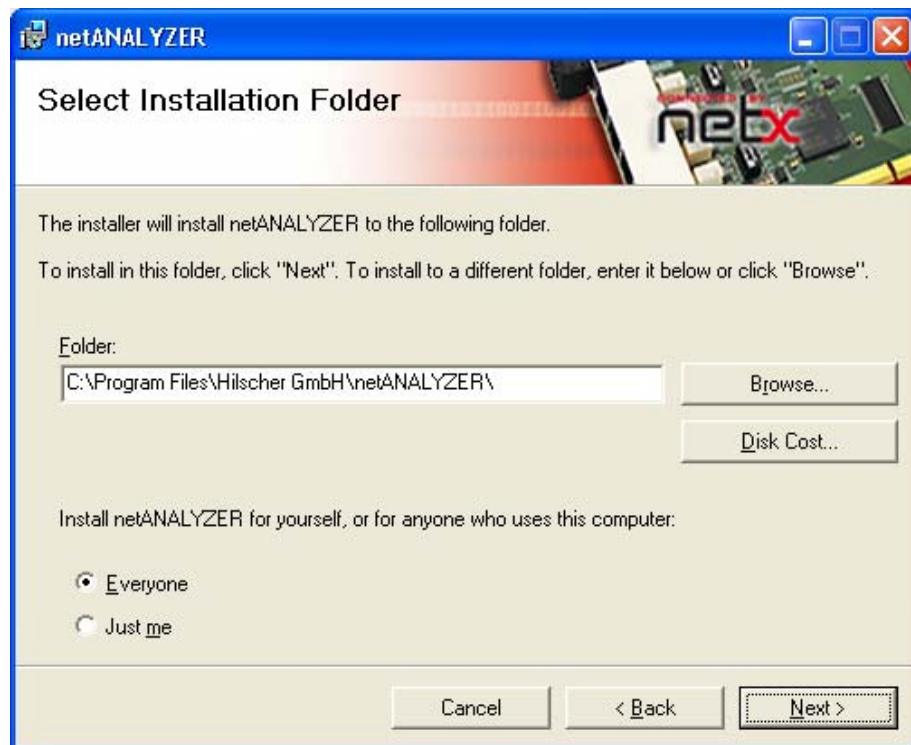


Figure 17: netANALYZER Setup Wizard: Defining the Installation Directory and the User

- Under **Folder** define the installation folder.
- Possibly select via **Browser...** a different directory.

- Possibly check via **Disk Cost...** the free disk space.
- Define the user: **Everyone** or **Just me**.
- The screen **Confirm Installation** is displayed:

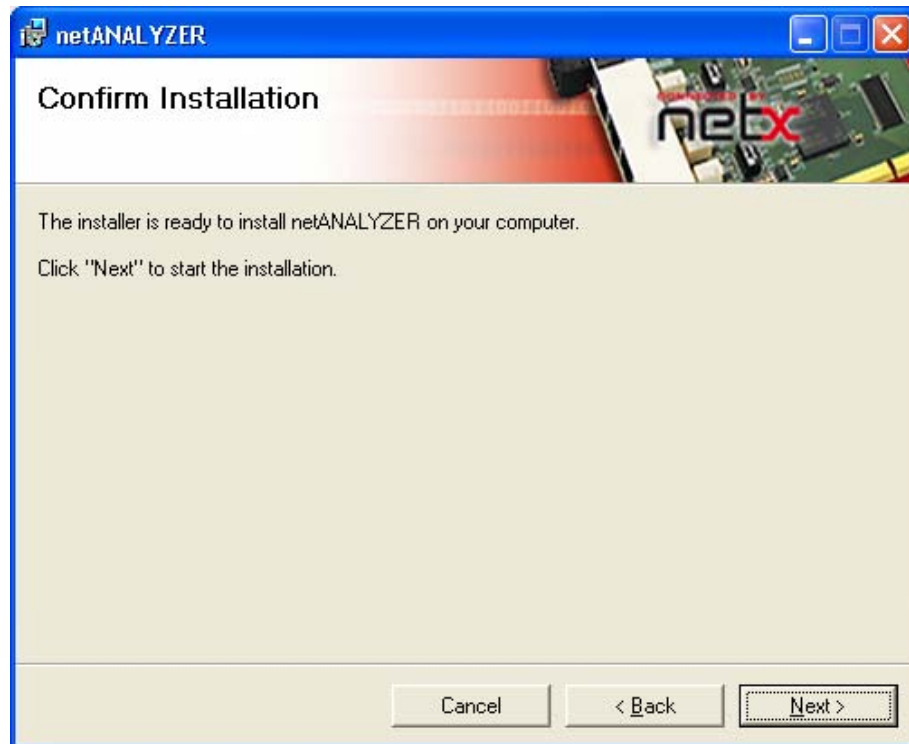


Figure 18: netANALYZER Setup Wizard: Starting the netANALYZER Installation

- Start the netANALYZER installation via **Next**.
- The screen **Installing netANALYZER** is displayed:

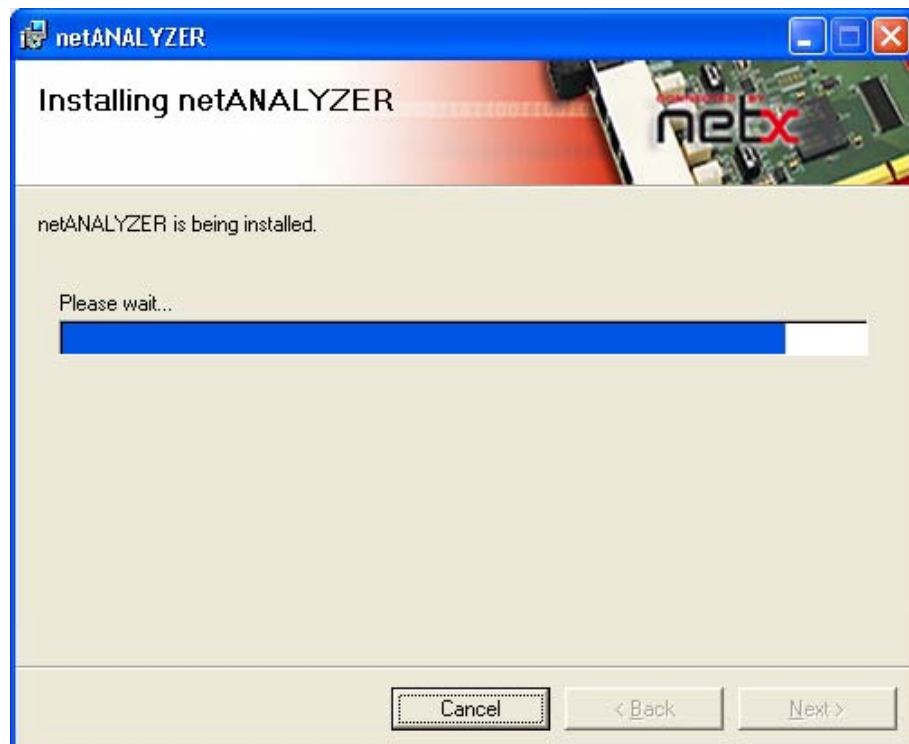


Figure 19: netANALYZER Setup Wizard: netANALYZER Installation

➤ The screen **Installation complete** is displayed:

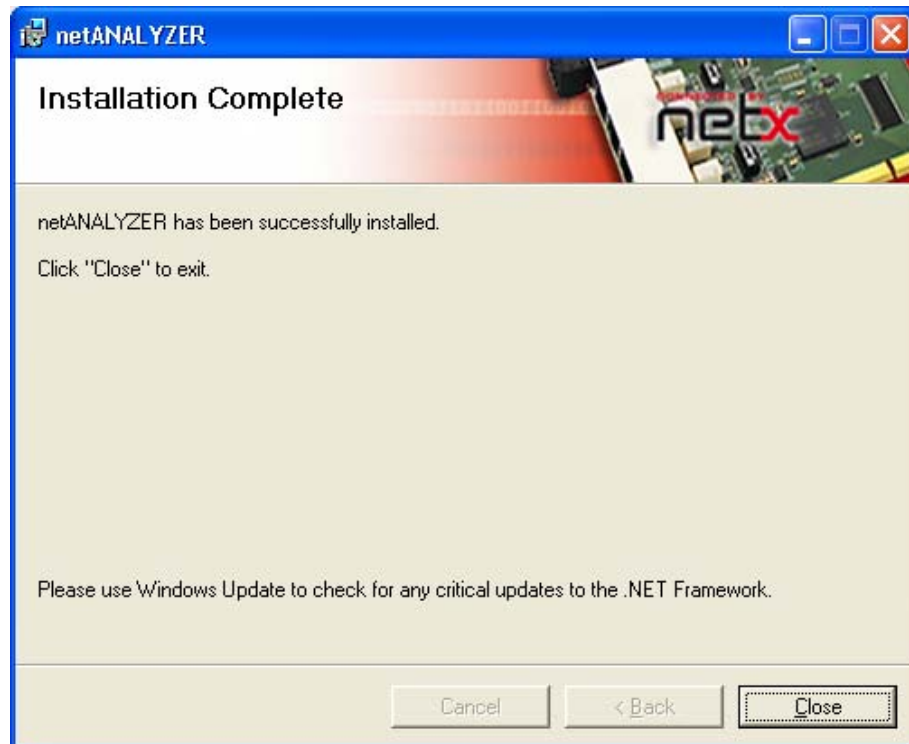


Figure 20: netANALYZER Setup Wizard: Closing the netANALYZER Installation

➤ Close the netANALYZER installation via **Close**.

➤ The netANALYZER installation is complete.

For the selection **Full Install** now will follow:

- the netANALYZER Driver Setup Wizard and
- the netANALYZER Wireshark Setup Wizard.

5.6.2.2 Installation netANALYZER Driver

This section describes the installation procedure of the netANALYZER Driver, if the following options are selected in the autostart menu:

- **Full Install: netANALYZER Software, Driver and Wireshark Plugin**

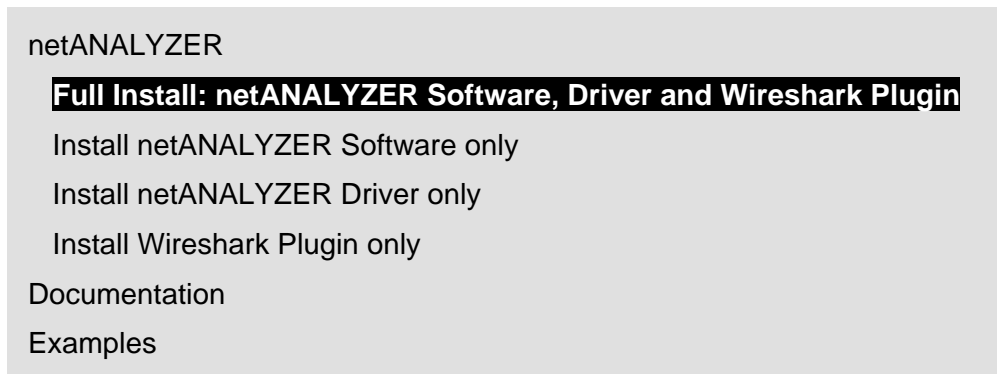


Figure 21: Options Autostart Menu of the netANALYZER Installation CD: Installation of the netANALYZER Driver via „Full Install“

or

- **Install netANALYZER Driver only**

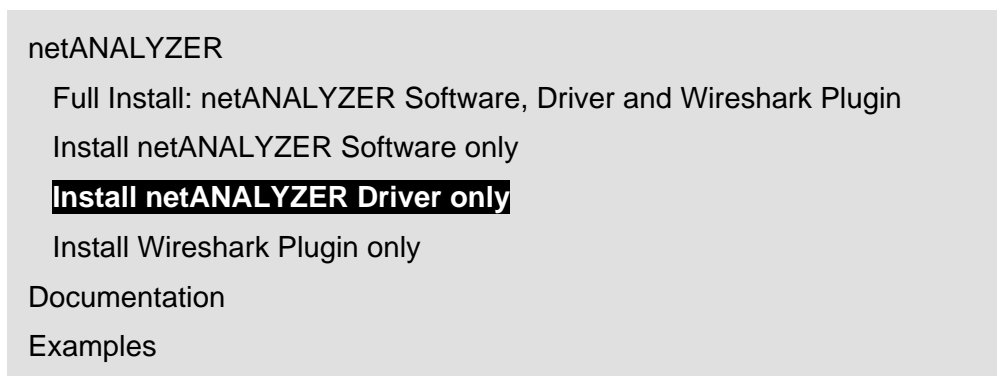


Figure 22: Options Autostart Menu of the netANALYZER Installation CD: Installation of the netANALYZER Driver via „Install netANALYZER Driver only“

⇒ The installation is started:

For the selection **Full Install** first will follow:

- the netANALYZER Setup Wizard.

⇒ Then screen **Please read the netANALYZER Device Driver License Agreement** is displayed:



Figure 23: netANALYZER Device Driver Setup Wizard (Example (x86) 1.3.4.0): Hilscher Software License Agreement

- Check **I accept the terms in the License Agreement**.
- Start the netANALYZER Driver Installation via **Install**.
- The screen **Installing netANALYZER Device Driver** is displayed:

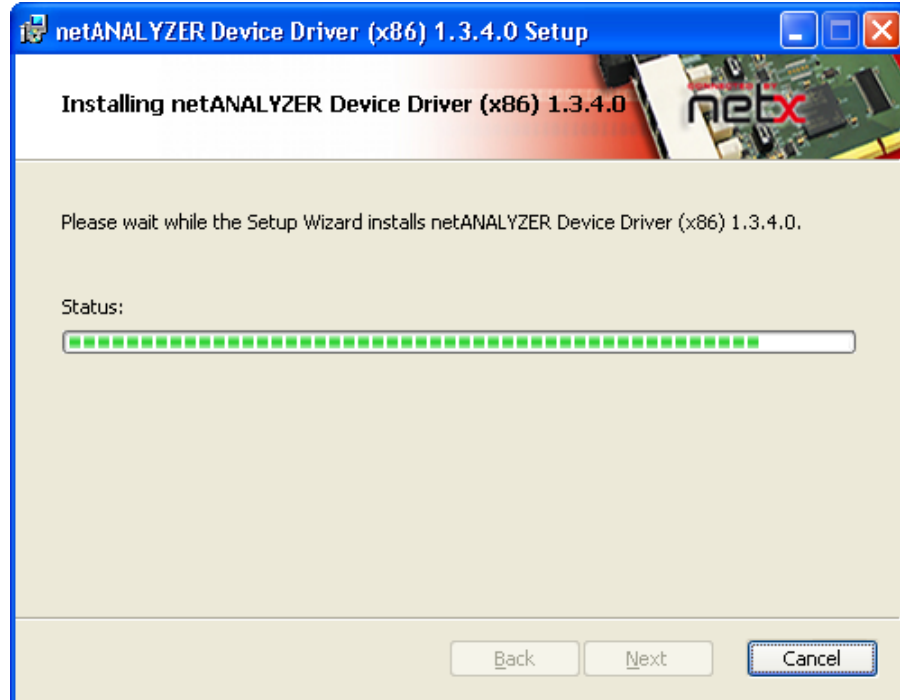


Figure 24: netANALYZER Device Driver Setup Wizard (Example (x86) 1.3.4.0): netANALYZER Driver Installation

- The screen **Completed the netANALYZER Device Driver Setup Wizard** is displayed:



Figure 25: netANALYZER Device Driver Setup Wizard (Example (x86) 1.3.4.0): Finishing the netANALYZER Driver Installation

- Finish the netANALYZER Driver Installation via **Finish**.
- The netANALYZER Driver Installation is complete.

For the selection **Full Install** now will follow:

- the netANALYZER Wireshark Setup Wizard.

5.6.2.3 Hints on how to install the netANALYZER Driver manually

The netANALYZER Device Driver can be installed manually.

Via EXE File (recommended):

By use of the setup file „netANALYZER Driver Setup.exe“ the bit version („x86“ = 32-bit or „x64“ = 64-bit) is selected automatically.

- To install the netANALYZER Driver manually, double click in the „Driver“ of the netANALYZER Installation CD to the file „netANALYZER Driver Setup.exe“.

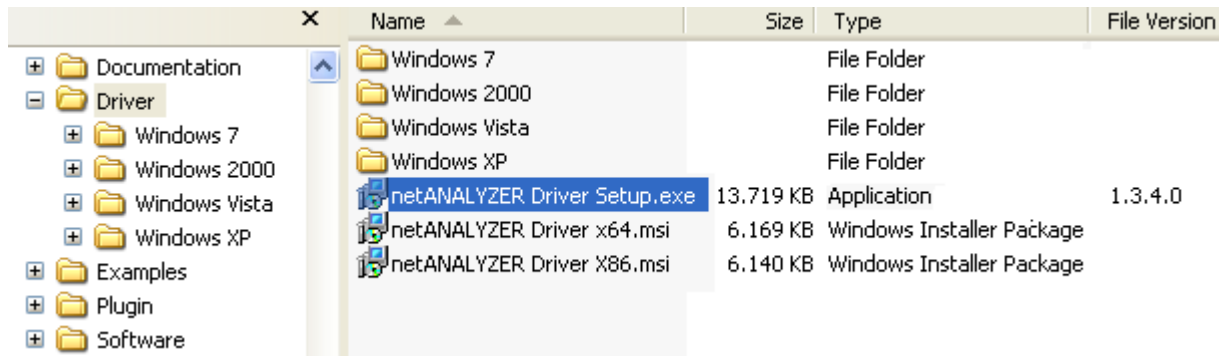


Figure 26: netANALYZER Driver Installation manually

- Follow to the instructions at the screen.

Via MSI File:

Note: If for the netANALYZER Driver Installation the netANALYZER Driver x[bit version].msi file is activated via double click and the bit version („x86“ = 32-bit, „x64“ = 64-bit) of the activated file is incompatible to the system requirements, the Windows Installer error message is displayed, that the installation package is not supported by this processor type.

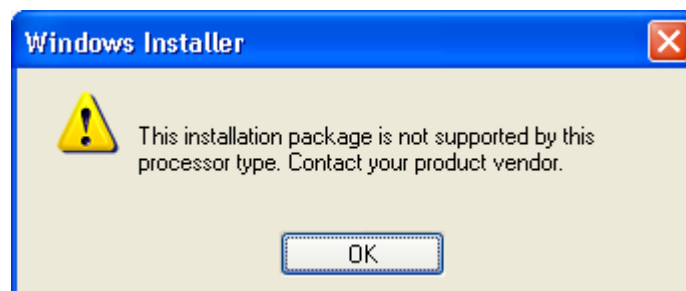


Figure 27: netANALYZER Driver manual Installation Error Message

- To install the netANALYZER Driver correctly, select the bit version of the netANALYZER Driver x[bit version].msi file, which is compatible to the system requirements.

5.6.2.4 Installation Wireshark netANALYZER Plugin

This section describes the installation procedure of the netANALYZER Wireshark Plugin, if the following options are selected in the autostart menu:

- **Full Install: netANALYZER Software, Driver and Wireshark Plugin**

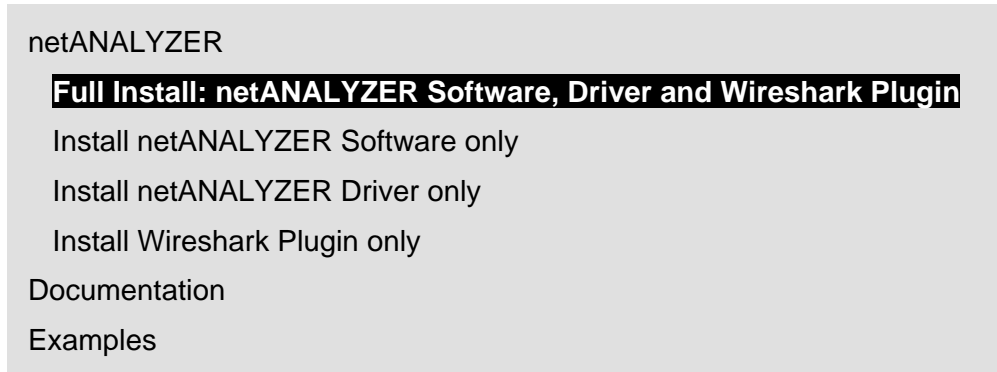


Figure 28: Options Autostart Menu of the netANALYZER Installation CD: Installation of the netANALYZER Wireshark Plugin via „Full Install“

or

- **Install Wireshark Plugin only**

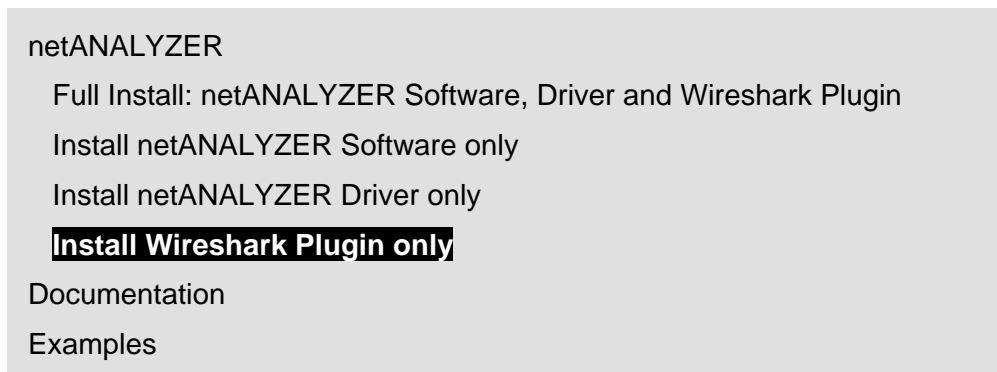


Figure 29: Options Autostart Menu of the netANALYZER Installation CD: Installation of the netANALYZER Wireshark Plugin via „Install Wireshark Plugin only“

⇒ The installation is started:

For the selection **Full Install** first will follow:

- the netANALYZER Setup Wizard and
- the netANALYZER Driver Setup Wizard.

⇒ Then screen **Welcome to the netANALYZER Driver Setup Wizard** is displayed:

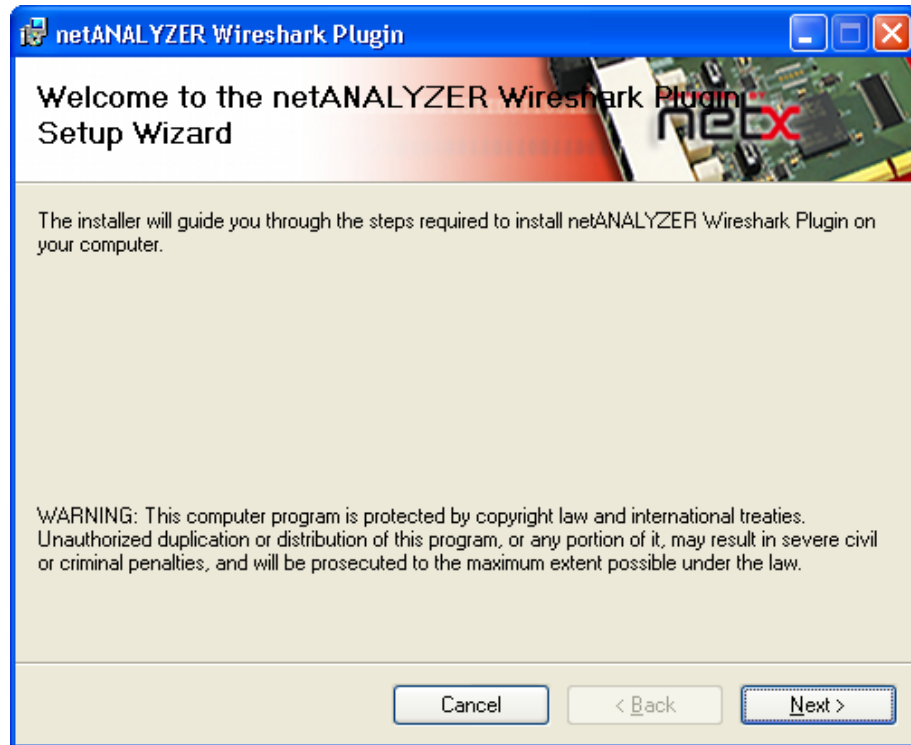


Figure 30: netANALYZER Wireshark Plugin Setup Wizard: The Installer guides you through the Setup.

- Click to **Next**.
- The screen **Select Installation Folder** is displayed:

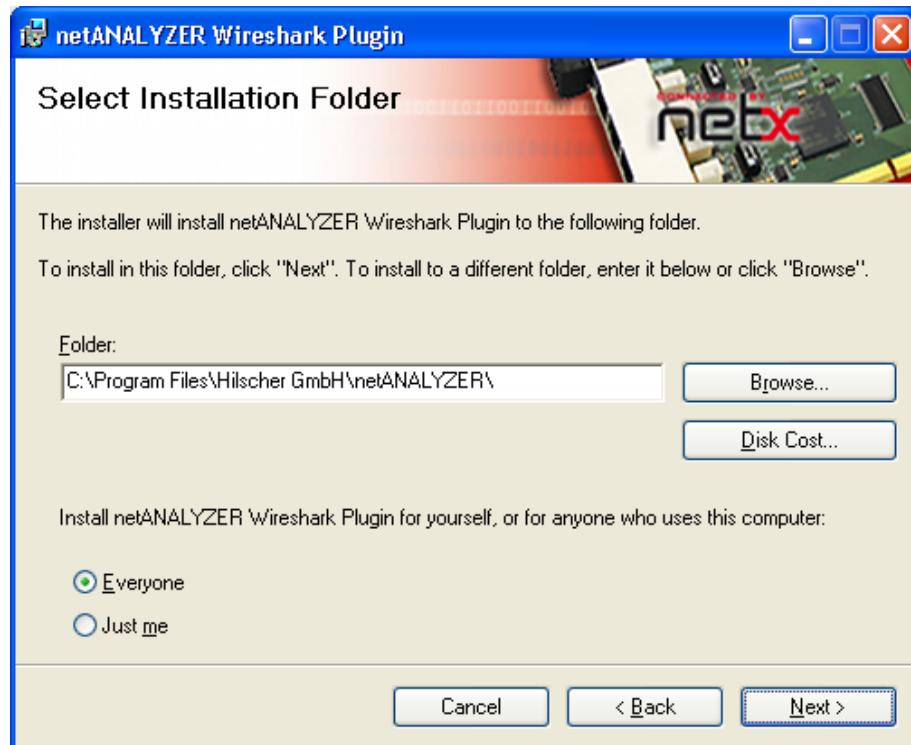


Figure 31: netANALYZER Wireshark Plugin Setup Wizard: Defining the Installation Directory and the User

- Under **Folder** define the installation folder.
- Possibly select via **Browser...** a different directory.

- Possibly check via **Disk Cost...** the free disk space.
- Define the user: **Everyone** or **Just me**.
- The screen **Confirm Installation** is displayed:

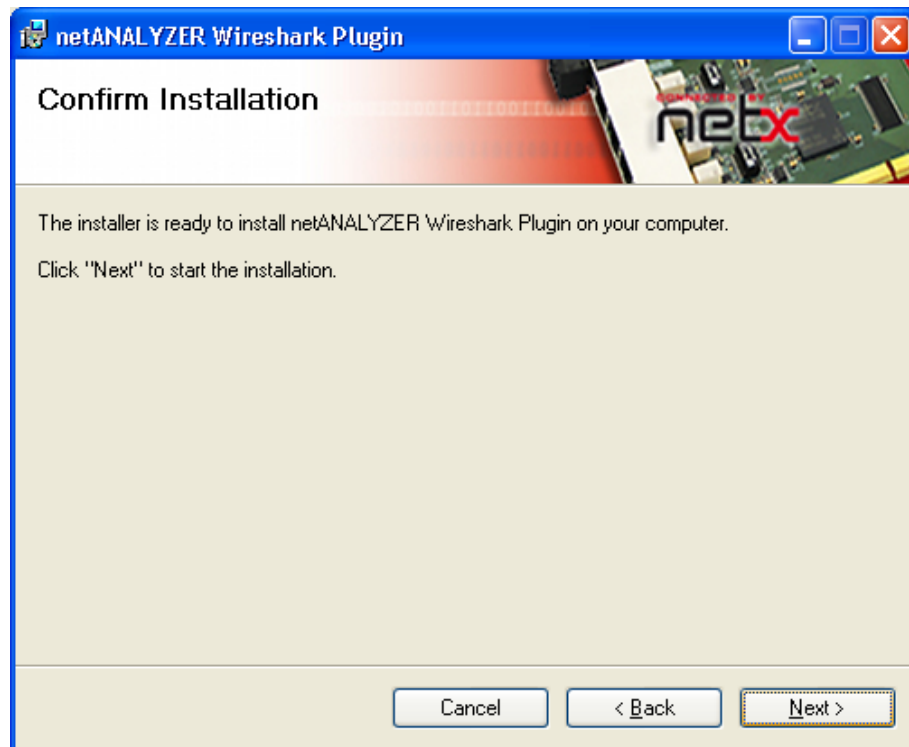


Figure 32: netANALYZER Wireshark Plugin Setup Wizard: Starting the netANALYZER Wireshark Plugin Installation

- Start the netANALYZER Wireshark Plugin Installation via **Next**.
- The screen **Installing netANALYZER** is displayed:

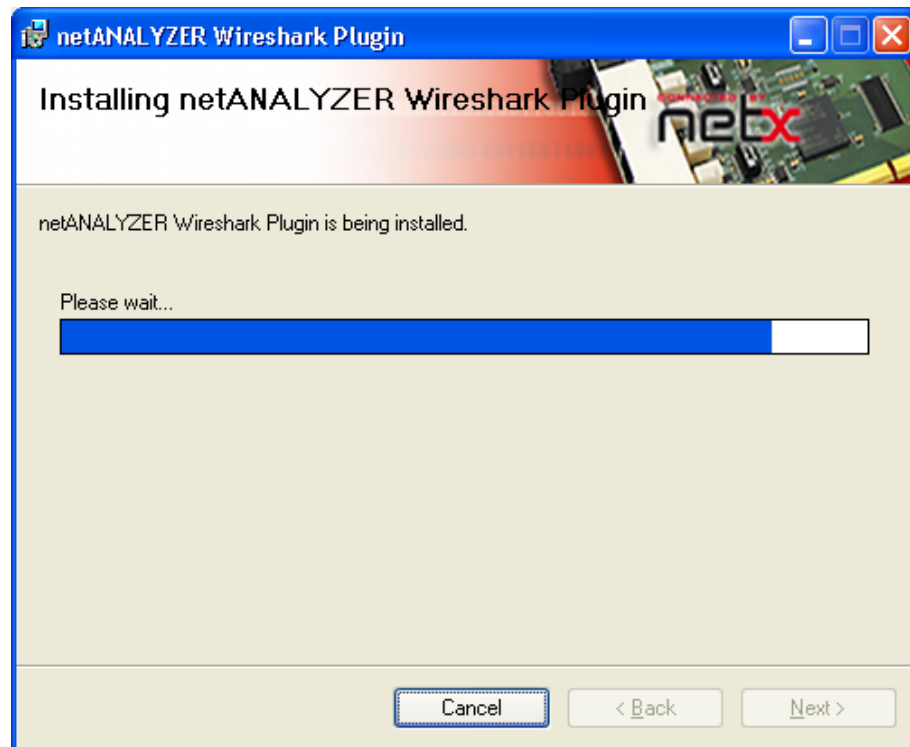


Figure 33: netANALYZER Wireshark Plugin Setup Wizard: netANALYZER Wireshark Plugin Installation

➤ The screen **Installation complete** is displayed:

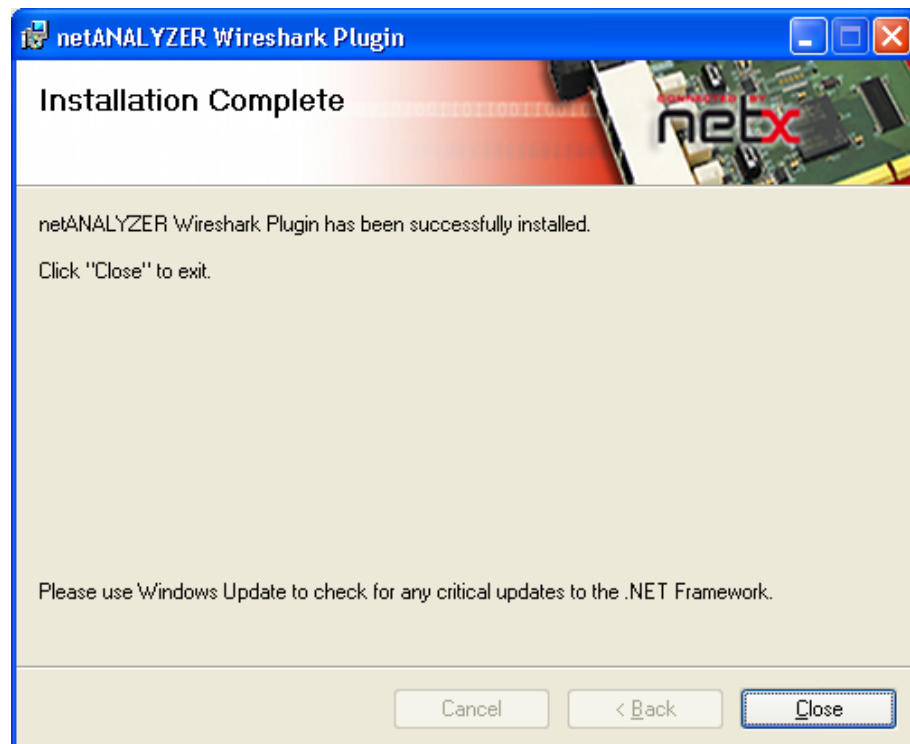


Figure 34: netANALYZER Wireshark Plugin Setup Wizard: Close the netANALYZER Wireshark Plugin Installation

➤ Close the netANALYZER Wireshark Plugin Installation via **Close**.

➤ The netANALYZER Wireshark Plugin Installation is complete.

5.6.3 Open Documentation or Examples

Via the autostart menu of the netANALYZER Installation CD are also available:

- The documentation for the netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE
- 2 programming examples for the application programming interface (API) the netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE

Therefore:

1. Close all programs!
 2. Enter the netANALYZER Installation CD in the local CD ROM drive.
- ⇒ The start screen of the autostart menu is displayed with the following options:

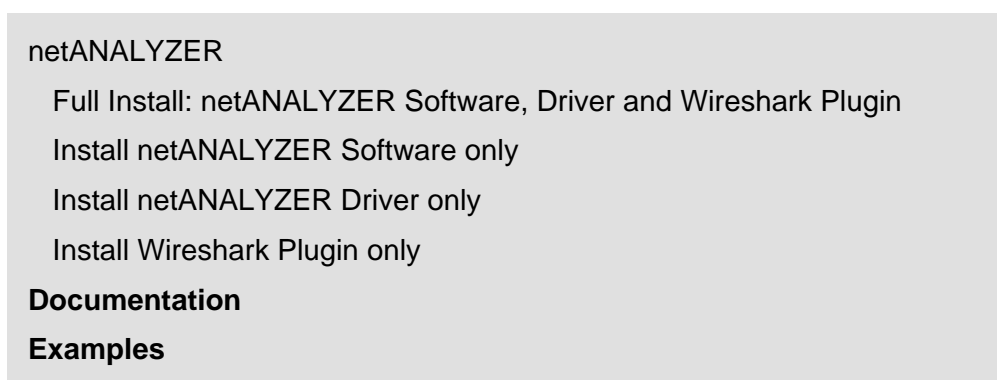


Figure 35: Options Autostart Menu of the netANALYZER Installation CD: Documentation or Programming Examples

3. Documentation:

➤ Click to **Documentation**.

⇒ The folder **Documentation** is displayed with:

- The user manual **netANALYZER NANL-C500-RE and NANL-B500-RE, Analyzer Card NANL-C500-RE, Analyzer Device NANL-B500-RE and netANALYZER Software**
- The folder **API** with the **Driver Manual netANALYZER API, Windows 2000/XP/Vista/7, V1.3**

Refer also to section *Documentations netANALYZER* on page 13.

4. Programming Examples:

➤ Click to **Examples**.

⇒ The folder **Examples** is displayed with:

- ⇒ 2 programming examples for the application programming interface (API) the netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE

5.7 Installing NANL-C500-RE and NANL-B500-RE

5.7.1 Safety Instructions

Obey to the following safety advices, when installing the NANL-C500-RE card.

5.7.1.1 Electrical Shock Hazard

NANL-C500-RE Card:



DANGER!



Lethal Electrical Shock caused by parts with more than 50V!

- HAZARDOUS VOLTAGE inside of the PC.
 - Therefore first disconnect the power plug of the PC.
 - Make sure, that the power supply is off at the PC.
 - Open the PC cabinet and install or remove the NANL-C500-RE card only after disconnecting power.
-

USA:



⚠ DANGER



Lethal Electrical Shock caused by parts with more than 50V!

- HAZARDOUS VOLTAGE inside of the PC.
 - Therefore first disconnect the power plug of the PC.
 - Make sure, that the power supply is off at the PC.
 - Open the PC cabinet and install or remove the NANL-C500-RE card only after disconnecting power.
-

5.7.2 Property Damage Messages

Obey to the following property damage messages, when installing the netANALYZER card NANL-C500-RE and the netANALYZER device NANL-B500-RE.

5.7.2.1 Device Destruction by exceeding allowed Supply or Signaling Voltage



NOTICE

Device Destruction!

NANL-C500-RE Card:

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.

NANL-B500-RE Device:

- The voltage applied at the NANL-B500-RE device must not exceed 30 V, otherwise the device may be destroyed.
- Connect only one 24 V DC power supply to the device. If the device is connected to both power connectors (0V/+24V/PE and +24V) simultaneously, this may lead to damage to the used power supply units!

NANL-C500-RE Card and NANL-B500-RE Device:

- All I/O signal pins at the NANL-C500-RE card and at the NANL-B500-RE tolerate only 3.3 V signaling voltage!
- Operation with 5 V signaling voltage may lead to severe damage to the NANL-C500-RE card or to the NANL-B500-RE device!

USA:



NOTICE

Device Destruction!

NANL-C500-RE Card:

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.

NANL-B500-RE Device:

- The voltage applied at the NANL-B500-RE device must not exceed 30 V, otherwise the device may be destroyed.
- Connect only one 24 V DC power supply to the device. If the device is connected to both power connectors (0V/+24V/PE and +24V) simultaneously, this may lead to damage to the used power supply units!

NANL-C500-RE Card and NANL-B500-RE Device:

- All I/O signal pins at the NANL-C500-RE card and at the NANL-B500-RE tolerate only 3.3 V signaling voltage!
- Operation with 5 V signaling voltage may lead to severe damage to the NANL-C500-RE card or to the NANL-B500-RE device!

5.7.2.2 Electrostatically sensitive Devices

NANL-C500-RE Card:

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.



NOTICE

Electrostatically sensitive Devices

To prevent damage to the PC and the NANL-C500-RE, make sure:

- that the NANL-C500-RE card is grounded via the endplate and the PC and make sure,
 - that you are discharged when you mount/demount the NANL-C500-RE card.
-

USA:



NOTICE

Electrostatically sensitive Devices

To prevent damage to the PC and the NANL-C500-RE, make sure:

- that the NANL-C500-RE card is grounded via the endplate and the PC and make sure,
 - that you are discharged when you mount/demount the NANL-C500-RE card.
-

5.7.3 Mounting Analyzer Card NANL-C500-RE to the PC



Note: The installation sequence:

1. Insert CD
2. Install software
3. Mount NANL-C500-RE card

must be obeyed. Otherwise, there will be incorrect registry entries. This in turn leads to disturbances in subsequent installation of software updates.

For mounting the netANALYZER card NANL-C500-RE to the PC handle as follows:



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC.
 - Make sure, that the power supply is off at the PC.
-

1. Open the cabinet of the PC.
2. Plug in the netANALYZER card NANL-C500-RE on a free PCI slot.
3. Fix the netANALYZER card NANL-C500-RE card using the hole intended.
4. Plug in the GPIO male connector to the female connector X40*. (*External Interface Input/Output Signals, see device drawing in section *Device Drawing NANL-C500-RE* on page 23.)
5. Close the PC casing.
6. Connect the PC to the power supply and switch on the PC.

5.7.4 Connecting Analyzer Device NANL-B500-RE to the Notebook



Note: The installation sequence:

1. Insert CD
2. Install software
3. Mount NANL-B500-RE device

must be obeyed. Otherwise, there will be incorrect registry entries. This in turn leads to disturbances in subsequent installation of software updates.

For connecting the netANALYZER device NANL-B500-RE to the Notebook handle as follows:

1. Plug in the ExpressCard of the netANALYZER device NANL-B500-RE to a free ExpressCard slot at the Notebook.
-



NOTICE

Device Destruction!

- Connect only one 24 V DC power supply to the device. Otherwise this may lead to damage to the used power supply units!
-
2. Connect the netANALYZER device NANL-B500-RE to an external 24V power supply.

5.7.5 Inserting Analyzer Card into the Communication Link

Connect the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE via two patch cables with the Ethernet device connections, in parallel to the communication connection to be analyzed. Basically, different assemblies are possible.



Note: To analyze the data transfer of a communication line between two devices, these devices must be connected to the same TAP (Test Application Point).

In the following subsections typical application cases are described.

5.7.6 Application Case 1

Capturing and analyzing the Communication between two Devices

- To capture the communication between two Ethernet devices, mount the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE over Ethernet cables as displayed in the picture below.
- Connect both Ethernet cable only in TAP A (or in TAP B).

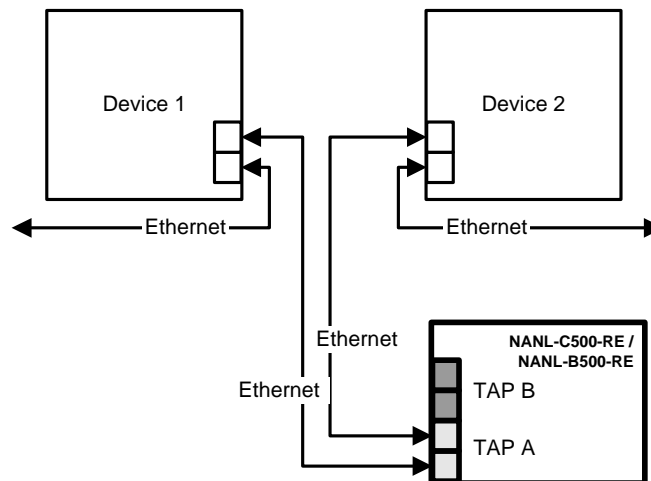


Figure 36: Application Case 1

Furthermore, it analyzes the number of erroneous messages.

A forwarding time of telegrams by a device can not be determined. See *Application Case 2*.

5.7.7 Application Case 2

Application Case 2 is the typical Application Case

In this case the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE can analyze the following procedures and parameters:

- the communication between two devices each for two channels each,
- the forwarding time through the device,
- the cycle time and the jitter in the cyclically running protocols,
- the changes of the data in the Ethernet frame through the device,
- the number of erroneous telegrams.

- To capture the communication of the two channels, mount the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE via Ethernet cables as shown in the picture.

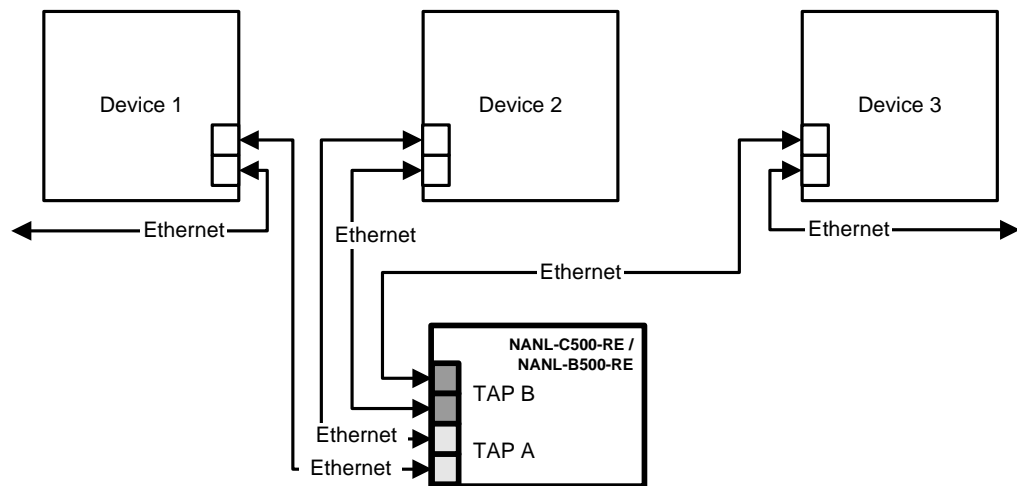


Figure 37: Application Case2

5.7.8 Application Case 3

Like Application Case 2, but with further Devices

This use case corresponds to the application case 2, but with the difference that further devices are between the two analyzed Ethernet channels.

In this case the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE can analyze the following procedures and parameters:

- the communication for two channels,
- the forwarding time through several devices,
- the cycle time and the jitter in the cyclically running protocols,
- the changes of the data in the Ethernet frame through several devices,
- the number of erroneous telegrams.

- To capture the communication of the two channels, mount the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE via Ethernet cables as shown in the picture.

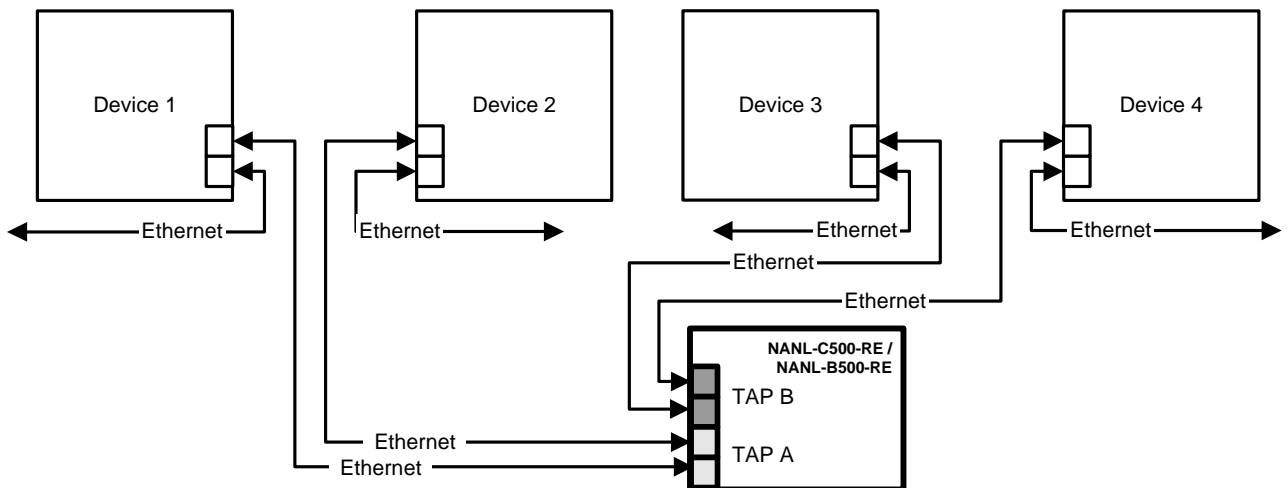


Figure 38: Application Case3

5.7.9 Application Case 4

Like Application Case 2, but with Analysis of Input Signals

This use case corresponds to the application case 2, but in addition to the Ethernet communication one to four input signals are included in the analysis. If an edge reversal at the digital input happens, a pseudo Ethernet frame with timestamp is created in the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE.

In this case the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE can analyze the following procedures and parameters:

- the communication between two devices for two channels,
- the forwarding time through the device,
- the cycle time and the jitter in the cyclically running protocols,
- the changes of the data in the Ethernet frame through the device,
- protocol-stack processing time from Ethernet frame reception to digital output switching,
- the input signal events on the basis of time-stamps,
- the number of erroneous telegrams.



NOTICE!

Device Destruction!

- All I/O signals are only 3.3 V tolerant.

USA:



NOTICE

Device Destruction!

- All I/O signals are max. 3.3 V tolerant.

-
- To capture the communication of the two channels, mount the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE via Ethernet cables as shown in the picture.

The picture also shows schematically how a digital output signal is connected from the device to the digital input of the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE.

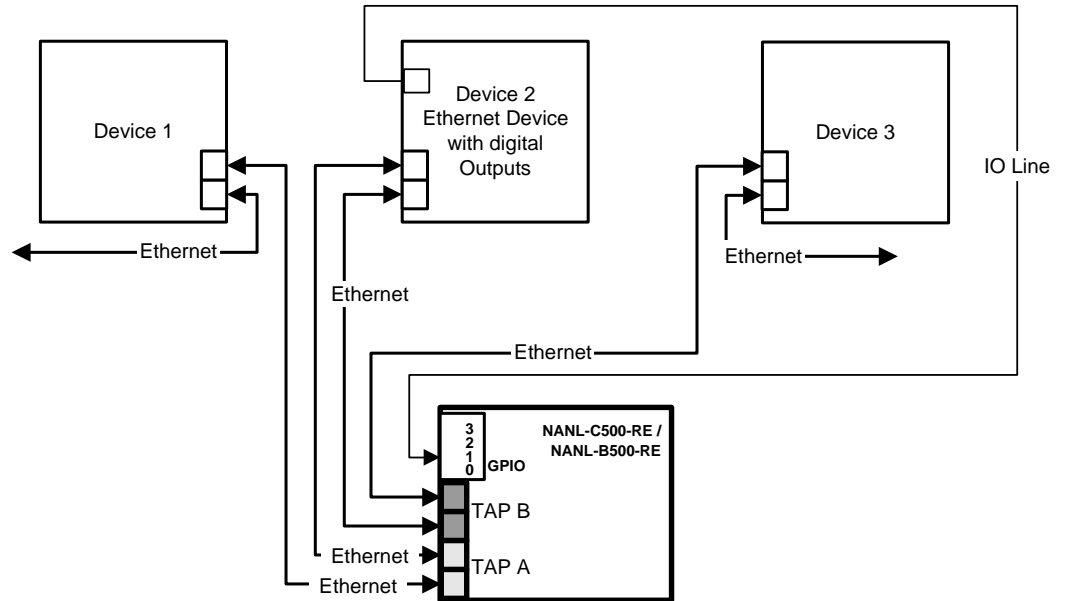


Figure 39: Application Case4 – Recording of the Runtime in the Device

5.8 Activating Wireshark GPIO Dissector



Note: GPIO events of the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE are decoded by Wireshark beginning with version 1.0.0. If after Wireshark installation the "Hilscher-netANALYZER-GPIO event" is not displayed, the appropriate protocol must be activated in Wireshark once.

Therefore:

- Select in the menu under **Edit > Preferences...** in the left column under **Protocols** „Hilscher“ and at the right side activate **Enable dissector**.

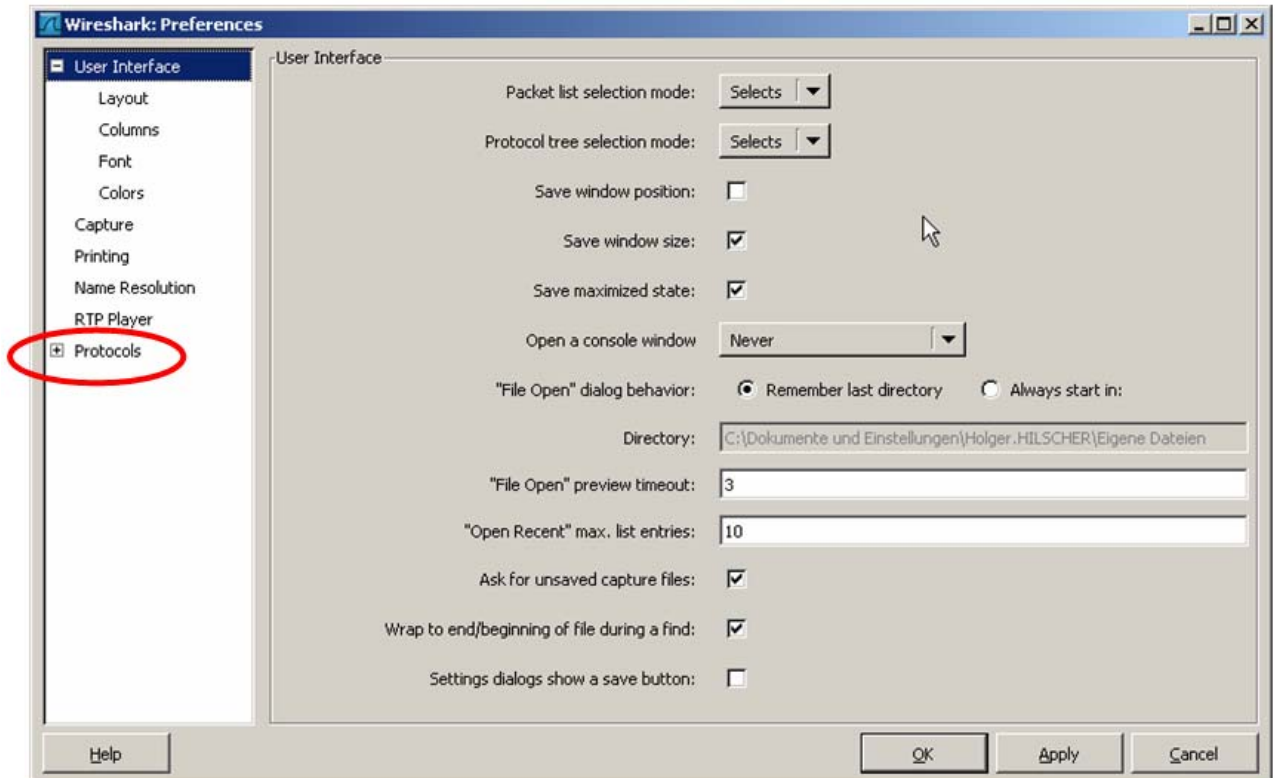


Figure 40: Wireshark: Preferences > Protocols

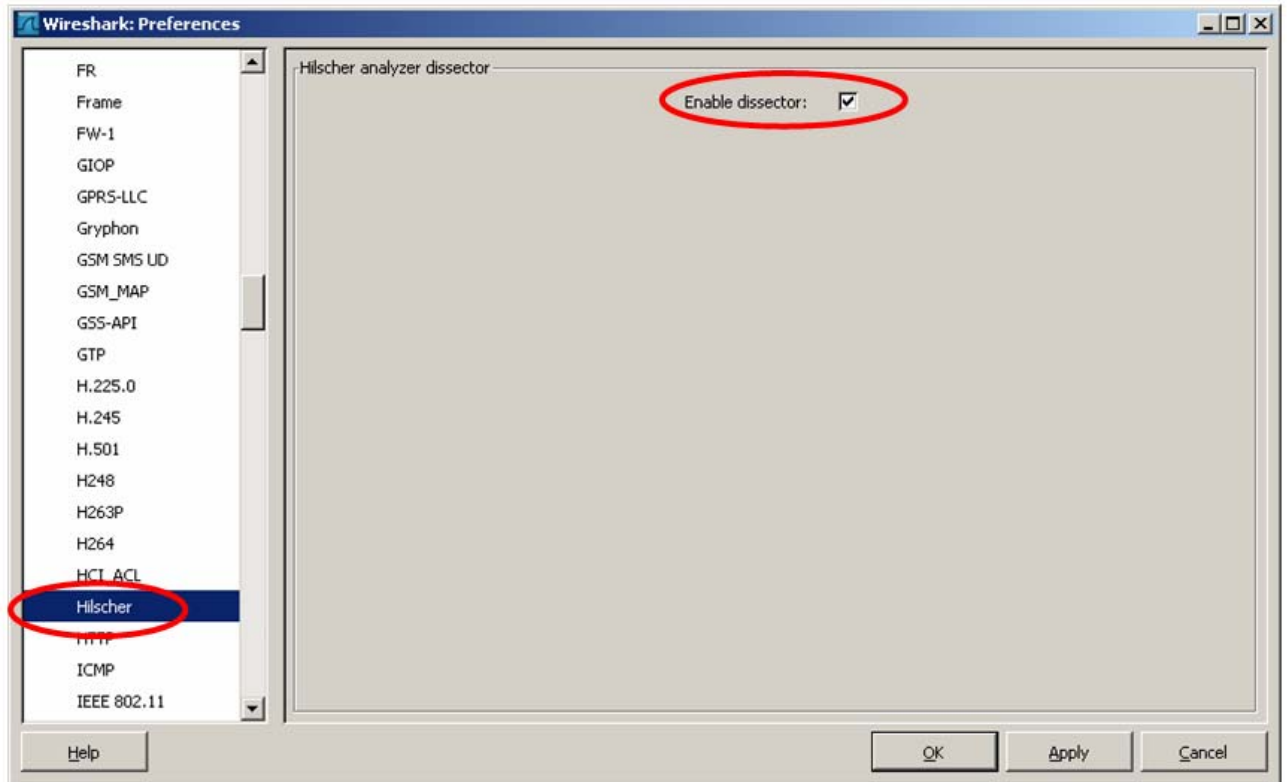


Figure 41: Wireshark: Preferences > ... Enable dissector

- In addition in the menu under **Analyze > Enable Protocols...** activate the protocol „Hilscher“.

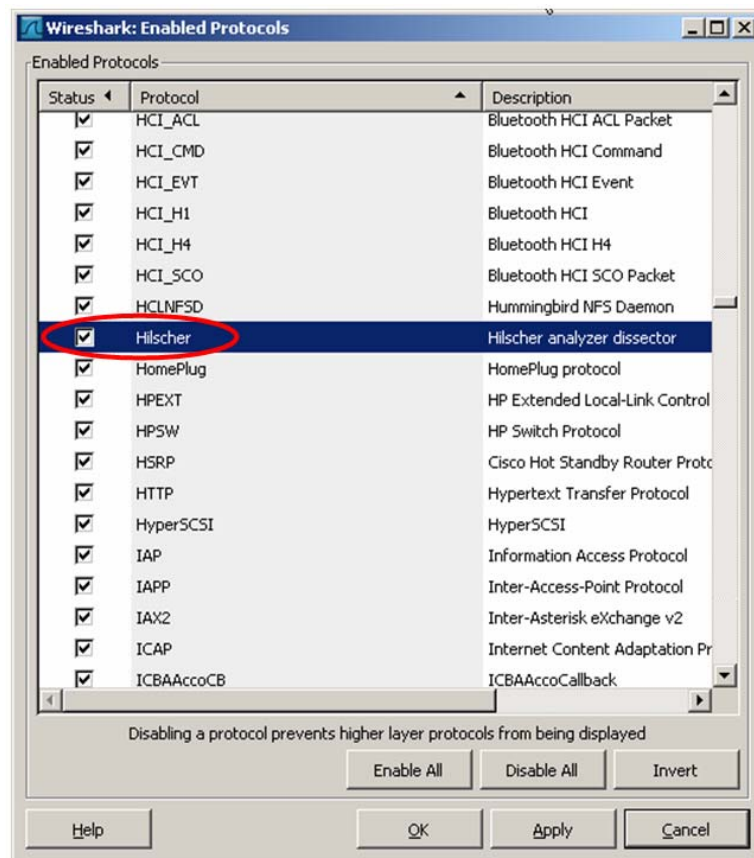


Figure 42: Wireshark: Enable Protocols

5.9 Wireshark netANALYZER Plugin

The Wireshark netANALYZER plugin allows to display in Wireshark the netANALYZER port number (the number of the port of the netANALYZER card) and specific error information for each Ethernet telegram.



Note: The Wireshark netANALYZER plugin is usable from Wireshark version 1.0.2.

5.9.1 Deinstalling earlier Plugins

Before installing the current plugin, the manually installed plugin of the netANALYZER versions 1.0-1.2 must be deinstalled manually. Also the 64-bit and the 32-bit Wireshark netANALYZER plugin are not compatible. Each of them must be deinstalled before the other plugin can be installed.



Note: The Wireshark netANALYZER plugin only can be deinstalled via *Start > Settings > Control Panel > Software > Add or Remove Programs > Currently installed programs > Remove*, if the plugin was already installed automatically before, otherwise the plugin must be deinstalled manually.

Deinstalling the Plugin manually

- Therefore delete the file „netanalyzer.dll“ or „netanalyzer_x64.dll“ from the directory *“plugins” of the installed Wireshark software* and replace it by the new plugin file.

Or, if the plugin file with the first manual installation was stored to the *user directory under “Application data” in the subdirectory “Wireshark\plugins”*, plugin file now must be deleted from this directory and must be replaced there by the current plugin file.

5.9.2 Installing the Plugin automatically



Note: The Wireshark netANALYZER plugin is installed with the netANALYZER installation automatically, only if Wireshark was installed on the computer before.

With the automatic installation the plugin is stored in the *user directory under “Application data” in the subdirectory “Wireshark\plugins” (C:\documents and Settings\[user name]\Application data \wireshark\plugins)*. Depending from the Windows® version the “Application data” directory can have also the name “appdata”.

5.9.3 Installing the Plugin manually

For questions about deinstalling the plugin refer to section *Deinstalling earlier Plugins* on page 67.



Note: If the Wireshark netANALYZER plugin was not installed automatically, it must be installed manually. This is required i. g., if Wirekshark was installed or actualized subsequently to the netANALYZER installation.

- To install the plugin manually, copy from the directory “plugin” of the netANALYZER Installation CD the file „netanalyzer.dll“ or „netanalyzer_x64.dll“ into the directory “*plugins*” of the installed *Wireshark software* or to the *user directory* under “*Application data*” in the subdirectory “*Wireshark\plugins*”.
- Select the file „netanalyzer.dll“, if Wireshark works as 32-bit version.
- Select the file „netanalyzer_x64.dll“, if Wireshark works as 64-bit version.

The „plugins“ directory for Wireshark is located for Wireshark version 1.0.4. mostly under „*C:\Program files\Wireshark\plugins\1.0.4*“. For another Wireshark version the version number differs accordingly.

After the netANALYZER plugin has been installed, it is activated automatically with the next start of the Wireshark program.

5.9.4 Wireshark: netANALYZER Info Block

If the Wireshark netANALYZER plugin is installed correctly, additionally port and error information are displayed for .pcap files, which contains a netANALYZER info block.

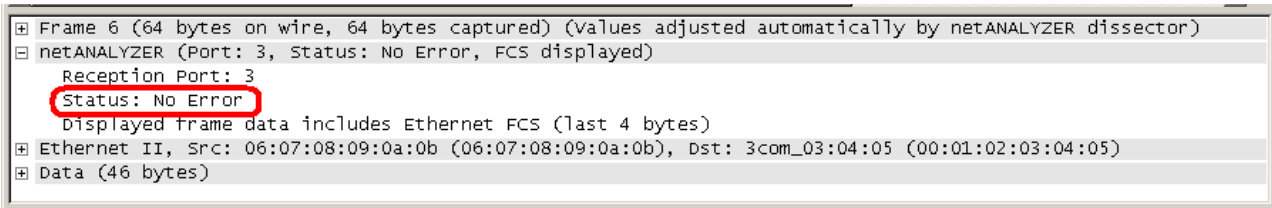


Figure 43: Wireshark: netANALYZER Info Block (Wireshark netANALYZER plugin was installed correctly): No Error

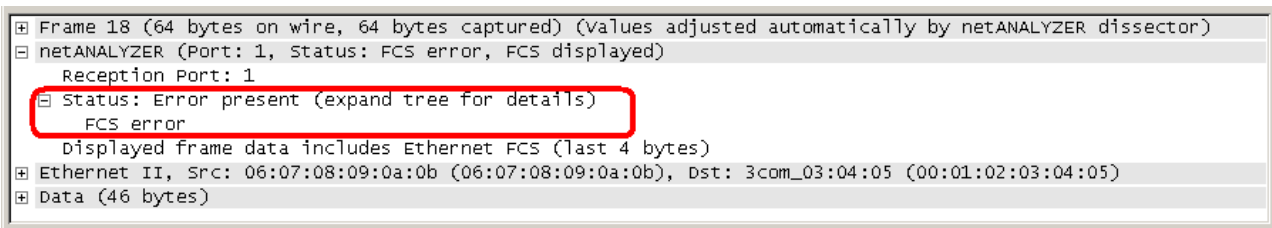


Figure 44: Wireshark: netANALYZER Info Block (Wireshark netANALYZER plugin was installed correctly): Error Messages with additional text information

5.9.4.1 Plugin not or not correctly installed



Note: If a .pcap files contains a netANALYZER info block and the plugin is not or not correctly installed, then Wireshark can interprete the available additional information at the end of the telegram not correctly and displays telegram errors. In this case deactivate the generation of the info block or (better) install the netANALYZER plugin.

If the plugin is not installed, then the info block can be recognized by „netANALYZER frame info block“ at the end of the telegram.

```

0000  01 0e cf 00 01 02 00 b2 23 34 45 00 88 92 00 80  .....#4E.....
0010  e7 90 3f 3b 00 00 00 00 06 21 38 04 89 00 00  ..?;.....18....
0020  00 00 00 00 02 16 00 00 00 00 00 00 00 00 00  .....
0030  00 00 00 00 00 00 00 00 00 00 00 00 00 04 0a 00 00  .....
0040  00 00 00 09 38 44 4c 00 06 06 00 00 00 00 00 00  ....8DI.....
0050  08 06 00 00 00 00 00 00 00 00 00 db 00 00 01 6e 65  .....ne
0060  74 41 4e 41 4c 59 5a 45 52 20 66 72 61 6d 65 20  tANALYZER frame
0070  69 6e 66 6f 20 62 6c 6f 63 6b 01 00 00 00 00 00  info block.....
    
```

Figure 45: Wireshark: netANALYZER Info Block without Plugin

5.9.5 Display Port Number in Wireshark Packet List

To display the port information in the protocol tree of Wireshark directly in the packet list of Wireshark a new column can be inserted.

- Select in Wireshark the menu **Edit > Preferences**

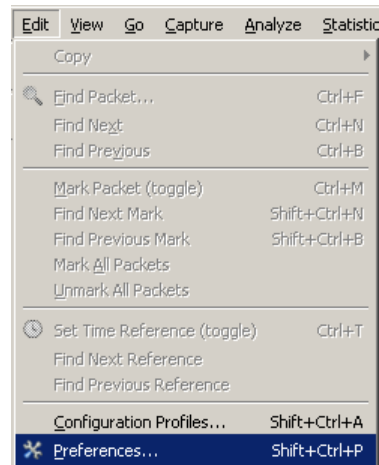


Figure 46: Wireshark: Edit > Preferences

- Select in the appearing window at the left side the entry **User Interfaces > Columns**.

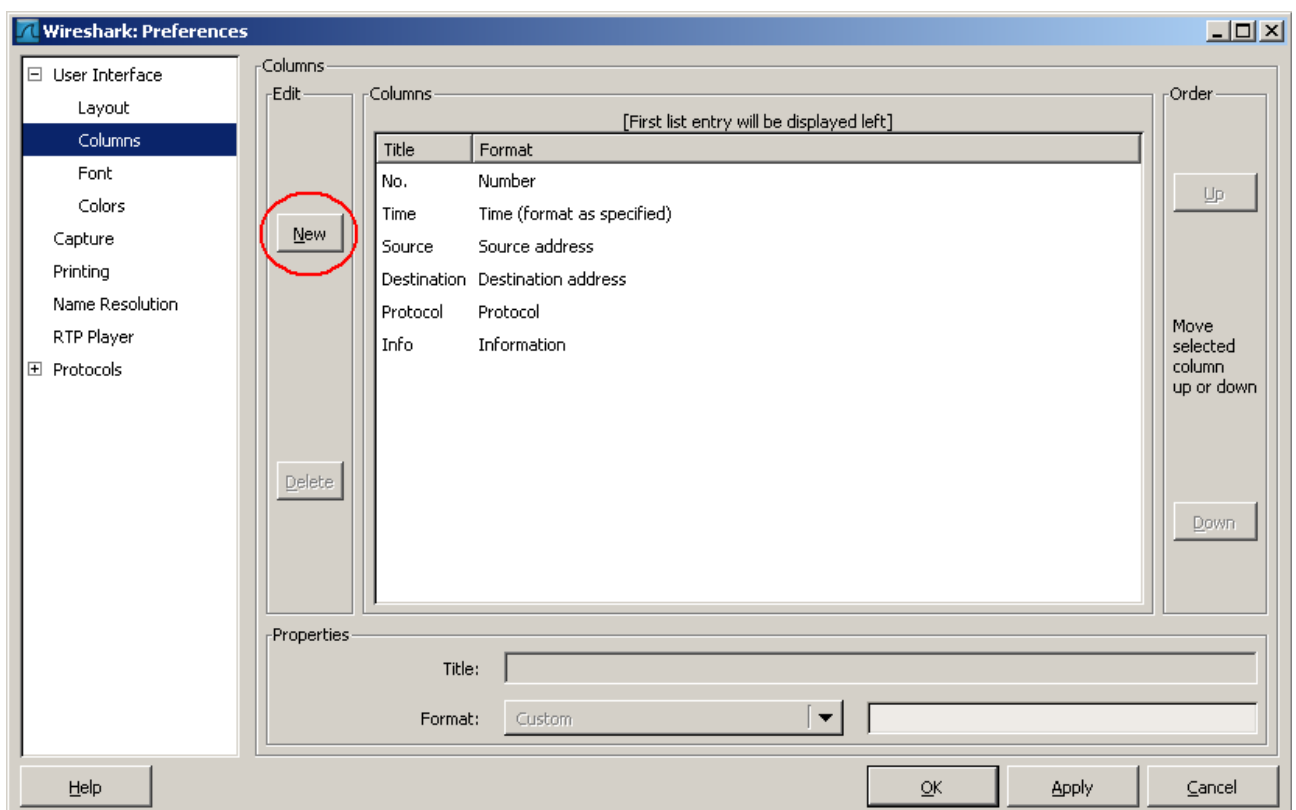


Figure 47: Wireshark: Preferences > User Interface > Columns

- Insert at the left a new user defined column with a click on the button **New**.

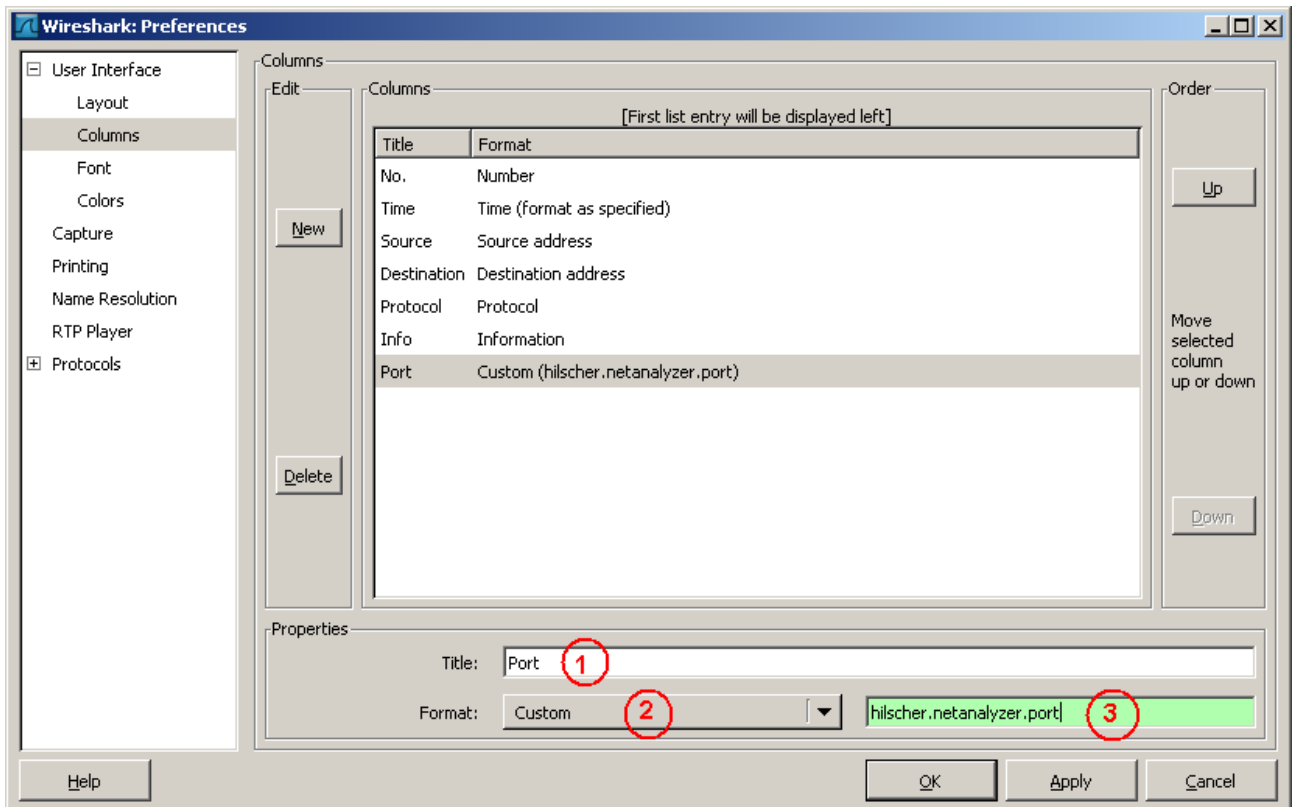


Figure 48: Wireshark: Preferences > User Interface > Columns > New

- Enter at **Title** (1) the heading name Port.
- Select Custom for **Format** (2).
- Enter for the **Filter name** (3) „hilscher.netanalyzer.port“.

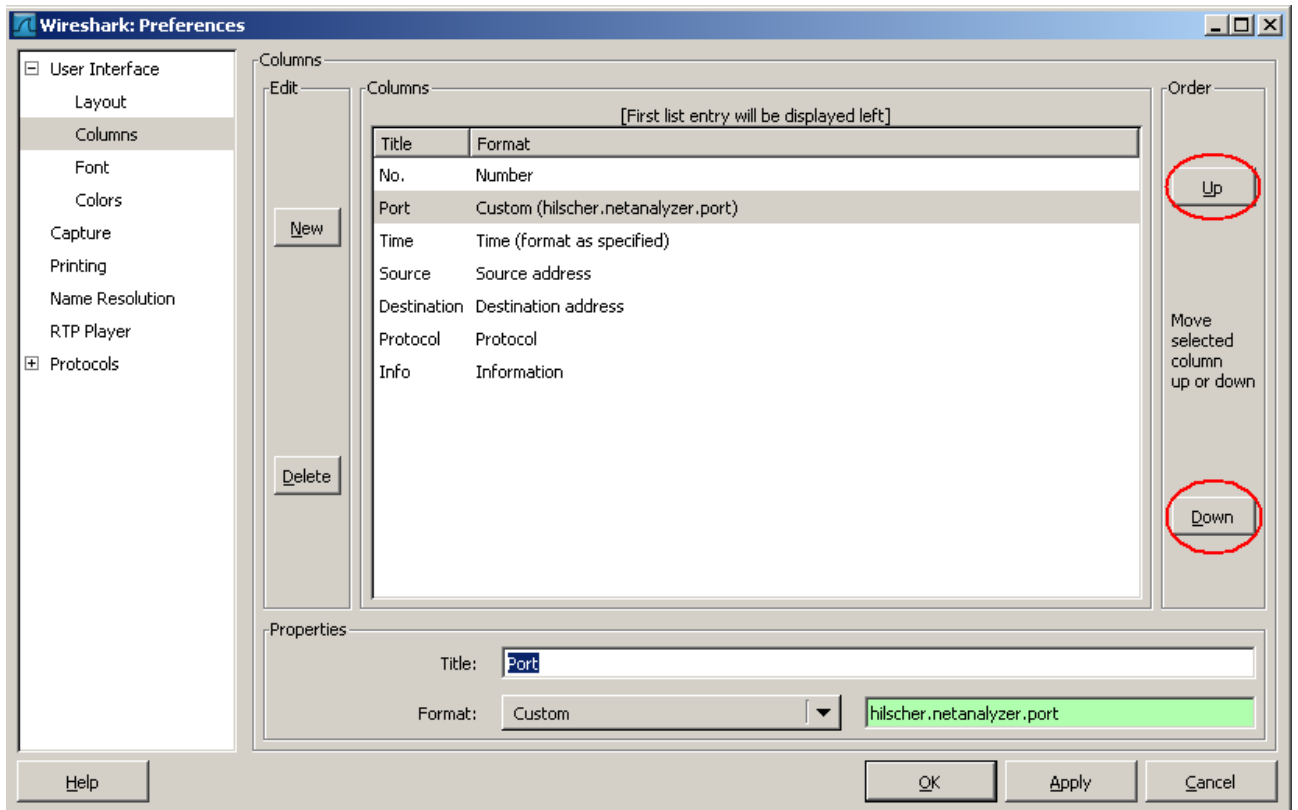


Figure 49: Wireshark: Preferences > User Interface > Columns > Move

- If necessary change the sequence of the columns with the buttons **Up** and **Down**.
- Close the window via **OK**.
- The number of the port now is displayed by an addition column.

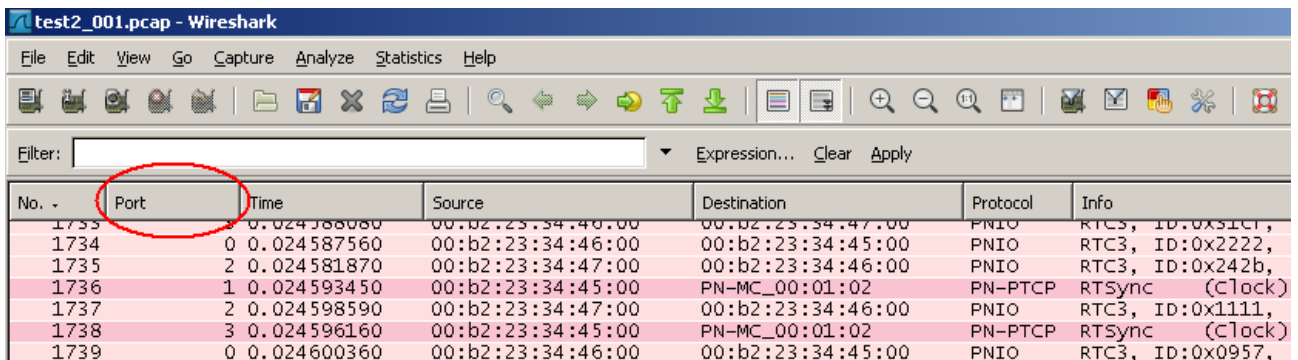


Figure 50: Wireshark: Port number in Packet list

5.9.6 FCS Handoff

Many Wireshark plugins are not compatible with FCS handoff. To deactivate the FCS handoff:

- Select in Wireshark **Edit > Preferences**

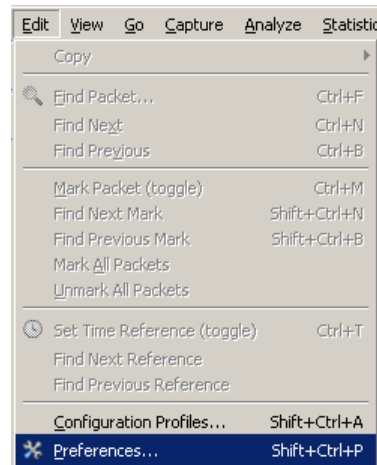


Figure 51: Wireshark: Edit > Preferences

- Select at the left side **Protocols > netANALYZER**.

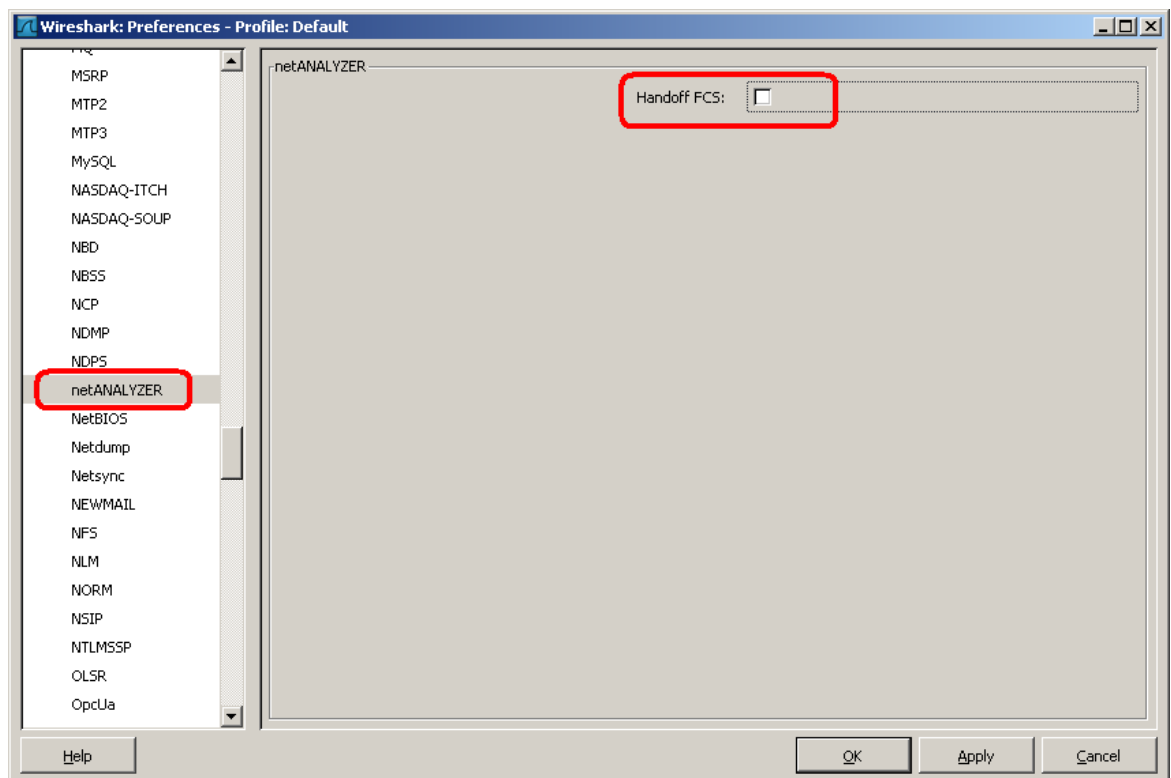


Figure 52: Wireshark: Preferences > Protocols > netANALYZER

- Uncheck **Handoff FCS**.
- Close the window via **OK**.
- The FCS checksum is excluded from the analysis.

5.10 netANALYZER Software

The **netANALYZER** software is a Windows® application that indicates the status information about the hardware and the received data packets. In addition, here the operator must define the filing paths for capturing the analysis data and initiate the conversion of the stored binary files (*.hea) to the WinPcap format (*.pcap).

5.10.1 Starting and closing netANALYZER Software

Starting the **netANALYZER** Software:

- Select via the Windows® start menu **Start > Programs > Hilscher GmbH > Hilscher netANALYZER**.

Closing the **netANALYZER** Software:

- Select via the **netANALYZER** Software menu **File > Close**.

5.10.1.1 Check for Hardware and Version Verification Device Driver



Note: During initializing of the **netANALYZER** software the hardware is checked and the device driver version is verified.

- If the hardware is not installed, the following error message is displayed: **Incompatible driver version**. In the **netANALYZER** main window in the status bar the message „Error in driver“ is displayed.
 - If the device driver or the **netANALYZER** software is not up to date and compatible, the following error message is displayed: **Please check driver version and installation**.
-

5.10.2 netANALYZER – Main Window

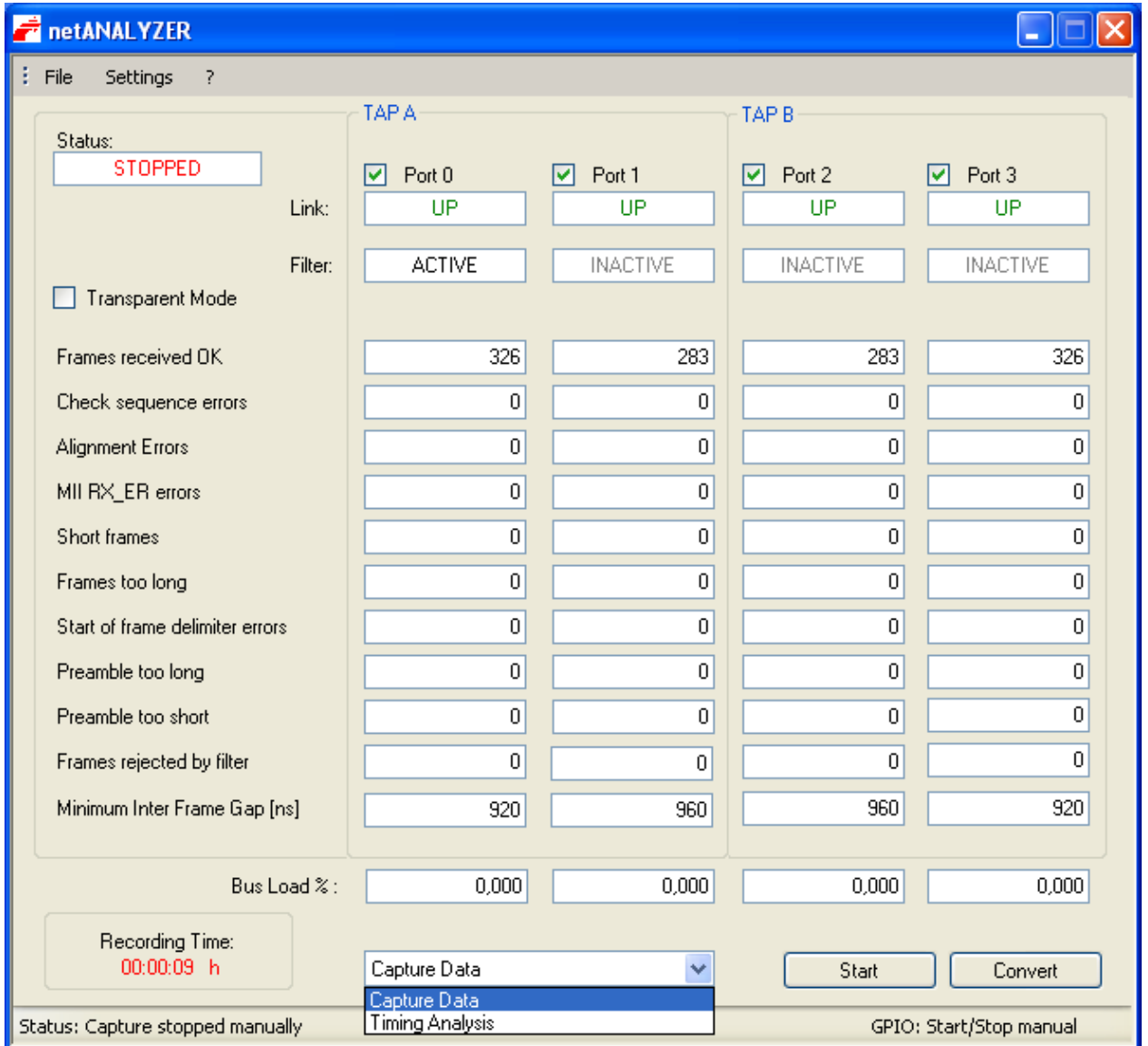


Figure 53: netANALYZER – Main Window

Parameter	Meaning	Range of Value / Value
Status	Defines the operating status of the firmware	RUN / STOP
Link/ TAP A (Port 0, Port 1), TAP B (Port 2, Port 3)	Status of the link connected to the port. Capturing for this port on/off, deactivated ports are greyed out.	UP / DOWN Selected/unselected
Filter/ TAP A (Port 0, Port 1), TAP B (Port 2, Port 3)	Indicates for each Port 0 to Port 3 the status of the filter. If the syntax "ACTIVE" is displayed in red, the filter is used, but it is not yet saved, and it will be lost after a new start of the software.	ACTIVE, INACTIVE
Transparent Mode	If checked, any telegram data, including the preamble and SFD are displayed or captured. For further information refer to section <i>Transparent Mode</i> on page 101.	checked / unchecked, Default: unchecked
Frames received OK	Number of frames received	0 to 2 ³² -1
Check sequence errors	Number of Sequence errors occurred	0 to 2 ³² -1
Alignment Errors	Number of alignment errors by collision, frame is not Byte-Align	0 to 2 ³² -1
MII RX_ER errors	Number of MII RX_ER errors	0 to 2 ³² -1
Short frames	Number of short frames	0 to 2 ³² -1
Frames too long	Number of frames too long	0 to 2 ³² -1
Start of frame delimiter errors	Number of SFD errors	0 to 2 ³² -1
Preamble too long	Preamble is too long	0 to 2 ³² -1
Preamble too short	Preamble is too short	0 to 2 ³² -1
Frames rejected by filter	Number of frames rejected by the filter	0 to 2 ³² -1
Minimum Inter Frame Gap [ns]	Minimum measurable gap between two telegrams on the line	0 to 327670 ns
Bus Load %	Busload in percentage Note: For NANL-C500-RE TAP B the PHY transmission rate can not be evaluated. For this reason, here the busload signal 10 Mbit/s is faulty. But, if in the PHY configuration dialog* the setting is changed to 10 Mbit/s manually (*see section <i>PHY Settings</i> on page 86), the busload signal can be displayed correctly. This is not true for NANL-B500-RE. Here everything automatically is displayed correctly.	0 – 100%
Recording Time	Recording Time, in „hours.minutes.seconds“	00.00.00 h
Analysis Mode	Selection list Data Capturing or Timing Analysis (See section <i>Data Capturing</i> on page 87 and section <i>Timing Analysis</i> on page 91.)	Capture Data, Timing Analysis
Start	Starting and stopping Data Capturing (See section <i>Starting Data Capturing</i> on page 87.)	
Convert	Converting Binary Files into WinPcap Format (See section <i>Converting Binary Files into WinPcap Format</i> on page 88.)	

More see next page

Parameter	Meaning	Range of Value / Value
Status Bar		
Status:	Indicates the Status of the application, of the firmware or of the driver:*	
GPIO:	Indicates the status of the external inputs.*	
* To read detailed explanations to the single status bar messages refer to section <i>Status Bar Messages</i> on page 78.		

Table 17: **netANALYZER** – Main Window: Parameters and Status Bar

5.10.3 Status Bar Messages

In the status bar of the main window of the **netANALYZER** software different status messages are displayed for the status of the application, for the firmware or for the driver or for the status of the external GPIO inputs and for the used filter. The following table lists all sorts of status messages.

Significance of the color of the text status messages:

Black: Actual status message

Red: Error message

Green: Function enabled

Status:	GPIO:	Description in the Status Bar:	Description
	X	GPIO: Start/Stop manual	Manually starting and stopping of the capturing process
	X	GPIO: Start on event	The start of the capturing process, is triggered via a GPIO event.
	X	GPIO: Stop on event	The stop of the capturing process, is triggered via a GPIO event.
	X	GPIO: Start/Stop on event	The start and stop of the capturing process, are triggered via an event.
X		Status: Error in driver	The hardware is not installed or not compatible.
X		Status: Capture Data ready	The application is ready.
X		Status: Capture in progress	The application is in the capturing mode.
X		Status: Capture stopped manually	The capturing process was manually stopped.
X		Status: Capture stopped automatically	The capturing process was automatically stopped by the application.
X		Status: Error in registry	The necessary entries in the registry were faulty or absent.
X		Status: Error, can't open directory	Access to the specified directory was denied. (Example: it does not exist)
X		Status: Successfully loaded settings	All settings could be loaded successfully.
X		Status: preparing start of Firmware	Starting the capturing process.
X		Status: preparing stop of Firmware	Stopping the capturing process.
X		Status: File not found	The specified file could not be found.
X		Status: Can't open file	The specified file could not be opened.
X		Status: Converting data	The conversion of captured data was proceeded.
X		Status: Conversion completed	The conversion of the captured data was completed
X		Status: Mode not available	The selected mode could not be initialized correctly.
X		Status: Mode available	The conversion of the recorded data was completed.
X		Status: Error: "XXXX"	An error has been occurred, the error code of which is XXXX.
X		Status: Error	An error has been occurred. The error code could not be represented yet.

Table 18: Status Bar Messages

5.10.4 Performing File Settings

- Select **Settings >File Settings**.

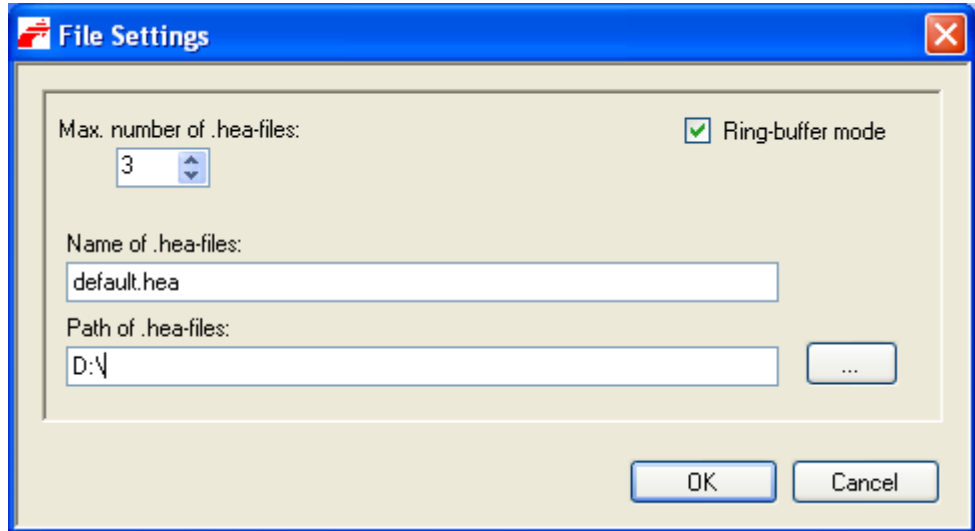


Figure 54: File Settings

Control	Explanation	Range of Value / Value
Max. number of .hea files	Maximum number *.hea files, which is to be saved before the capturing is stopped.	Standard file size: 1GB
Ring-buffer mode	If checked, the capturing data are stored to the ring buffer. If unchecked the capturing data are stored to a stack buffer (stack buffer mode) and data capturing is finished automatically, when all .hea files are filled completely.	checked / unchecked, Default: checked
Name of .hea files	Name for *.hea files.	1 .. 255 characters
Path of .hea files	Path to be defined by the operator, under which the netANALYZER driver shall save the binary file (*.hea).	

Table 19: Description File Settings

- Determine in the window **File Settings** under **Max Number of .hea files** the number of binary files to be stored.
- Check **Ring-buffer mode** to define, that the capturing data are to be stored to the ring buffer.
- Under **Name of .hea files** define the systematic name of the *.hea files.
- Under the **Path of .hea files** determine where the binary files will be stored.
- Click to the **OK** button to close the window **File Settings**.

5.10.4.1 Application Message

- The query **Do you want to save the Configuration** is displayed when in the window **File Settings** a change has been made and the **Cancel** button is clicked.

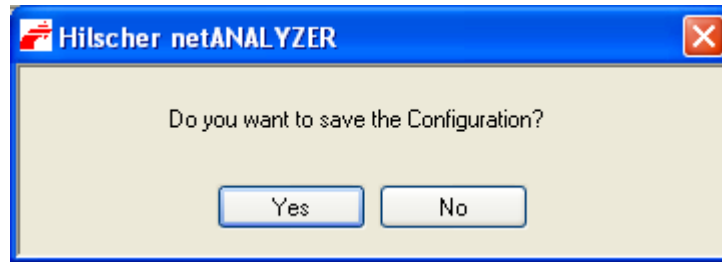


Figure 55: netANALYZER – Do you want to save the Configuration?

- Answer the question with **Yes**, if you want to save the changes.
- Answer the question with **No**, if you want the changes.

5.10.5 GPIO Settings

- Select **Settings >GPIO Settings**.

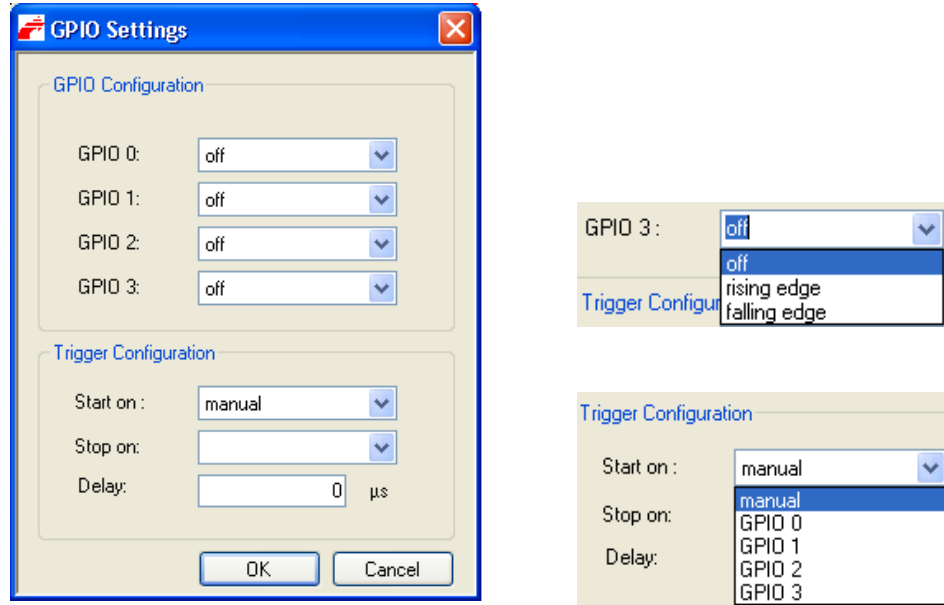


Figure 56: GPIO Settings



Note: If for the start or the end of the capturing process a GPIO event is selected, that will not be checked (e. g. “OFF”), the data capturing process will not start.

Control	Explanation	Range of Value / Value
GPIO Configuration / GPIO 0 – GPIO 3	Selection list, which GPIO event shall be assigned to which input (GPIO) and is displayed as a pseudo frame in Wireshark. GPIO event: off (no event), rising edge or falling edge	off rising edge falling edge
Trigger Configuration / Start on, Stop on	Selection list for the start and the end of the capturing of the GPIO input. Manual: The capturing process is started and stopped manually, via the netANALYZER user interface.	manual GPIO 0 – GPIO 3
Delay	Time after the stop event during which still data are captured.	0 ... 40.000.000 μs

Table 20: GPIO Settings

- Under **GPIO Configuration** define which GPIO event shall be assigned to which input (GPIO).
- Under **Trigger Configuration** define the GPIO event for the start and the end of the data capturing and the delay time.

5.10.6 Filter Settings

To reduce the amount of data or to select analysis data more specific one or two filter masks can be defined. Already defined filters can be saved and reloaded.

The filter mask checks the first 512 Bytes of the frame, consisting of the destination MAC address (Byte 0 to 5), the source MAC address (6 to 11 Bytes), the Ether-type (Byte 12 and 13) in the first two Bytes for the frame data.



Note: All predefined filters are provided with a write protection. I. e., the filter masks defined under **Enable Filter A** or **Enable Filter B** can not be changed and the values for „Mask“ and „Value“ in the filter mask can not be edited.

Opening Filter Options:

- Select **Settings >Filter Settings**.

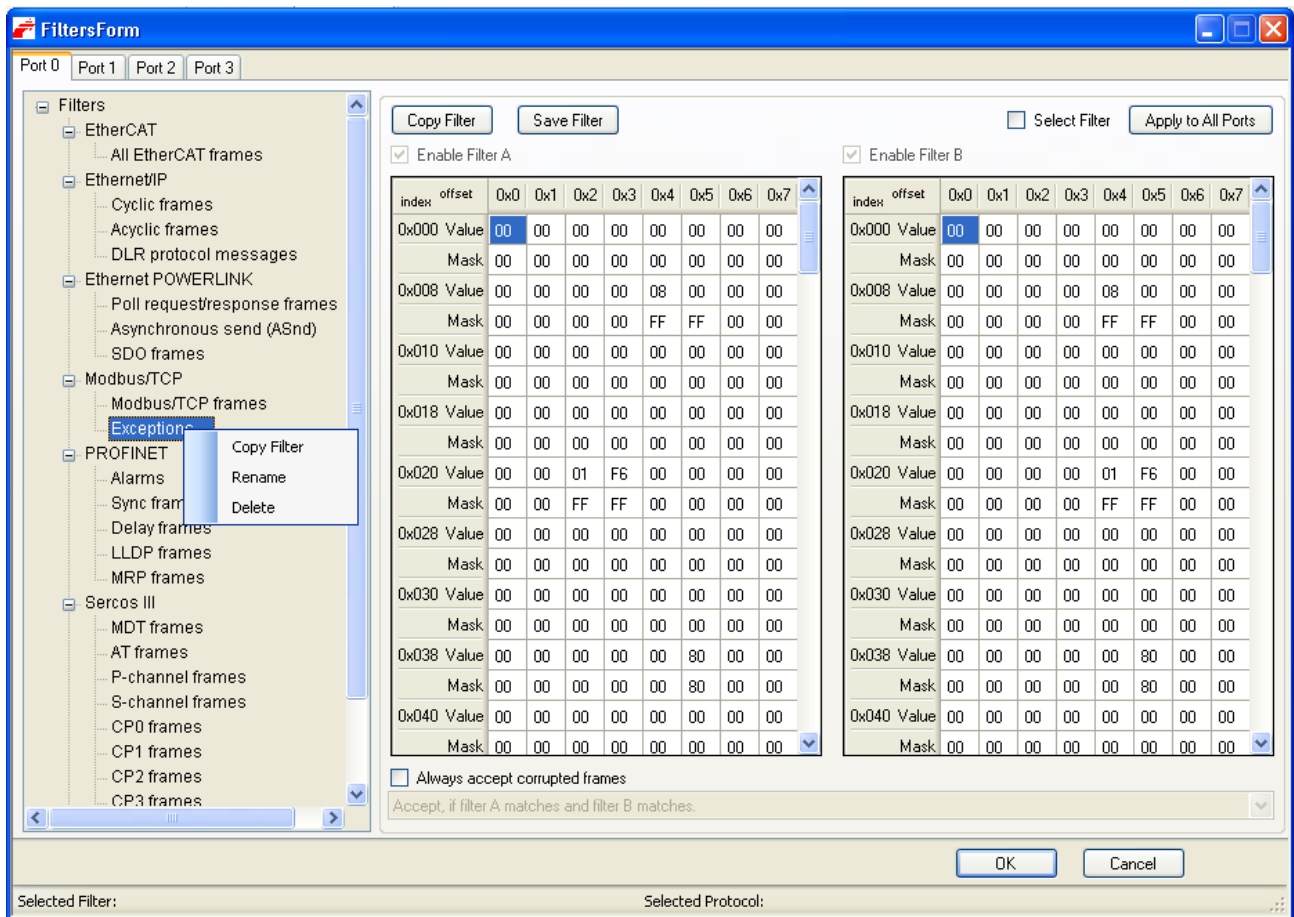


Figure 57: FiltersForm

Control	Explanation	Range of Value / Value
Port	Filter settings page per Port	Port 0, Port 1, Port 2, Port 3
Filters	Selection list as tree structure with predefined filters for different Ethernet protocols. To add a newly defined filter the tree structure can be enlarged. E. g. via right click on Modbus/TCP > Exceptions the menu Copy Filter, Rename, Delete is opened to copy, rename or delete a filter.	Predefined filters an newly defined filters
Copy Filter	Copies the filter selected under the Filters and adds this one as copy below.	
Save Filter	Saves the newly defined filter.	
Select Filter for this Port	Defines the under Filters selected filter for this port.	
Apply to All Ports	The selected filter is applied to all ports.	
Enable Filter A Enable Filter B	Definable filter masks: „Filter A“ or „Filter B“ or „Filter A and Filter B“. All predefined filters are provided with a write protection.	checked: Filter A, Filter B, Filter A and Filter B
Filter Matrix	Matrix for entering byte- and mask values.	1-512 byte
Offset	Byte Offset for each 8 Byte of a frame, which are indexed by the Byte Index.	0x0 to 0x7
Index	Byte Index, which defines 64 x each 8 Byte of a frame.	0x000 to 0x1F8
Value	Assessed value under restriction of the mask. Entry in hexadecimal notation	0 ... FF hex
Mask	Mask Value = 0: Value of the value-Bit is not included. Value = 1: Value of the value-Bit is included. Entry in hexadecimal notation	0 ... FF hex
Always accept corrupted Frames	Faulty Frames should always be displayed, even if they would be filtered out otherwise.	
Selection List Filter Configuration	Selection list of the possible combinations of the following filter options: 1. Accept / reject value 2. Filter A and / or filter B 3. Value must be true or should not apply 4. And or link of the values (In the case of multiple filters) Depending on what filter/s are selected, the list box offers different options.	
Selected Filter:	Under Filters selected filter	
Selected Protocol:	Under Filters selected protocol	

Table 21: Filter Settings – Window FiltersForm

5.10.6.1 Selection List Filter Configuration

The selection list filter configuration offers the following options:

Filter A	Filter B	Configuration:
X	X	Accept, if filter A matches and filter B matches.
X	X	Accept, if filter A doesn't match and filter B matches.
X	X	Accept, if filter A matches and filter B doesn't match.
X	X	Accept, if filter A doesn't match and filter B doesn't match.
X	X	Accept, if filter A matches or filter B matches.
X	X	Accept, if filter A doesn't match or filter B matches.
X	X	Accept, if filter A matches or filter B doesn't match.
X	X	Accept, if filter A doesn't match or filter B doesn't match.
X	X	Reject, if filter A matches and filter B matches.
X	X	Reject, if filter A doesn't match and filter B matches.
X	X	Reject, if filter A matches and filter B doesn't match.
X	X	Reject, if filter A doesn't match and filter B doesn't match.
X	X	Reject, if filter A matches or filter B matches.
X	X	Reject, if filter A doesn't match or filter B matches.
X	X	Reject, if filter A matches or filter B doesn't match.
X	X	Reject, if filter A doesn't match or filter B doesn't match.
X		Accept, if filter A matches.
X		Accept, if filter A doesn't match.
X		Reject, if filter A matches.
X		Reject, if filter A doesn't match.
	X	Accept, if filter B matches.
	X	Accept, if filter B doesn't match.
	X	Reject, if filter B matches.
	X	Reject, if filter B doesn't match.

Table 22: Combinations of the Selection List Filter Configuration

5.10.6.2 Defining, saving, loading Filter Settings

To define, to save or to load filter settings for one or several filters, proceed as follows:

1. Enable checkbox Enable Filter A or Enable Filter B or Enable Filter A and Enable Filter B.
2. Enter the value to be assessed under restriction of the mask in the line **Value**.

Entry in hexadecimal notation, value range from 00 to FF.

3. Enter the desired mask in the line **Mask**.

Value = 0: Value of the value-Bit is not included.

Value = 1: Value of the value-Bit is included.

Value in Mask	Value used for the Filter
FF	The value FF effects, that the value in ,Value' is used for the Filter.
00	The value 00 effects, that the value in ,Value' is not used for the Filter.
0F	The value 0F effects that lower 4 Bits of the value in ,Value' are used for the Filter.
F0	The value F0 effects, that upper 4 Bits of the value in ,Value' are used for the Filter.

Table 23: Value used for the Filter

Entry in hexadecimal notation, value range from 00 to FF.

Example:

Byte	Destination MAC Address						Source MAC Address						Data Type		User Data	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Value	00	15	CF	DD	DA	BE	00	00	00	00	00	00	00	00	00	00
Mask	FF	FF	FF	00	00	00	00	00	00	00	00	00	00	00	00	00

Table 24: Example Defining Filter Settings

The filter shown in the example filters for frames beginning with 00,15, CF.

4. Enable **Always check accept corrupted frames**.
 ➤ Faulty Frames are always displayed, even if they would be filtered out otherwise.
5. Select in the selection list filter configuration a combination of the filter options.

Depending on what filter/s are selected, the list box offers different options.

6. Save the current filter via **Save Filter**.

5.10.7 PHY Settings

Via **PHY Settings** for Port 0 to Port 3 the data transmission rate can be set manually to a defined value. Then every Ethernet telegram is captured from the beginning on. With the setting **Auto** no data capturing is provided during auto negotiation.



Note: For a good portion of all applications the **Auto** setting for **PHY Configuration** is comfortable. A typical application when the transmission rate must be defined manually to 100 Mbit/s, is given e. g. with the PROFINET / Fast-Startup.

Proceeding, how to set the transmission rate:

- Select **Settings > PHY Settings**.

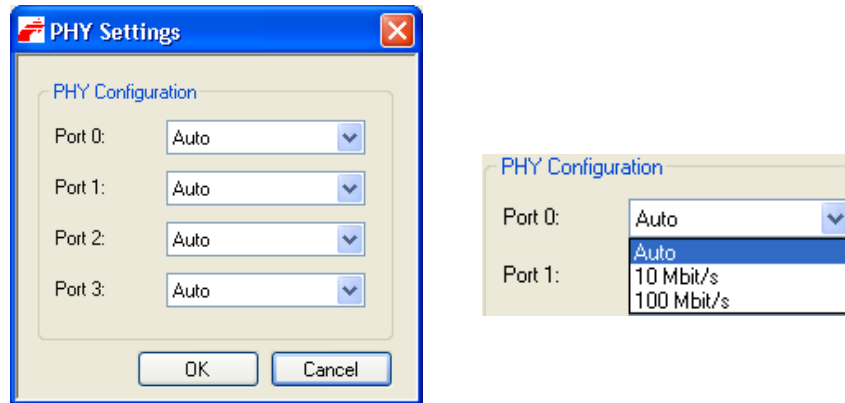


Figure 58: PHY Settings

Control	Explanation	Range of Value / Value
PHY Configuration / Port 0 to Port 3	For Port 0 to Port 3 the transmission rate can be set manually per port.	Auto, 10 Mbit/s, 100 Mbit/s, Default: Auto

Table 25: GPIO Settings

- Under **PHY Configuration > Port 0 to Port 3** each set the transmission rate.

6 Analysis Methods

6.1 Data Capturing

6.1.1 Select Capture Data Mode

- Select in the **netANALYZER** window in the selection list for the analysis mode the list item **Capture Data**.

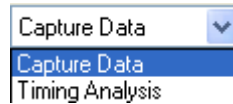


Figure 59: netANALYZER – Selection List for the Analysis Mode

- ⇒ The data capturing now can be started.

6.1.2 Starting Data Capturing

6.1.2.1 Starting Capturing

- If necessary activate or deactivate capturing ports in the main windows.
- Click in the window **netANALYZER** on the **Start** button.
- ⇒ In the window **netANALYZER** the menu bar and buttons are disabled. Furthermore, the **Start** button now is displayed as **Stop** button.
- ⇒ The capturing process of the received Ethernet frames starts.



Note: If in the netANALYZER software under **Settings > File Settings Ring-buffer mode** is:

- *checked*, the capturing data are stored to the ring buffer,
- *unchecked*, the capturing data are stored to a stack buffer (stack buffer mode) and data capturing is finished automatically, when all .hea files are filled completely.

6.1.3 Converting Binary Files into WinPcap Format

- Click in the window **netANALYZER** to the button **Convert**.
- In the window **Path of .hea file and .pcap files** are displayed:
 - Under **.hea File > All filtered .hea files for this name or capture**: the filtered **.hea* files.
 - Under **.pcap files > .pcap files that will be generated**: the **.pcap* files to be converted.

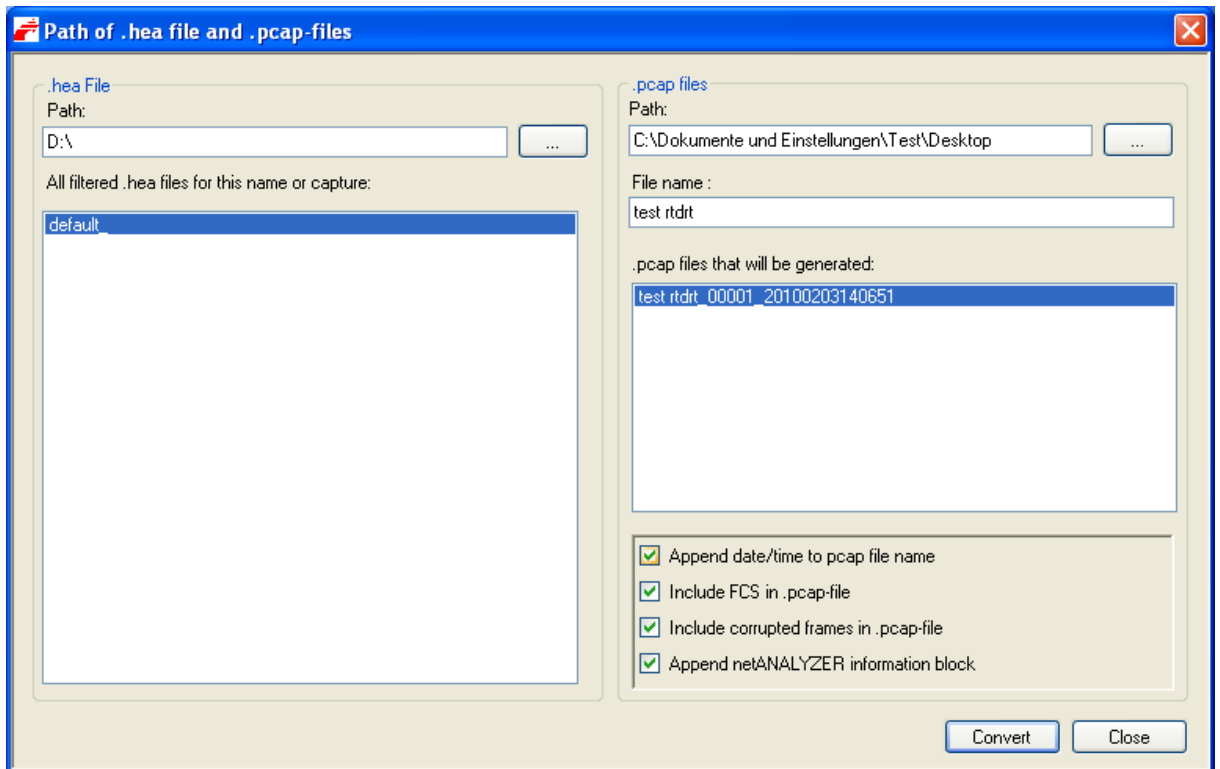



Figure 60: netANALYZER – Path of .hea file and .pcap files

Control	Explanation
.hea File	
Path	Path to be defined by the operator, under which the netANALYZER driver shall save the binary file (*.hea). Here the path defined in the window File Settings can be changed.
All filtered .hea files for this name or capture	Edited list of .hea files

Table 26: Description **Path of .hea file and .pcap files - .hea File**

.hea File


1. Under the **Path** determine where the binary files will be stored.
 - Under **.hea File > Path** click to .
 - In the window **Search Folder** define the file location.

Control	Explanation
.pcap files	
Path	Path to be defined by the operator, under which the netANALYZER software shall save the WinPcap file (*.pcap).
File name	Systematic file name for the *.pcap files. The netANALYZER software still assigns for every file in addition an ongoing number in the file name.
.pcap files that will be generated	Preview of the .pcap files that will be generated
Append date/time to pcap file name	Date and time are added to the file name or not.
Include FCS in .pcap-files	Checkbox whether the Ethernet checksum must be with the PCAP file or not. (Some Wireshark-dissectors do not support FCS.)
Include corrupted frames in .pcap file	If this option is activated, also incorrect frames will be transferred into the .pcap file. If the option is deactivated only correct telegrams are saved to the .pcap file.
Append netANALYZER information block	Inserts the netANALYZER info block into the .pcap file to have additional information for every telegram. Requires to install the netANALYZER Wireshark plugin.
Convert	Conversion of binary files into WinPcap format.

Table 27: Description Path of .hea file and .pcap files - .pcap files

.pcap files

2. To change the path to store .pcap files:

- Under **.pcap files > Path** click to .
- In the window **Search Folder** define the file location, where to store WinPcap files.
- Data are saved in multiple .pcap-files, 50 MB each.

3. Via **Convert** convert the binary files to the WinPcap format.
 - ↗ In the window **Conversion** the conversion process details are displayed.

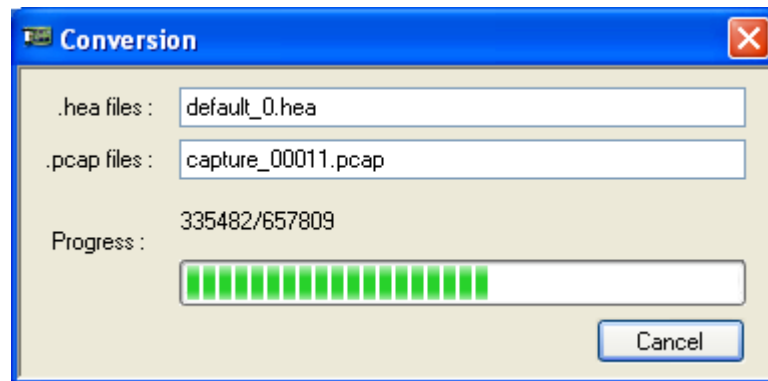


Figure 61: *netANALYZER* – Conversion

Control	Explanation
.hea files	Display of the name of the currently created binary file
.pcap files	Display of the name of the currently converted WinPcap file
Progress	Progress bar for the conversion in KByte

Table 28: Description Conversion

4. After the conversion was completed successfully, the window **Path of .hea file and .pcap files** closes automatically.

6.2 Timing Analysis

6.2.1 Selecting Timing Analysis Mode

- Select in the **netANALYZER** window in the selection list for the analysis mode the list item **Timing Analysis**.



Figure 62: **netANALYZER** – Selection List for the Analysis Mode

- The window **Timing Analysis** is displayed.

6.2.2 Timing Analysis Window

If the timing analysis has been selected, the following window is automatically displayed at the screen additionally:

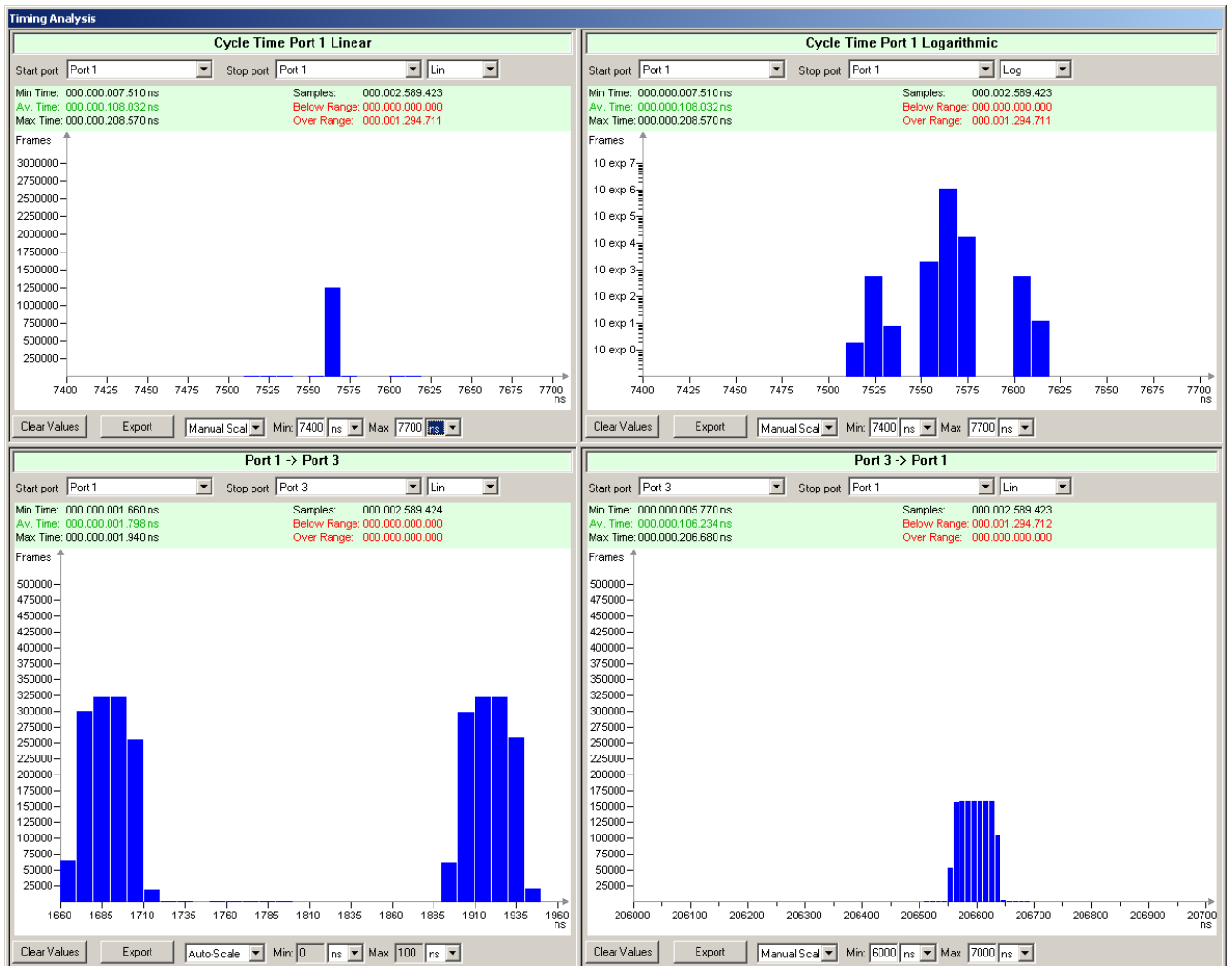


Figure 63: **netANALYZER** – Timing Analysis Window, four Timing Analysis Windows

Up to four analysis windows here are represented at once, the size of the individual windows can be varied about the divider.

One analysis window in detail consists of the following components:

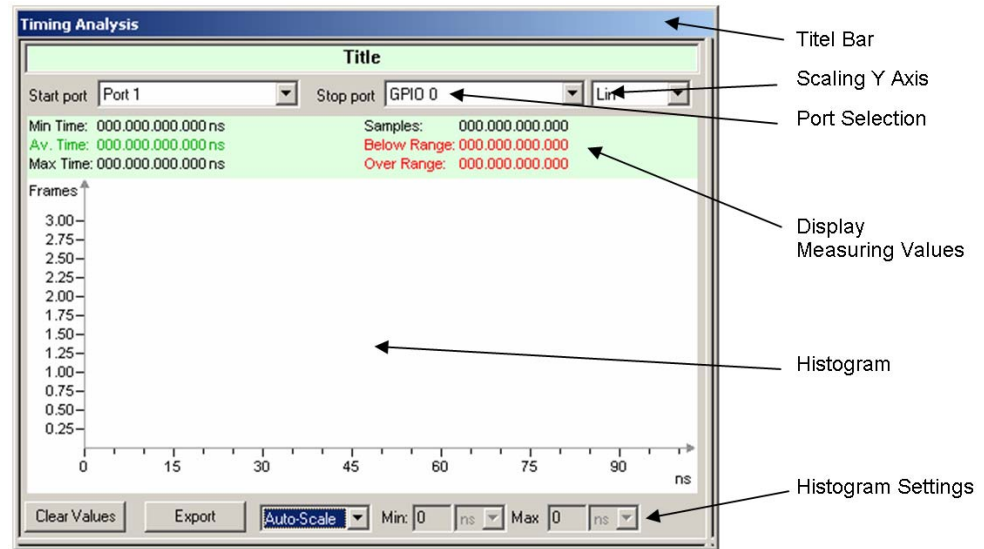


Figure 64: netANALYZER – Timing Analysis Window

Control	Explanation	Range of Value / Value
Title Line (Tag field)	Here the user can enter an arbitrary title for his histogram.	
Port Selection (Start Port / Stop Port)	Indicates the analysis ports. The timing analysis is always carried out for frames or events between start and stop port. Choice (port 0-3, GPIO 0-3). More detailed description for the port choice and different analysis methods see below.	
Y Axis Scaling	Linear or logarithmic	
Measured Value Display	Here, the minimum and maximum measured values and the arithmetic mean value (left side) are displayed, in addition (right side) the number of measured values are displayed, and also the number of measured values below and above the display area of the histogram. (The display area can be found in the histogram settings.)	Left side: Min Time, Av Time, Max Time Right side: Samples, Below Range, Over Range
Histogram: (Frames/ Time Diagram)	Graphical representation of the distribution function of all measurements.	
Histogram Settings		
Clear Values	Deletes all values recorded till now for the current histogram and starts with the analysis once more.	
Export	Stores measured values and histogram data into text file.	
Auto-Scale / Manual Scale, Min / Max	Selection list to select the automatic scaling of the x-axis or to the manual scaling by means of the two time data displayed at the right side. Manual Scale can also be set via mouse action.	

Table 29: Description Timing Analysis Window

6.2.3 Examples for the Possibilities of the Timing Analysis



Note: Normally certain cyclical frames form the base for the timing analysis, so e.g. the Sync telegram at PROFINET or MDT0 at Sercos III. It is of importance that only these frames are brought to the timing analysis. Therefore before the start of the analysis a corresponding filter must be set, which prefilters possible acyclic or additional cyclical telegrams and exclusively lets through the frame to be analyzed.

6.2.3.1 Cycle Time Measurement

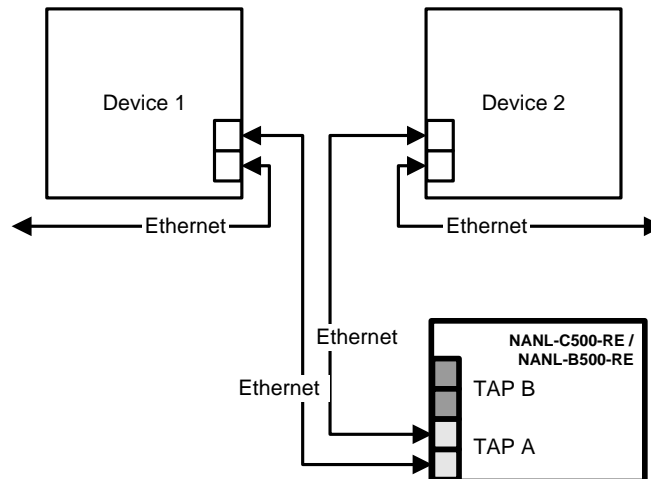


Figure 65: Application Case1 – Example Cycle Time Measurement

For the cycle time measurement, it is sufficient to insert one TAP of the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE into transmission distance. Here the differences between two successive frame times are formed, and gives the cycle time as a result. In the port selection as start and as destination port correspondingly the same port must be selected.

6.2.3.2 Forwarding Time Measurement

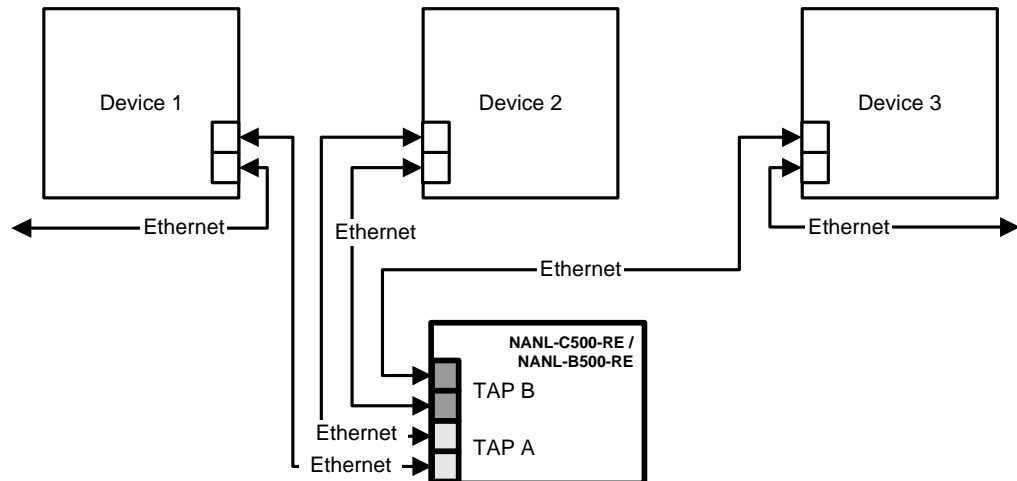


Figure 66: Application Case2 - Example Forwarding Time Measurement

For the forwarding time measurement the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE must be inserted before and behind the device to be examined. Here the time difference between the telegram coming in on the one side of the device is measured up to the next telegram on the other side of the device. The port selection correspondingly must be carried out from a port of the first TAP to a port of the second TAP: Difference of port 0/1 to port 2/3. or for measurement to the opposite direction port 2/3 to port 0/1.

6.2.3.3 Stack Operating-Time Measurement

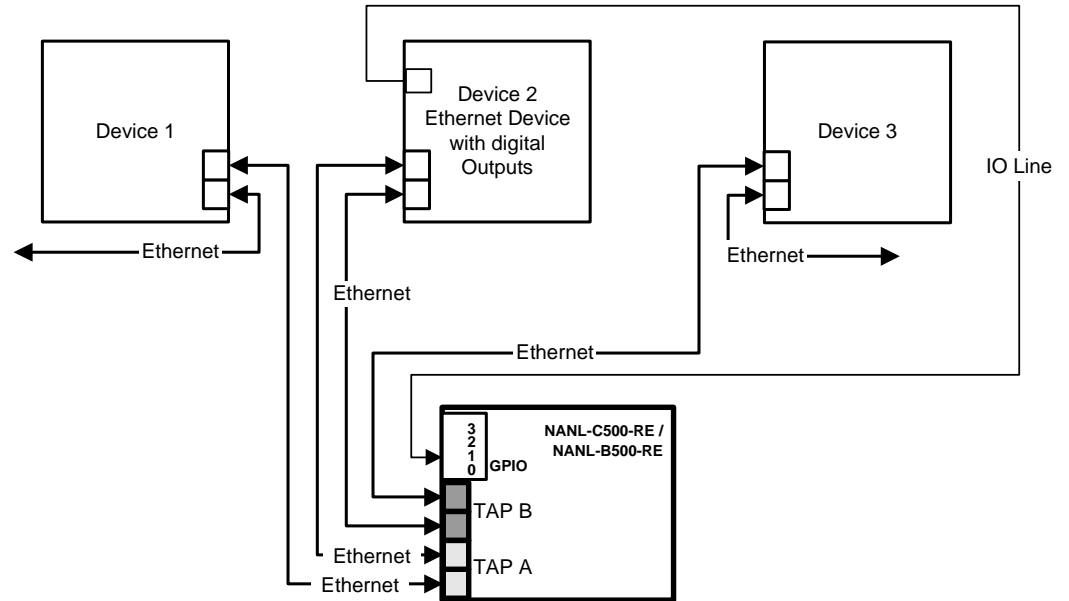


Figure 67: Application Case 4 – Recording of the Runtime in the Device – Example Stack Operating-Time Measurement

For stack operating-time measurement the difference between a part of the Ethernet channel and a GPIO can be formed. Here, e. g. a cyclical process data frame on port x becomes supervised as well as the appearance of a digital switching event on GPIO y after this frame was processed in the software stack.

6.2.3.4 Response-Time Measurement

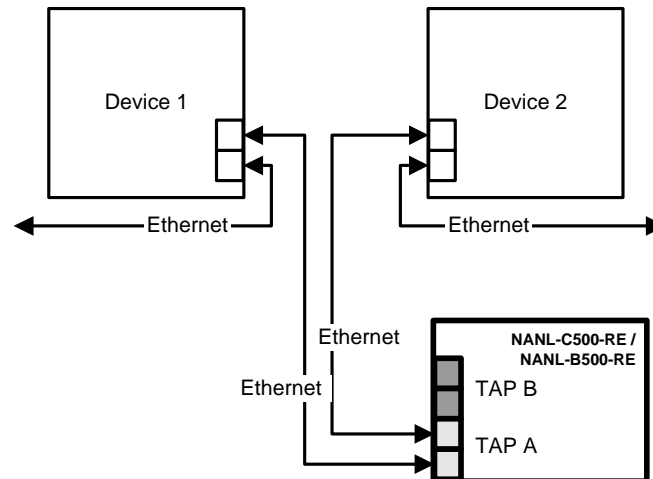


Figure 68: Application Case 1 – Example Response-Time Measurement

For response-time measurement the difference in time between two different ports on the same TAP is measured. Here, for example, the incoming frame on port 0 is recorded, and the outgoing response frame on port 1.



Note: Because of the auto crossover function of most of the RTE systems, the assignment of port 0 and 1 or port 2 and 3 can change between different test runs.

6.3 Information to Analysis

6.3.1 Timestamp

The Figure hereafter shows for „Ethernet Mode“ or for „Transparent Mode“, where the timestamp for the associated data packet is taken.

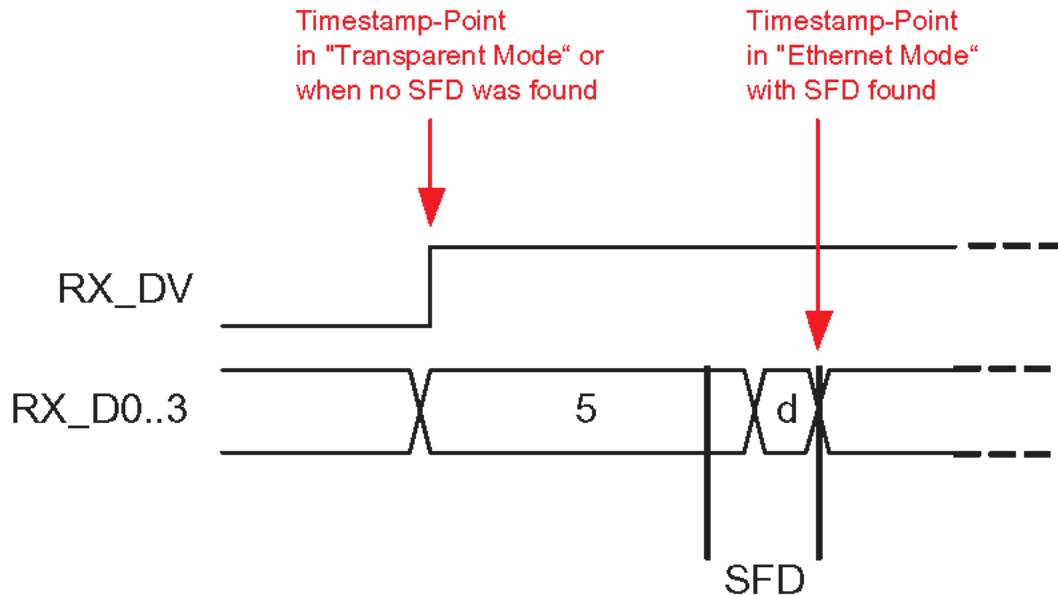


Figure 69: Message Timestamp-Point for „Ethernet Mode“ and „Transparent Mode“¹

„Ethernet Mode“ (Standard Capturing):

In „Ethernet Mode“ the time stamp is taken at the reception of the SFD (Start-of-Frame-Delimiter).

„Transparent Mode“ (SFD² is disturbed):

In „Transparent Mode“ the time stamp is taken at the always at the very front with the lateral growth, i. e. at the proper start of the frame. Here preamble and SFD are not interpreted.

¹ „DV“ = Data Valid, „D0..3“ = Data, „5 d“ = SFD identifier

² „SFD“ = Start-of-Frame-Delimiter

6.3.2 Input Signal as pseudo Frame

For GPIO events a special pseudo Ethernet frame is generated by the firmware. This allows Wireshark with a special dissector to display GPIO events within the frame list.

“



Note: A special MAC address is used, of the Hilscher range 00:02:A2:FF:FF:FF. This address must never be assigned to a real address.

Format of the Pseudo Frames (Length: 17 Bytes):

6 Bytes Destination MAC Address	6 Bytes Source MAC Address	Ethertype	ID	GPIO Number	Edge (pos/neg)
00:02:A2:FF:FF:FF	00:02:A2:FF:FF:FF	0x88FF	0x00	0x00 ... 0x03	0x00 ... 0x01

Table 30: Format of the Pseudo Frames

6.3.3 Determining Cycle Time and Forwarding Time (Capturing-Mode)

The parameters cycle time and forwarding time at the capturing-mode can be determined by the use of Wireshark from the captured and to the pcap format converted analysis data. The procedure, how to determine the parameters, varies with the different types of communication.

Cycle Time (Example PROFINET IRT)

The cycle time is the time difference between the time stamps of two consecutive frames of a cyclically occurring frame type (such as the Sync-frame).

1. Open in Wireshark the *.pcap file of the captured and into in the pcap format converted analysis data. (see section *Starting Data Capturing* on page 87 and section *Converting Binary Files into WinPcap Format* on page 88).
2. Take in Wireshark the time difference between the time stamps of two successive frames of a cyclically occurring frame type.

Forwarding Time (Example PROFINET IRT)

The forwarding time is the time difference between the time stamps of a cyclically occurring frame after and of a cyclically occurring frame before a device (e. g. Sync-frame).

1. Open in Wireshark the *.pcap file of the analysis data, captured after or before a device and converted into in the pcap format. (see section *Starting Data Capturing* on page 87 and section *Converting Binary Files into WinPcap Format* on page 88).
2. Take in Wireshark the time difference between the time stamps of a cyclically occurring frame after and of a cyclically occurring frame before a device.

6.3.4 Determining Cycle Time and Forwarding Time (Timing Analysis)

The parameters cycle time or forwarding time can be found out at the data capturing mode in the **netANALYZER** timing analysis window.

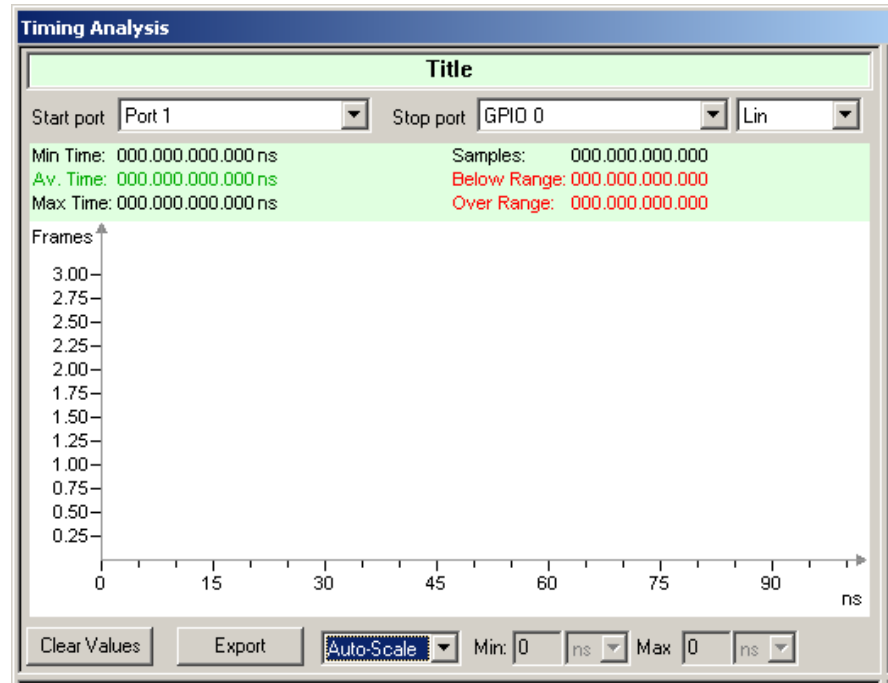


Figure 70: netANALYZER – Timing Analysis Window

Cycle Time

- To find out the cycle time, select at **Start Port** and at **Stop Port** each the same port.

Forwarding Time

- To find out the forwarding time, select at **Start Port** and at **Stop Port** each the port in front of or after the device, for which the forwarding time shall be found out.

6.4 Transparent Mode

The **Transparent Mode** is used with the data capturing to register any telegram data, i. e., any bits transmitted including the frame data, preamble and SFD (=Start of Frame Delimiter).



Note: The usage of the **Transparent Mode** only makes sense with a 100 Mbit connection.

The figure below shows the basic principle of an Ethernet frame (Ethernet telegram) in the in the **Standard Ethernet Mode** or in the **Transparent Mode**.

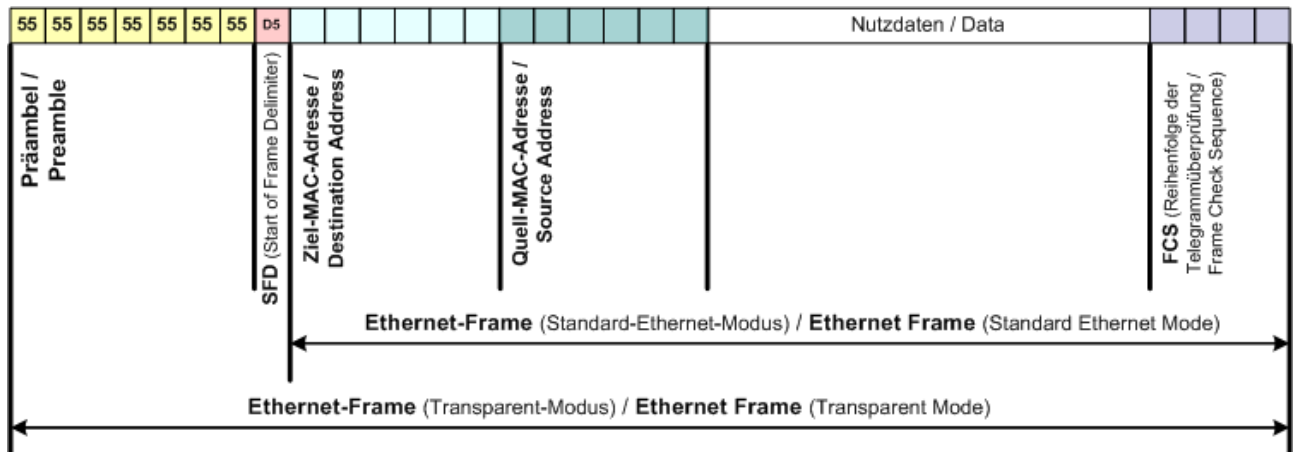


Figure 71: Basic Principle of an Ethernet Frame in the Standard Ethernet Mode or in the Transparent Mode

As during the **Standard Ethernet Mode** the preamble and the SFD (=Start of Frame Delimiter) are not included to the telegram, these parts are captured in the **Transparent Mode**.

```

0000 01 80 c2 00 00 0e 00 14 22 40 4f e4 88 cc 02 07 ..... "@O.....
0010 04 00 14 22 40 4f e4 04 09 07 70 6f 72 74 2d 30 ..."@O.. ..port-0
0020 30 31 06 02 00 14 08 41 42 72 6f 61 64 63 6f 6d 01.....A Broadcom
0030 20 4e 65 74 58 74 72 65 6d 65 20 35 37 78 78 20 Netxtre me 57xx
0040 47 69 67 61 62 69 74 20 43 6f 6e 74 72 6f 6c 6c Gigabit Controll
0050 65 72 20 2d 20 50 61 6b 65 74 70 6c 61 6e 65 72 er - Pak etplaner
0060 2d 4d 69 6e 69 70 6f 72 74 0a 0a 53 49 4d 41 54 -Minipor t..SIMAT
0070 49 43 20 50 43 0c 23 53 49 45 4d 45 4e 53 20 41 IC PC.#S IEMENS A
0080 47 20 53 49 4d 41 54 49 43 20 50 43 20 2b 20 65 G SIMATI C PC + e
0090 6e 67 69 6e 65 65 72 69 6e 67 0e 04 00 80 00 80 ngineeri ng.....
00a0 10 14 05 01 c0 a8 0a 25 02 00 00 00 01 08 2b 06 .....% .....+
00b0 01 04 01 81 c0 6e fe 08 00 0e cf 02 00 00 00 00 .....n.. .....
00c0 fe 0a 00 0e cf 05 00 14 22 40 4f e4 fe 09 00 12 ..... "@O.....
00d0 0f 01 02 00 00 00 10 00 00 5a bb b9 68 ..... .Z..h
    
```

```

0000 55 55 55 55 55 55 55 d5 01 80 c2 00 00 0e 00 14 UUUUUUU. ....
0010 22 40 4f e4 88 cc 02 07 04 00 14 22 40 4f e4 04 "@O..... "@O..
0020 09 07 70 6f 72 74 2d 30 30 31 06 02 00 14 08 41 ..port-0 01.....A
0030 42 72 6f 61 64 63 6f 6d 20 4e 65 74 58 74 72 65 Broadcom Netxtre
0040 6d 65 20 35 37 78 78 20 47 69 67 61 62 69 74 20 me 57xx Gigabit
0050 43 6f 6e 74 72 6f 6c 6c 65 72 20 2d 20 50 61 6b Controll er - Pak
0060 65 74 70 6c 61 6e 65 72 2d 4d 69 6e 69 70 6f 72 etplaner -Minipor
0070 74 0a 0a 53 49 4d 41 54 49 43 20 50 43 0c 23 53 t..SIMAT IC PC.#S
0080 49 45 4d 45 4e 53 20 41 47 20 53 49 4d 41 54 49 IEMENS A G SIMATI
0090 43 20 50 43 20 2b 20 65 6e 67 69 6e 65 65 72 69 C PC + e
00a0 6e 67 0e 04 00 80 00 80 10 14 05 01 c0 a8 0a 25 ngineeri ng.....%
00b0 02 00 00 00 01 08 2b 06 01 04 01 81 c0 6e fe 08 .....+ .....n..
00c0 00 0e cf 02 00 00 00 00 fe 0a 00 0e cf 05 00 14 ..... "@O.....
00d0 22 40 4f e4 fe 09 00 12 0f 01 02 00 00 00 10 00 ..... .Z..h
00e0 00 5a bb b9 68
    
```

Figure 72: Ethernet Telegram (Ethernet Frame) in Wireshark in the Standard Ethernet Mode or in the Transparent Mode

7 Troubleshooting

General

- Check, if the preconditions are served for the operation of the netANALYZER card NANL-C500-RE or the netANALYZER device NANL-B500-RE:

Further information to this you find in section *Preconditions for Installation and Operation* on page 32.

Link is not recognized



Note: For 10-Mbit/s-connections and for increased bus load the PHY (physical interface) can not correctly detect the link. If in such a case in the netANALYZER main window under **Link DOWN** is displayed, for troubleshooting the speed must be set manually to 10 Mbit/s in the **PHY Settings** dialog.

LINK-LED

- Check using the LINK LED status, if a connection to the Ethernet is established.

Further information to this you find in chapter *LED* on page 103.

Cable

- Check that the pin occupation of the used cable is correct.

Analyzer Device NANL-B500-RE:

- Check that the power supply of the device is connected to the mains voltage.

8 LED

8.1 LED NANL-C500-RE and NANL-B500-RE

LED	Color	State	Meaning
SYS	green	On	Operating System running
	yellow	Flashing cyclic at 1Hz	Device indicates boot error
	yellow	Static	Bootloader is waiting for booting procedure / card or device deinitialized
	-	Off	Power supply for the device is missing or hardware defect
STA0	green	On	Capturing process active
	red	On	Capturing process inactive
STA1	green	Single Flash / On	Activity by signals on the GPIO
	red	On	Error between PCI and firmware to the PC
LINK / RJ45 Ch0 u. Ch1	green	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
RX/TX / RJ45 Ch0 u. Ch1	yellow	Flashing / On	The device sends/receives Ethernet frames

Table 31: LED NANL-C500-RE and NANL-B500-RE

Indicator States

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off phase with a frequency of 2,5 Hz: on for 200 ms followed by off for 200 ms.
Single Flash	The indicator shows one short flash followed by an off phase. The interval period for the flash when triggering a GPIO event is 100 ms.

Table 32: Indicator States

9 Technical Data



Note: All technical data are temporarily and can be altered without notice.

9.1 Analyzer Card NANL-C500-RE

Item	NANL-C500-RE
PC Interface	PCI V2.3, 33 MHz, 32-Bit Dual-Port Memory; DPM and DMA
Required PCI Connector	PCI slot (3.3 V)
Data Throughput PCI-Bus	Tested to 35 MB/s
Dual-Port Memory Size	64 KByte
Function	Passive Ethernet analyzer for RT-Ethernet systems; analyzes the data in a communication link and captures the incoming Ethernet frames. Additionally, events of four digital inputs can be captured.
Communication	Receipt of Ethernet frames
Channels / Ports	2 communication channels with integrated TAP (TAP B, TAP A), and each with two ports for capturing data in both directions (together 4 Ports: Port 0 to Port 3)
Filter	2 Filter on the first 512 Bytes of the Ethernet-Frames (Source and Destination MAC Address, Ether-Type and 498 following Bytes)
Time Stamp Resolution	10 ns
LED Display	SYS, STA0, STA1, 4x Link, 4x Activity: SYS / System Status, STA0 / Capturing active / inactive, STA1 / Event signal detected, Link and Activity per channel
IO Interface	External Interface Input/Output Signals (female connector X40): 4 digital Inputs/Outputs, 3.3 V / 10mA The 4 digital inputs / outputs of the external interface input / output signals are configured by the software only as inputs.
GPIO	Resolution for events > 150 µs
Analyzer Software (recommended)	Open Source Wireshark
Ethernet Frame Types	Ethernet II (10 BASE-TX / 100 BASE-TX)
Data Format	Open WinPcap data format
Processor	netX 500 with ARM 926 CPU
Reception Rate	10/100 MBit/s
Ethernet Interface	Ethernet RJ45 Socket, potential free
Ethernet Cable	2 x 2 Twisted-Pair cupric cable, CAT5 (100 MBit/s), Length of cable max. 100 m
Power Supply	+3.3 V ±5 % / 800 mA
Dimensions (L x W x D)	137 x 107 x 17,5 mm
Operating Temperature	0 °C ... 55 °C

Table 33: Technical Data Analyzer Card NANL-C500-RE

9.2 Analyzer Device NANL-B500-RE

Item	NANL-B500-RE
PC Interface	ExpressCard 34, PCI Express Base Specification Revision 2.0 and PCI Express to PCI/PCI-X Bridge Specification Revision 1.0
Required PCI Connector	ExpressCard Slot (for notebook)
Data Throughput PCI-Bus	Tested to 35 MB/s
Dual-Port Memory Size	64 KByte
Function	Passive Ethernet analyzer for RT-Ethernet systems; analyzes the data in a communication link and captures the incoming Ethernet frames. Additionally, events of four digital inputs can be captured.
Communication	Receipt of Ethernet frames
Channels / Ports	2 communication channels with integrated TAP (TAP B, TAP A), and each with two ports for capturing data in both directions (together 4 Ports: Port 0 to Port 3)
Filter	2 Filter on the first 512 Bytes of the Ethernet-Frames (Source and Destination MAC Address, Ether-Type and 498 following Bytes)
Time Stamp Resolution	10 ns
LED Display	SYS, STA0, STA1, 4x Link, 4x Activity: SYS / System Status, STA0 / Capturing active / inactive, STA1 / Event signal detected, Link and Activity per channel
IO Interface	External Interface Input/Output Signals (female connector X40): 4 digital Inputs/Outputs, 3.3 V / 10mA The 4 digital inputs / outputs of the external interface input / output signals are configured by the software only as inputs.
GPIO	Resolution for events > 150 µs
Analyzer Software (recommended)	Open Source Wireshark
Ethernet Frame Types	Ethernet II (10 BASE-TX / 100 BASE-TX)
Data Format	Open WinPcap data format
Processor	netX 500 with ARM 926 CPU
Reception Rate	10/100 MBit/s
Ethernet Interface	Ethernet RJ45 Socket, potential free
Ethernet Cable	2 x 2 Twisted-Pair cupric cable, CAT5 (100 MBit/s), Length of cable max. 100 m
USB Plug*	Mini B USB Plug (5-pin)
SD*	Micro SD Card Slot
Switch *	RUN / STOP / RESET
	* for future use only
Connector 24V Voltage Supply	Combicon: 0V/+24V/PE alternatively Female Connector +24V (only alternative use permitted!), Maximum permitted cable length: 3 m
Power Supply nominal	24V DC / 180mA / 4,3W
Range	18V ... 30V DC
Dimensions (L x W x D)	115 x 62 x 133 mm
Operating Temperature	0 °C ... 55 °C

Table 34: Technical Data Analyzer Device NANL-B500-RE

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11 Glossary

ASIC netX 500

Application Specific Integrated Circuit
Real-Time capable controller for short response times

CSV

Comma Separated Value

DMA

Direct Memory Access

DPM

Dual-Port Memory

FCS

Frame Check Sequence (Check sum at the frame end for error detection)

GPIO

General Purpose Input/Output

hea

File extension of the binary files with the capture information content (default.hea) created by the Hilscher **netANALYZER** software

NANL-C500-RE

Analyzer Card NANL-C500-RE

NANL-C500-RE

Analyzer Device NANL-B500-RE

netANALYZER

netANALYZER software **netANALYZER** (Windows® Application)

.NET Framework Version 2.0

Microsoft .NET Framework Version 2.0

<http://www.microsoft.com/downloads/details.aspx?familyid=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=de>

SFD

Start-of-Frame-Delimiter: Bits subsequent to the preamble at the start of an Ethernet telegram.

PHY

Physical Interface

TAP

Test Access Point

Wireshark

„Network Monitoring Program Wireshark“

<http://www.wireshark.org>

WinPcap

„The Library WinPcap“

<http://www.winpcap.org/>

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