



# User Manual TAP CURIOUS

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# 1 Working safely

### Intended use

The use of TAP CURIOUS described in these instructions serves to analyze Ethernet-based data flows. Using TAP CURIOUS for any alternative purpose is not envisaged and can lead to loss or damage. TAP CURIOUS must not be used for illegitimate or unlawful data espionage.

### User

You are allowed to use TAP CURIOUS if you have knowledge of and authorizations for the following areas:

- assessing the safety of electrical systems and equipment,
- installing and configuring IT systems,
- measuring and analyzing electrical functions and systems,
- occupational health and safety,
- assembling and connecting-up electrical equipment,
- accident prevention and occupational safety regulations applicable at the place of use.

#### Avoiding hazards

NOTICE

**Defect caused by excessive signal voltage** Excessive signal voltage can damage TAP CURIOUS. Apply only signal voltage that conforms to the standard.

# 2 Scope of delivery

- Box
- TAP CURIOUS
- Power pack with Euro adapters
- Plug for the power supply
- Plug for the digital input and output
- Operating instructions, Wireshark plugins and web server files on USB stick (the latest version can be found at www.kunbus.de/support.html)

# 3 Introduction

The KUNBUS TAP CURIOUS is your network monitor for analyzing all standard industrial Ethernet solutions. Four probe ports allow you to capture up to two independent realtime Ethernet connections.

You can use filters to reduce data volumes or select specific analysis data. You can configure these filters via an integrated web server. The web server can operate in 2 different modes. "Basic" mode helps you set your filters and configure your device. "Expert" mode was developed for people with expert knowledge of frame filters. In this mode, you can filter a frame by all the aspects it contains.

The digital input and output allows you to create useful trigger conditions. These can systematically help limit sporadic effects, and identify and remedy the causes.

An internal throughput delay of 0  $\mu$ s (zero delay) makes TAP CURIOUS almost transparent for the data channels to be checked.

TAP CURIOUS is connected to a PC via a standard Ethernet interface. You can operate TAP CURIOUS in 1 Gbit/s or 100 Mbit/s mode. Captured packet data is read and analyzed using network monitors such as "Wireshark", the freely available network analysis software.

Overview

# 4 Overview



Illustration 1: Front

1	Uplink-Port	2	Link LED
3	Power LED	4	Status LEDs for the 2 com- munication channels (5)
5	Monitoring ports (2 communication channels)	6	LEDs for filter and overflow



Illust	ration 2: Top		
1	Socket for power supply	2	External input and output in- terface
			terrace

The individual overview points are explained in the following sections.

### 4.1 Power supply

TAP CURIOUS is connected to the power supply pack via a 5-pole plug. The plug is supplied as standard.



Illustration 3: Power supply

The port is assigned as follows:

Pin	Assignment
1	DNC
2	20-28 V
3	GND
4	DNC
5	PE

The Power LED indicates whether or not TAP CURIOUS is connected to the power supply:



LED	Display	Meaning
Power	off	TAP CURIOUS is not connected to the power supply.
	green	TAP CURIOUS is connected to the power supply.

## 4.2 Digital input and output

TAP CURIOUS has a digital input and output. This is protected against reverse polarity. The terminal (Weidmüller BLZF 3.50/04/180 SN BK BX) designed for the digital input and output is supplied as standard.



The port is assigned as follows:

Pin	Assignment
1	20-28 V
2	Digital output
3	Digital input
4	GND

# 4.3 Uplink interface

You can connect TAP CURIOUS to your PC via the uplink interface. To do this, you need an Ethernet cable with standard RJ45 plugs. If your PC does not have a free RJ45 port, you can use a USB adapter.



*Illustration 4:* Gigabit interface The "Link" LED indicates the interface status:



LED	Display	Meaning
CC-	off	No connection to the remote station
Link	green	Successfully connected to the remote station
	yellow flash- ing	Communication running

## 4.4 Test inputs

TAP CURIOUS has 2 communication channels for monitoring the lines. Each of the ports Con 1 and Con 2, as well as Con 3 and Con 4, are connected directly to a communication channel.

You can connect the ports to a device via an Ethernet cable with standard RJ45 plugs.



Illustration 5: Test inputs

Status LEDs signal the status of the individual ports:



LED	Display	Meaning
Con (A, B ,C, D)	off	No communication
activity	green flashing	Communication running
	red	Frame has been blocked by a filter (burn time 500 ms), it is not output via the uplink
Con (A, B, C, D)	green	100 Mbit/s mode
speed	yellow	10 Mbit/s mode

# 4.5 Filter and overflow LEDs

You can apply filters to the frames. The LEDs are able to show these filter results. The "Filters [} 20]" chapter explains how this works.



LED	Display	Meaning
Overflow	off	No overflow on uplink port
	red	Only in 100 Mbit/s mode: Overflow on uplink port (burn time 2 s)
Filter LED0	off	No filter match
	green	Filter match
Filter LED1	off	No filter match
	green	Filter match
Filter LED2	off	No filter match
	green	Filter match
Filter LED3	off	No filter match
	green	Filter match
Filter LED4	off	No filter match
	green	Filter match

# 5 Application examples

TAP CURIOUS is able to monitor devices in various ways. 2 examples are shown here.

### Example 1:

Connect your devices as shown to capture the communication between two devices. This allows you to find faulty frames on the network.



### Example 2:

Connect your devices as shown to monitor the frames before and after a device throughput. In this example, device 2 is monitored. Here, you could analyze the following:

- Measure the device throughput time,
- Check whether frames have been distorted or truncated,
- Measure jitter on cyclical frames.



# 6 Starting TAP for the first time

- Unpack the device and make sure you have all the components listed in the scope of delivery.
- Connect the device to the power pack supplied.
  - $\Rightarrow$  The POWER LED lights up.
- Load the "Wireshark" network analysis software onto the PC and install it. You can download Wireshark from www.wireshark.org.
- Download the Wireshark plugin DLL from the KUNBUS website and copy the DLL file into the Wireshark plug-in directory (e.g.: C: \Programs\Wireshark\plugins\1.10.2). Starting with Whireshark version 2.6.0, the file structure has changed. The location for the DLL file is here: ...\Wireshark\plugins\2.6\epan Depending on whether you are using the 32- or 64-bit version of Wireshark, you will need to download the corresponding DLL file:
  - 32-bit version: tap32\_1xxx.dll (Wireshark plugin WIN32)
  - 32-bit version: tap32\_2xxx.dll (Wireshark-Plugin WIN32)
  - 64-Bit-Version: tap64\_1xxx.dll (Wireshark-Plugin WIN64)
     64-Bit-Version: tap64\_2xxx.dll (Wireshark-Plugin WIN64)
  - xxxx represents the used version (e.g. 1.10.2)
- Connect TAP CURIOUS to an Ethernet interface on the PC using a RJ45 cable. Die "Link" LED lights up as as soon as the PC and TAP CURIOUS are connected
- Connect the line to be tested to one of the probe ports. Each of the ports "Con A" and "Con B" and ports "Con C" and "Con D" are connected directly. So communication is possible even when TAP is deactivated. The "Speed" LEDs show the connection speed set for the probe ports. When frames are being transmitted on the line, the "Activity" LED flashes green
- Start Wireshark on the PC and activate the "TAP" plugin in the menu at "Edit > Preferences > Protocols > TAP".

SoulSeek A		
SounBinTCP	KUNBUS TAP	
SPDV	C Enable TAP	
SPRT		
SRVLOC		
SSCOP		
SSH		
SSL		
STANAG 5066 DTS		
STANAG 5066 SIS		
StarTeam		
STP		
STT		
SUA		
SV		
SYNCHROPHASO		
T.38		
TACACS+		
TALI		
TAP		
TCAP		
TCP		
TCPENCAP		
TCPROS *		
4 III		

Illustration 6: Wireshark Plugin

- All available Ethernet interfaces are listed in the main window. Click on the Ethernet interface you require to select it.
- Set any filters you want via the web server. This allows you to search for specific frames and prevents your PC's main memory from becoming overloaded.
- $\Rightarrow$  You can now use Wireshark to analyze the data.

TAP CURIOUS expands the Ethernet packets by 20 bytes of additional information. You can use TAP CURIOUS without the plugin or with a different Ethernet analysis program. But you will not be able to analyze this additional information. You might also find that the analysis program reports a data packet as faulty due to this additional information.

Information on the additional data can be found in the chapter called "Monitoring the interface [} 58]".

# 7 Filters

### 7.1 Why do we use filters?

TAP CURIOUS records all Ethernet frames transmitted on the connected network line. TAP sends the Ethernet frames to the connected PC via the "Uplink to PC" port. Wireshark writes these frames to the main memory (RAM) on your PC.

This not only makes it more difficult for your to monitor data, it can also overload the main memory and cause your PC to crash.

To prevent this from happening, you can set various filters for each probe port. These filters check whether the incoming frame has the properties you defined in the filter settings. If the data have these properties, they will be written to the main memory on your PC. If the data do not have these properties, they will be ignored.

The following filter elements are available:

### Status filter

The status filter enables you to filter properties such as the receiving time or the status of a frame. This filter is applied to the 20 bytes, which are additionally transmitted to the standard frame.

### Segment filter

You can use the segment filter to filter data for parity or disparity within the frame. There are 16 words (4 bytes) available, and these can be checked in succession.



You can set a total of 5 filters per probe port.

### 7.2 Setting filters

#### Requirements:

- ✓ Wireshark is installed on your PC.
- ✓ TAP CURIOUS is properly connected.
- Open the Network and sharing center on your PC.
- Click on "Change adapter settings".
- Double-click to open the network connection for your TAP CURIOUS.
- Click on "Properties"
- Activate the "IPv4" protocol. You need this protocol to configure filter settings via the web server.
- Open Wireshark

File 

Select the network connection for TAP CURIOUS.

📕 Th	e Wire	shark N	etwork	c Analyzer								The second Colors and State
File	Edit	View	Go	Capture	Analyze	Statistics	Telephony	Wireless	Tools	Help		
		۱	010	XC	9 🗢 🖻	) <u>\$</u> 7	4 🔳 🗏	$\Theta_{\mathbf{Q}} = \mathbf{Q}_{\mathbf{Q}}$	€.⊞			
A	oply a d	isplay filt	:er <	:Ctrl-/>								
					Wel	come to W	/ireshark					
					Сар	oture						
					usin	g this filter:	📕 Enter a ca	pture filter .				
					LAN	PortX1.2					_	
					LAN	PortX1.1						
					LAN	Gbit-TAP	Gigabit Note	ork Conne	ction 1/	M Vorbin		
					LAN	Verbir No a	addresses	OIK COIIIE	ction: LA	an-verbii	idung / ·	
					LAN	Verbing	apture filter					

- ⇒ TAP CURIOUS will transmit a broadcast frame. You can determine the current IP address of TAP CURIOUS from this frame. When you start TAP CURIOUS for the first time, the default IP address is 192.168.0.10.
  - Click on "Address Resolution Protocol".
- Make a note of the TAP CURIOUS IP address.

Cepturing from LAN-Gbit-TAP	Construction of the second s	
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help		
≝ <u>#</u> @ ]} ]] 2 2 2 4 + + 2 7 <u>4</u> <b>]</b> ] = 0,0,0,1		
Apply a display fiber <cb1-(></cb1-(>		Expression + TA
No. Time Source Destination Protocol Length Info		
1 0.000000 Broadcast Broadcast ARP 60 Gratuitous ARP fo	or 192.165.1.120 (Request)	
Frame I: be bytes on wire (400 bits), be bytes captured (400 bits) on interface 0 Ethemet II, Snci Broadcast (ffiffiffiffiffiffiff), Osti Broadcast (ffiffiffiffiff)		
Address Resolution Protocol (request/gratuitous ARP)		
Hardware type: Ethernet (1)		
Hardware size: 6		
Protocol size: 4		
Opcode: request (1)		
Sender NAC address: Broadcast (ff:ff:ff:ff:ff:ff:ff)		
Sender IP address: 192.165.1.128		
Tanget NAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)		
(9)Ref 1. 000(622) 125/100/1/150		
0000 ff		
0020 00 00 00 00 00 00 c0 a5 01 75 00 00 00 00 00 00		
***** ** ** ** ** ** ** ** ** ** ** **		
Z LAN Gbit-TAP: dive capture in progress>	Packets: 1 · Displayed: 1 (100.0%)	Profile: Defai
		PE 0 0 01-32
	う日期の行わる	01.06.2017

• Enter the IP address into the address line in your browser.

 $\Rightarrow$  The web server will open.

You can now set the filters you want and configure TAP CURIOUS.

The web server has 2 modes:

"Edit Registers (Expert)" mode is the right mode for you if you are already closely familiar with the structure of an Ethernet frame.

"Filter Basic" mode is the right mode for you if you do not deal with this topic so often and feel you need a little more support.

A detailed list of the parameters for filter settings and the TAP CURIOUS configuration can be found in the chapter called "Tabulated list of filters and configuration registers [] 41]".

In the chapters that follow, we describe how to configure settings on the web server.

### 7.2.1 Settings in Basic mode

Basic mode is the right mode for you if you want to set filters in the easiest way possible or feel you need a little support. Filter settings you would make in multiple registers in Expert mode can be made here from just one menu option.

- ✓ Your TAP CURIOUS is properly installed.
- ✓ Your network connection for TAP CURIOUS is active.
- $\checkmark$  You have opened the web server.
- Click on "Filter basic"
- $\Rightarrow$  Basic mode will open.

### Setting filters

 Click on the register of a port on which you want to set filters (e.g. "Con A").

Channel 1	Channel 2	TAP CURIOUS - Filter Basic - V1.0			
Con A Con B	Con C Con D Config	Save ALL Import Export			
Con	DestAddressfilter				
	SrcAddressfilter				
A	EtherType				
Off Save Delete	IPv4 DestAddressfilter				
(buttons affect ALL filters in port!)	IPv4 SrcAddressfilter				
Log: 07:51:57: X1.1(ALL) on	extern Out				
	LED 0				
	LED 1				
	LED 2				
	LED 3				
	LED 4				
		last saved: 6/7/2017 7:52:40			

You can set filters for the selected port here.

• Click on the orange triangle in front of the filter option.

#### ⇒ You will now see a menu in which you can set the filters.

Channel 1	Channel 2	TAP	CURIOUS - Filter Basic	V1.0
Con A Con E	B Con C Con D	Configuration	Save ALL Imp	port Export
Con A	DestAddressfilter set filter Data c8:3e:a7:00:01:	negate	external input • Yes/No	negate
(buttons affect ALL filters in port!)				Off Delete
07:51:57: X1.1(ALL) on	<ul> <li>SrcAddressfilter</li> <li>EtherType</li> <li>IPv4 DestAddressfilter</li> <li>IPv4 SrcAddressfilter</li> <li>extern Out</li> <li>LED 0</li> <li>LED 1</li> <li>LED 2</li> <li>LED 3</li> <li>LED 4</li> </ul>			Lat saved: 6/7/2017 7:52:40

To use any filter setting, you need to have activated the filter and saved the settings. Do this by clicking on "On" and then "Save".

You can set the following filters:

Dest. address filter This is where you can set frames that are transmitted to a particular MAC address. Enter the MAC address you require.

Check the "Set filter > Negate" box to filter all frames that are not transmitted to this MAC address.

You can combine the filter with the external input. Do this by checking the "External input > Yes/No" box.

Check the "External input > Negate" box if the external input has to be "low".

Src. address filterThis is where you can set frames that are transmitted from a particularMAC address. Enter the MAC address you require.

Check the "Set filter > Negate" box to filter all frames that are not transmitted from this MAC address.

You can combine the filter with the external input. Do this by checking the "External input > Yes/No" box.

Check the "External input > Negate" box if the external input has to be "low".

	We have gat here:	hered the values of a few important protocols for you	
	Туре	Protocol	
	0x0800	IP Internet Protocol, Version 4 (IPv4)	
	0x0804	Address Resolution Protocol (ARP)	
	0x8100	VLAN Tag	
	0x8892	PROFINET	
	0x884A	EtherCAT	
	0x88AB	POWERLINK	
	0x88CD	SERCOS III	
	Check the "Se the selected I	et filter > Negate" box to filter all frames that do not match Ethernet type.	
	You can com the "External	bine the filter with the external input. Do this by checking input > Yes/No" box.	
	Check the "E: "low".	xternal input > Negate" box if the external input has to be	
Pv4 Dest. address filter	This is where you can set frames that are transmitted to a particular IP address. Enter the IP address you require.		
	Check the "Set filter > Negate" box to filter all frames that are not transmitted to this IP address.		
	You can com the "External	bine the filter with the external input. Do this by checking input > Yes/No" box.	
	Check the "E: "low".	xternal input > Negate" box if the external input has to be	
Pv4 Src. address filter	This is where you can set frames that are transmitted from a particular IP address. Enter the IP address you require.		
	Check the "Set filter > Negate" box to filter all frames that are not transmitted from this IP address.		
	You can combine the filter with the external input. Do this by checking the "External input > Yes/No" box.		
	Check the "F	xternal input > Negate" box if the external input has to be	

specification.

This is where you can filter by the protocol type via which a frame's useful data are transmitted. The values comply with the Ethernet

Ethernet type

Extern Out LED 0-1			
	show that a filter applies via the filter LEDs or the external output.		
	To be able to use the configuration settings, they have to be saved.		
	Example:		
	You want to filter all frames that are transmitted from the MAC address "C8 3E A7 01 23 45". LED 2 will light up when a frame has been transmitted from MAC address "C8 3E A7 01 23 45".		
	<ul> <li>In the "Dest. address filter" menu, set value "C8 3E A7 01 23 45".</li> <li>In the "Dest. address filter" checkbox in the "LED 2" menu, click "set".</li> </ul>		
	For TAP CURIOUS to use your filter settings, they have to be saved.		
Saving the configuration	As soon as you have set filter and configuration, you can save the settings so that they can be used at a later time.		
	<ul> <li>Click on Export.</li> </ul>		
	∘ Enter a file name ∘ Click on OK		
Loading an existing configuration file	If you have already saved a configuration in the web server, you can import this file to TAP CURIOUS again at any time. • Click on "Import".		

- Select the file you want.
- Click on "OK".

### Configuring TAP CURIOUS

• Click on the "Configuration" register.



- Software version
- MAC address

These data are specified by KUNBUS for this device and cannot be changed. Please have these data to hand if you report a problem to our support.

Setting the connection speed You can select the connection speed for all ports in the "Config channel 1&2" menu. The default speed is 100 Mbit.

• To change the default, check the "10 Mbit mode" box.

Configuration	You can change the following communication parameters in the "Config TAP" menu:
	<ul> <li>IP address</li> <li>The IP address ensures that TAP CURIOUS can be clearly identified within a network. When assigning a new IP address, you should therefore make sure that it is not being used by another device in the network.</li> <li>If you use DHCP, you do not need to set the IP address. In this case, TAP CURIOUS will receive the IP address from the DHCP server.</li> </ul>
	<ul> <li>Subnet         This is where you can adapt the net mask. The net mask is a bit mask         that indicates the bit position within the IP address that is being used to         address the network section. Make sure the settings you change here         match your network settings.     </li> </ul>
	<ul> <li>Gateway address</li> <li>You can set the gateway address here.</li> </ul>
Using DHCP	If you use a DHCP server, it can assign a free IP address to TAP CURIOUS.
Setting outputs filters	The "Reset with timer" menu allows you to reset one of the filter LEDs or the external output after a selected time.
	<ul> <li>In the "Switch off delay in ms" field, enter a time after which you want the output to be reset.</li> </ul>
	<ul> <li>Check the "Activate" box</li> </ul>
	To be able to use the configuration pattings, they have to be saved and

To be able to use the configuration settings, they have to be saved and TAP CURIOUS needs to be restarted.

### 7.2.2 Settings in Expert mode

If you are closely familiar with the structure of Ethernet frames, you can use Expert mode to configure TAP CURIOUS and set the filters.

### Setting filters

- ✓ Your TAP CURIOUS is properly installed.
- ✓ Your network connection for TAP CURIOUS is active.
- $\checkmark$  You have opened the web server.
- Click on the register of a port on which you want to set filters (e.g. B. "CON A").

annel 1 HIDE Dat	а					
Con A			Copy to Con B	Con B		Copy to Co
Reg. Name Value	Status			Reg. Name Value	Status	
001		Time1_TargetReg	00000000	101	Time1_TargetReg	00000000
002		Time1_MaskReg	00000000	102	Time1_MaskReg	00000000
003		Time2_TargetReg	00000000	103	Time2_TargetReg	00000000
304		Time2_MaskReg	00000000	104	Time2_MaskReg	00000000
105		State_TargetReg	00000000	105	State_TargetReg	00000000
106		State_MaskReg	00000000	106	State_MaskReg	00000000
007		SegFilter1_PosReg	00000000	107	SegFilter1_PosReg	00000000
808		SegFilter1_TargetReg	00a73ec8	108	SegFilter1_TargetReg	00000000
109		SegFiter1_MaskReg	11111111	109	SegFilter1_MaskReg	11111111
10		SegFiter2_PosReg	0000001	110	SegFiter2_PosReg	00000001
111		SegFiter2_TargetReg	00000201	111	SegFilter2_TargetReg	
012		SegFiter2_MaskReg	11110000	112	SegFilter2_MaskReg	0000ffff
013		SegFilter3_PosReg	00000001	113	SegFiter3_PosReg	
314		SegFiter3_TargetReg	00000000	114	SegFilter3_TargetReg	00000000
115		SegFiter3_MaskReg	00001111	115	SegFiter3_MaskReg	ffff0000
116		SegFilter4_PosReg	0000002	116	SegFilter4_PosReg	00000002
117		SegFiter4_TargetReg		117	SegFilter4_TargetReg	
118		SegFiter4_MaskReg	111111111	118	SegFiter4_MaskReg	111111111
019		SegFiter5_PosReg	0000003	119	SegFilter5_PosReg	0000003
320		SegFiter5_TargetReg	00000000	120	SegFiter5_TargetReg	00000000
021		SegFiter5_MaskReg	0000ffff	121	SegFiter5_MaskReg	0000ffff
122		SegFilter6_PosReg	0000003	122	SegFilter6_PosReg	0000003
123		SegFiter6_TargetReg	80000000	123	SegFiter6_TargetReg	80000000
24		SegFiter6_MaskReg	11110000	124	SegFilter6_MaskReg	00001111
325		SegFiter7_PosReg	0000007	125	SegFiter7_PosReg	00000007
126		SegFilter7_TargetReg	00000000	126	SegFilter7_TargetReg	00000000
127		SegFiter7_MaskReg	00001111	127	SegFilter7_MaskReg	11110000
328		SegFiter8_PosReg	80000000	128	SegFiter8_PosReg	80000000
329		SegFilter8_TargetReg		129	SegFilter8_TargetReg	
330		SegFiter8_MaskReg	11110000	130	SegFitter8_MaskReg	0000ffff
131		SegFilter9_PosReg		131	SegFiter9_PosReg	
132		SegFiter9_TargetReg	0000008	132	SegFilter9_TargetReg	80000000
133		SegFiter9_MaskReg	11110000	133	SegFiter9_MaskReg	11110000
334		SegFilter10_PosReg	0000006	134	SegFiter10_PosReg	00000006
135		SegFiter10_TargetReg	0000000	135	SegFiter10_TargetReg	
136		SegFilter10_MaskReg	00001111	135	SegFiter10_MaskReg	00001111
137		SegFilter11_PosReg	0000007	137	SegFiter11_PosReg	00000007
138		SegFiter11 TargetReg	00000000	138	SegFilter11 TargetReg	

Set your filters here. You will find the values you require in the chapter called "Tabulated list of filter registers [] 41]".

#### Filter examples

In the filter examples below, the x in the register number stands for the associated port.

Con A Register (0)01, Register (0)02, Register (0)03, ...

Con B Register (1)01, Register (1)02, Register (1)03, ...

Con C Register (2)01, Register (2)02, Register (2)03, ...

Con D Register (3)01, Register (3)02, Register (3)03, ...

Filtering by the destination MAC address

#### Input field for MAC address: 6 bytes

**Example:** You want to filter all frames that have been transmitted to the MAC address C8 3E A7 01 23 45.

Register	Parameter	Function
SegFilter1:		
x07	00 00 00 00	Word offset of the MAC address
x08	01 A7 3E C8	First 4 bytes of the MAC address
x09	FF FF FF FF	Mask on all bits
SegFilter2:		
x10	00 00 00 01	Word offset of the rest of the MAC address
x11	00 00 45 23	Last 2 bytes of the MAC address
x12	00 00 FF FF	Mask on the first 2 bytes
Filter 1:		
x55	00 00 00 00	No negation of SegFilter1 and 2
x56	00 00 00 03	Filter1 consists of SegFilter1 and 2
Uplink:		
x65	00 00 00 00	Do not invert output
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.
Config reg:		
401	xx xx xx xE	Activate filter for Con A (1110)
401	xx xx xx xD	Activate filter for Con B (1101)
401	xx xx xx xB	Activate filter for Con C (1011)
401	xx xx xx x7	Activate filter for Con D (0111)

Filtering by protocol types IP4 and IP6

**Example:** You want to filter all registers of protocol types IPv4 and IP6. The values you require are:

- IP4= 0x0800
- IP6= 0x86DD

Register	Parameter	Function			
SegFilter	SegFilter1:				
x07	00 00 00 03	Word offset of protocol type			
x08	80 00 00 08	IPv4 protocol type			
x09	00 00 FF FF	Mask on the first 2 bytes			
SegFilter	2:				
x10	00 00 00 03	Word offset of protocol type			
x11	00 00 DD 86	86 IPv6 Type			
x12	00 00 FF FF	Mask on the first 2 bytes			
Filter 1					
x55	00 00 00 00	No negation of SegFilter1			
x56	00 00 00 01	Filter1 consists of SegFilter1			
Filter 2					
x57	00 00 00 00	No negation of SegFilter2			
x58	00 00 00 02	Filter2 consists of SegFilter2			
Uplink					
x65	00 00 00 00	Do not invert output			
x66	00 00 00 03	Frame is output at the uplink port if filter 1 or 2 applies.			
ConfigRe	g				
401	xx xx xx xE	Activate filter for CON A port (1110)			

Filtering by the source MAC address

Input field for Src address: 6 bytes

**Example:** You want to filter all frames that have been transmitted from the MAC address C8 3E A7 02 32 AB.

Register	Parameter	Function
SegFilter	1:	
x07	00 00 00 01	Word offset of the MAC address
x08	3E C8 xx xx	First 2 bytes of the MAC address
x09	FF FF 00 00	Mask on the last 2 bytes
SegFilter	2:	
x10	00 00 00 02	Word offset of the rest of the MAC address
x11	AB 32 02 A7	Last 4 bytes of the MAC address
x12	FF FF FF FF	Mask on 4 bytes
Filter 1		
x55	00 00 00 00	No negation of SegFilter1 and 2
x56	00 00 00 03	Filter1 consists of SegFilter1 and 2
Uplink		
x65	00 00 00 00	Do not invert output
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.
ConfigRe	g	
401	xx xx xx xE	Activate filter for CON A port (1110)

Filtering by the destination or source MAC address

Input field for the destination MAC address: 6 bytes

Input field for the source MAC address: 6 bytes

**Example:** You want to filter all frames that are transmitted to the MAC address C8 3E A7 01 23 45 or from the MAC address C8 3E A7 02 32 AB.

Register	Parameter	Function
SegFilter	1:	
x07	00 00 00 00	Word offset of the destination MAC address
x08	01 A7 3E C8	First 4 bytes of the destination MAC address
x09	FF FF FF FF	Mask on all bits
SegFilter	2:	
x10	00 00 00 01	Word offset of the rest of the destination MAC address
x11	xx xx 45 23	Last 2 bytes of the destination MAC address
x12	00 00 FF FF	Mask on 2 bytes
SegFilter	3:	
x13	00 00 00 01	Word offset of the source MAC address
x14	3E C8 xx xx	First 2 bytes of the source MAC address
x15	FF FF 00 00	Mask on 2 bytes
SegFilter	4:	
x16	00 00 00 02	Word offset of the rest of the source MAC address
x17	AB 32 02 A7	Last 2 bytes of the source MAC address
x18	FF FF FF FF	Mask on all bits
Filter 1		
x55	00 00 00 00	No negation of SegFilter1 and 2
x56	00 00 00 03	Filter1 consists of SegFilter1 and 2
Filter 2		
x57	00 00 00 00	No negation of SegFilter3 and 4
x58	00 00 00 0C	Filter2 consists of SegFilter3 and 4
Uplink		
x65	00 00 00 00	Do not invert output
x66	00 00 00 03	Frame is output at the uplink port if filter 1 or 2 applies.
ConfigRe	g	
401	xx xx xx xE	Activate filter for CON B port (1101)

(IPv4 0x0800)

Filtering by the sender IP address

Input field for sender IP address: 4 bytes

Example: You want to filter all frames that have been transmitted from the IP address 01 02 03 04.

Register	Parameter	Function		
SegFilter1:				
x07	00 00 00 03	Word offset of protocol type		
x08	80 00 00 08	IPv4 protocol type		
x09	00 00 FF FF	Mask on 2 bytes		
SegFilter	2:			
x10	00 00 00 06	Word offset of the sender IP address		
x11	02 01 00 00	4 bytes of the sender IP address		
x12	FF FF 00 00	Mask for all bits		
SegFilter	3:			
x13	00 00 00 07	Word offset of the sender IP address		
x14	00 00 04 03	4 bytes of the sender IP address		
x15	00 00 FF FF	Mask for all bits		
Filter 1				
x55	00 00 00 00	No negation of SegFilter1 and 2		
x56	00 00 00 07	Filter1 consists of SegFilter1 and 2		
Uplink				
x65	00 00 00 00	Do not invert output		
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.		
ConfigRe	g			
401	xx xx xx xE	Activate filter for CON B port (1101)		

(IPv4 0x0800)

Filtering by the target IP address

Input field for target IP address: 4 bytes **Example:** You want to filter the target IP address "01 02 03 04".

Register	Parameter	Function
SegFilter	1:	
x07	00 00 00 03	Word offset of protocol type
x08	80 00 00 08	IPv4 protocol type
x09	00 00 FF FF	Mask on 2 bytes
SegFilter	2:	
x10	00 00 00 07	Word offset of the target IP address is 10
x11	02 01 00 00	First 2 bytes of the target IP address
x12	FF FF 00 00	Mask on 2 bytes
SegFilter	3:	
x13	00 00 00 08	Word offset of the rest of the target IP ad- dress is 11
x14	00 00 04 03	Last 2 bytes of the target IP address
x15	00 00 FF FF	Mask on 2 bytes
Filter 1		
x55	00 00 00 00	No negation of SegFilter1,2 and 3
x56	00 00 00 07	Filter1 consists of SegFilter1,2 and 3
Uplink		
x65	00 00 00 00	Do not invert output
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.
ConfigRe	g	
401	xx xx xx xE	Activate filter for CON B port (1101)

Filtering by IP4 and external input

**Example:** You want to filter by protocol type IPv4 and the external input.

Protocol type IPv4 corresponds to 0x0800. The external input is "high".

Register	Parameter	Function
SegFilter1:		
x07	00 00 00 03	Word offset of protocol type
x08	80 00 00 08	IPv4 protocol type
x09	00 00 FF FF	Mask on 2 bytes
Filter 1		
x55	00 00 00 00	No negation of SegFilter1
x56	10 00 00 01	Filter1 consists of SegFilter1 and the exter- nal input
Uplink		
x65	00 00 00 00	Do not invert output
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.
ConfigRe	g	
401	xx xx xx xE	Activate filter for CON A port (1110)

Filtering by IP4 and setting the external output

**Example:** You want to filter by protocol type IPv4 and set the external output if a frame with protocol type IPv4 arrives.

Protocol type IPv4 corresponds to 0x0800.

Register	Parameter	Function			
SegFilter1:					
x07	00 00 00 03	Word offset of protocol type			
x08	80 00 00 08	IPv4 protocol type			
x09	00 00 FF FF	Mask on 2 bytes			
Filter 1					
x55	00 00 00 00	No negation of SegFilter1			
x56	00 00 00 01	Filter1 consists of SegFilter1			
Uplink					
x65	00 00 00 00	Do not invert output			
x66	00 00 00 00	Frame is output at the uplink port if filter 1 applies.			
External	output				
x67	00 00 00 00	No negation of ext. out			
x68	00 00 00 01	Set external output if filter 1 applies			
ConfigReg					
401	xx xx xx xE	Activate filter for CON A port (1110)			
extOut_C	ConfigReg				
402	00 00 01 01	Port Con A active, reset via a timer			
extOutTin	extOutTimerReg				
403	01 31 2D 00	Timer resets the value every 200 ms			

#### Filtering by CRC error

**Example:** You want to filter all frames that report a CRC error.

Set the following filter registers:

Register	Parameter	Function
State:		
x05	08 00 00 00	CRC Error Statusbit
x06	FF 00 00 00	Mask on 1 byte
Filter 1		
x55	00 00 00 00	No negation of StateFilter
x56	80 00 00 00	Filter1 consists of state filter
Uplink		
x65	00 00 00 00	Do not invert output
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.
ConfigRe	g	
401	xx xx xx xE	Activate filter for CON A port (1110)

**Example:** You want to filter all frames that are 1012 bytes long.

Filtering by frame length

Set the following filter registers:

Register	Parameter	Function
State:		
x05	00 00 03 F4	Frame is 1012 bytes long (0x03F4)
x06	00 00 FF FF	Mask on 2 bytes
Filter 1		
x55	00 00 00 00	No negation of StateFilter
x56	80 00 00 00	Filter1 consists of state filter
Uplink		
x65	00 00 00 00	Do not invert output
x66	00 00 00 01	Frame is output at the uplink port if filter 1 applies.
ConfigRe	ġ	
401	xx xx xx xE	Activate filter for CON A port (1110)

### Configuring filters

You can set what you want to do with the result of a filter in the Registers menu "401-410". You can show that a filter applies via the filter LEDs or the external output.

Information and setting values can be found in the chapter called "TAP configuration register [} 51]".

To be able to use the configuration settings, they have to be saved.

	Configuring TAP CURIOUS
Device information	<ul> <li>Click on "Config settings &gt; Snow settings".</li> <li>Device information is displayed in the first line:</li> <li>– Serial number of TAP CURIOUS</li> <li>– Software version</li> </ul>
	These data are specified by KUNBUS for this device and cannot be changed. Please have these data to hand if you report a problem to our support.
Connection settings	You can select the connection speed for all ports in the "Channel mode" menu. The default speed is 100 Mbit.
	$_{\circ}$ To change the default, check the "10 Mbit mode" box.
DHCP settings	If you use a DHCP server, it can assign a free IP address to TAP CURIOUS.
	◦ In the "Use DHCP" menu, click on "Yes" to use DHCP.
Configuration	You can change the following communication parameters in the "Config TAP" menu:
	<ul> <li>IP address</li> <li>The IP address ensures that TAP CURIOUS can be clearly identified within a network. When assigning a new IP address, you should therefore make sure that it is not being used by another device in the network.</li> <li>If you use DHCP, you do not need to set the IP address. In this case, TAP CURIOUS will receive the IP address from the DHCP server.</li> </ul>
	<ul> <li>Subnet</li> <li>This is where you can adapt the net mask. The net mask is a bit mask that indicates the bit position within the IP address that is being used to address the network section. Make sure the settings you change here match your network settings.</li> </ul>
	<ul> <li>Gateway address</li> </ul>

You can set the gateway address here.

# 7.3 Tabulated list of filter registers

A tabulated overview of all filter registers can be found in this chapter.

Number	Name of the register	Name of the filter	Access
X01	Time1_TargetReg	Timestamp_1	RW 32 bit
X02	Time1_MaskReg		RW 32 bit
X03	Time2_TargetReg	Timestamp_2	RW 32 bit
X04	Time2_MaskReg		RW 32 bit
X05	State_TargetReg	Status	RW 32 bit
X06	State_MaskReg		RW 32 bit
X07	SegFilter1_PosReg	Segment filter_1	RW 16 bit
X08	SegFilter1_TargetReg		RW 32 bit
X09	SegFilter1_MaskReg		RW 32 bit
X010	SegFilter2_PosReg	Segment filter_2	RW 16 bit
X011	SegFilter2_TargetReg		RW 32 bit
X012	SegFilter2_MaskReg		RW 32 bit
X013	SegFilter3_PosReg	Segment filter_3	RW 16 bit
X014	SegFilter3_TargetReg		RW 32 bit
X015	SegFilter3_MaskReg		RW 32 bit
X016	SegFilter4_PosReg	Segment filter_4	RW 16 bit
X017	SegFilter4_TargetReg		RW 32 bit
X018	SegFilter4_MaskReg		RW 32 bit
X019	SegFilter5_PosReg	Segment filter_5	RW 16 bit
X020	SegFilter5_TargetReg		RW 32 bit
X021	SegFilter5_MaskReg		RW 32 bit
X022	SegFilter6_PosReg	Segment filter_6	RW 16 bit
X023	SegFilter6_TargetReg		RW 32 bit
X024	SegFilter6_MaskReg		RW 32 bit
X025	SegFilter7_PosReg	Segment filter_7	RW 16 bit
X026	SegFilter7_TargetReg		RW 32 bit
X027	SegFilter7_MaskReg		RW 32 bit
X028	SegFilter8_PosReg	Segment filter_8	RW 16 bit
X029	SegFilter8_TargetReg		RW 32 bit
X030	SegFilter8_MaskReg		RW 32 bit
X031	SegFilter9_PosReg	Segment filter_9	RW 16 bit
X032	SegFilter9_TargetReg		RW 32 bit
X033	SegFilter9_MaskReg		RW 32 bit
X034	SegFilter10_PosReg	Segment filter_10	RW 16 bit
X035	SegFilter10_TargetReg		RW 32 bit
X036	SegFilter10_MaskReg		RW 32 bit

Number	Name of the register	Name of the filter	Access
X037	SegFilter11_PosReg	Segment filter_11	RW 16 bit
X038	SegFilter11_TargetReg		RW 32 bit
X039	SegFilter11_MaskReg		RW 32 bit
X040	SegFilter12_PosReg	Segment filter_12	RW 16 bit
X041	SegFilter12_TargetReg		RW 32 bit
X042	SegFilter12_MaskReg		RW 32 bit
X043	SegFilter13_PosReg	Segment filter_13	RW 16 bit
X044	SegFilter13_TargetReg		RW 32 bit
X045	SegFilter13_MaskReg		RW 32 bit
X046	SegFilter14_PosReg	Segment filter_14	RW 16 bit
X047	SegFilter14_TargetReg		RW 32 bit
X048	SegFilter14_MaskReg		RW 32 bit
X049	SegFilter15_PosReg	Segment filter_15	RW 16 bit
X050	SegFilter15_TargetReg		RW 32 bit
X051	SegFilter15_MaskReg		RW 32 bit
X052	SegFilter16_PosReg	Segment filter_16	RW 16 bit
X053	SegFilter16_TargetReg		RW 32 bit
X054	SegFilter16_MaskReg		RW 32 bit
X055	Filter1_NegReg	Filter_1	RW 32 bit
X056	Filter1_MaskReg		RW 32 bit
X057	Filter2_NegReg	Filter_2	RW 32 bit
X058	Filter2_MaskReg		RW 32 bit
X059	Filter3_NegReg	Filter_3	RW 32 bit
X060	Filter3_MaskReg		RW 32 bit
X061	Filter4_NegReg	Filter_4	RW 32 bit
X062	Filter4_MaskReg		RW 32 bit
X063	Filter5_NegReg	Filter_5	RW 32 bit
X064	Filter5_MaskReg		RW 32 bit
X065	Gbit_Filter_NegReg	Gbit Upload Filter	RW 32 bit
X066	Gbit_Filter_MaskReg		RW 32 bit
X067	ExOut_Filter_NegReg	Ext Output Filter	RW 32 bit
X068	ExOut_Filter_MaskReg		RW 32 bit
X069	LED0_LED2_Filter_Ne- gReg	LED0 - LED2 Fil- ter	RW 32 bit
X070	LED0_LED2_Fil- ter_MaskReg		RW 32 bit
X071	LED3_LED4_Filter_Ne- gReg	LED3 - LED4 Fil- ter	RW 32 bit
X072	LED3_LED4_Fil- ter_MaskReg		

x05-State\_TargetReg

Byte	Bit	Description
1	0-15	Frame length (with KUNBUS
2		additional data 20 bytes)
3	0	Port Con A
	1	Port Con B
	2	Port Con C
	3	Port Con D
	4-7	Reserved
4	0	Short Frame
	1	Long Frame
	2	Lost Frame
	3	CRC Error
	4	Alignment Error
	5	Wrong IFG
	6	Wrong Preamble

v06 State MaskPog		D'1	
X00-State_Waskiveg	Byte	BIt	Description
	1	0-31	Filter mask
	2		Value = 0: $\rightarrow$ Bit ignored
	3		Value = 1: $\rightarrow$ Bit considered
	4		
x07, x10 x49, x52-	Byte B	it Des	scription
SegFilterXX_PosReg	1 0	-15 Byt	e offset for 4 bytes in the frame
	2	Off 00	set = 0 → [01 00 5e 6e] ed c2 00 24 01 3a b6 c1 08 45 00
		Off 00	set = 1 → 01 00 5e 6e [ed c2 00 24] 01 3a b6 c1 08 45 00
		Off 00	set = 2 → 01 00 5e 6e ed c2 00 24 [01 3a b6 c1] 08 45 00
		Off 45	set = $3 \rightarrow 01\ 00\ 5e\ 6e\ ed\ c2\ 00\ 24\ 01\ 3a\ b6\ c1\ [08\ 00\ 00]$
x08, x11 x50, x53-	Byte B	it De	scription
SegFilterXX_largetReg	1 0	-31 4 k	byte filter data for which the test is required
	2	Re 00	ceived frame data $\rightarrow$ [c0 4a 00 01] 94 f7 c8 3e a7 00 95 08 06
	4	Fra	ame data entries in the register $ ightarrow$ 01 00 4a c0

x09, x12 … x51, x54-SegFilterXX\_MaskReg

Bit	Byte	Description
1	0-31	Filter mask
2		Value = 0: $\rightarrow$ Bit ignored
3		Value = 1: $\rightarrow$ Bit considered
4		

x55, ..., x63-FilterX\_NegReg

Byte	Bit	Description
1	0	Negate result of Segment filter_1
	1	Negate result of Segment filter_2
	2	Negate result of Segment filter_3
	3	Negate result of Segment filter_4
	4	Negate result of Segment filter_5
	5	Negate result of Segment filter_6
	6	Negate result of Segment filter_7
	7	Negate result of Segment filter_8
2	0	Negate result of Segment filter_9
	1	Negate result of Segment filter_10
	2	Negate result of Segment filter_11
	3	Negate result of Segment filter_12
	4	Negate result of Segment filter_13
	5	Negate result of Segment filter_14
	6	Negate result of Segment filter_15
	7	Negate result of Segment filter_16
3	0-7	Reserved
4	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Ext. input has to be "low"
	5	Negate result of timestamp low
	6	Negate result of timestamp high
	7	Negate result of status

x56, …, x64-FilterX\_MaskReg

Byte	Bit	Description
1	0	Add Segment filter_1 to the filter
	1	Add Segment filter_2 to the filter
	2	Add Segment filter_3 to the filter
	3	Add Segment filter_4 to the filter
	4	Add Segment filter_5 to the filter
	5	Add Segment filter_6 to the filter
	6	Add Segment filter_7 to the filter
	7	Add Segment filter_8 to the filter
2	0	Add Segment filter_9 to the filter
	1	Add Segment filter_10 to the filter
	2	Add Segment filter_11 to the filter
	3	Add Segment filter_12 to the filter
	4	Add Segment filter_13 to the filter
	5	Add Segment filter_14 to the filter
	6	Add Segment filter_15 to the filter
	7	Add Segment filter_16 to the filter
3	0-7	Reserved
4	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Add ext. input to the filter
	5	Add timestamp "low" to the filter
	6	Add timestamp "high" to the filter
	7	Add status filter to the filter

x65-Gbit\_Filter\_NegReg

Byte	Bit	Description
1	0	Negate result of Filter 1
	1	Negate result of Filter 2
	2	Negate result of Filter 3
	3	Negate result of Filter 4
	4	Negate result of Filter 5
	5	Reserved
	6	Reserved
	7	Reserved
2	0-7	Reserved
3	0-7	Reserved
4	0-7	Reserved

x 66-Gbit\_Filter\_MaskReg

Byte	Bit	Description
1	0	Frame is sent if filter 1 applies
	1	Frame is sent if filter 2 applies
	2	Frame is sent if filter 3 applies
	3	Frame is sent if filter 4 applies
	4	Frame is sent if filter 5 applies
	5	Reserved
	6	Reserved
	7	Reserved
2	0-7	Reserved
3	0-7	Reserved
4	0-7	Reserved

x68-ExOut	Filter	MaskReg
	_	- 0

Byte	Bit	Description
1	0	Set the external output if filter 1 applies
	1	Set the external output if filter 2 applies
	2	Set the external output if filter 3 applies
	3	Set the external output if filter 4 applies
	4	Set the external output if filter 5 applies
	5	Reset the external output if filter 1 applies
	6	Reset the external output if filter 2 applies
-	7	Reset the external output if filter 3 applies
2	0	Reset the external output if filter 4 applies
	1	Reset the external output if filter 5 applies
	2-7	Reserved
3	0-7	Reserved
4	0-7	Reserved

x67-ExOut\_Filter\_NegReg

Byte	Bit	Description
1	0	Set the external output if filter 1 does not apply
	1	Set the external output if filter 2 does not apply
	2	Set the external output if filter 3 does not apply
	3	Set the external output if filter 4 does not apply
	4	Set the external output if filter 5 does not apply
	5	Reset the external output if filter 1 does not apply
	6	Reset the external output if filter 2 does not apply
	7	Reset the external output if filter 3 does not apply
2	0	Reset the external output if filter 4 does not apply
	1	Reset the external output if filter 5 does not apply
	2-7	Reserved
3	0-7	Reserved
4	0-7	Reserved

x70-LED0\_LED2\_Filter\_MaskReg

Byte	Bit	Description
1	0	Set LED0 if filter 1 applies
	1	Set LED0 if filter 2 applies
	2	Set LED0 if filter 3 applies
	3	Set LED0 if filter 4 applies
	4	Set LED0 if filter 5 applies
	5	Set LED0 if filter 1 applies
	6	Reset LED0 if filter 2 applies
	7	Reset LED0 if filter 3 applies
2	0	Reset LED0 if filter 4 applies
	1	Reset LED0 if filter 5 applies
	2	Set LED1 if filter 1 applies
	3	Set LED1 if filter 2 applies
	4	Set LED1 if filter 3 applies
	5	Set LED1 if filter 4 applies
	6	Set LED1 if filter 5 applies
	7	Reset LED1 if filter 1 applies
3	0	Reset LED1 if filter 2 applies
	1	Reset LED1 if filter 3 applies
	2	Reset LED1 if filter 4 applies
	3	Reset LED1 if filter 5 applies
	4	Set LED2 if filter 1 applies
	5	Set LED2 if filter 2 applies
	6	Set LED2 if filter 3 applies
	7	Set LED2 if filter 4 applies

Byte	Bit	Description
4	0	Set LED2 if filter 5 applies
	1	Reset LED2 if filter 1 applies
	2	Reset LED2 if filter 2 applies
	3	Reset LED2 if filter 3 applies
	4	Reset LED2 if filter 4 applies
	5	Reset LED2 if filter 5 applies
	6	Reserved
	7	Reserved

x69-LED0\_LED2\_Filter\_NegReg

Byte	Bit	Description
1	0	Set LED0 if filter 1 does not apply
	1	Set LED0 if filter 2 does not apply
<b>Byte</b> 1 2	2	Set LED0 if filter 3 does not apply
	3	Set LED0 if filter 4 does not apply
	4	Set LED0 if filter 5 does not apply
	5	Reset LED0 if filter 1 does not apply
	6	Reset LED0 if filter 2 does not apply
	7	Reset LED0 if filter 3 does not apply
2	0	Reset LED0 if filter 4 does not apply
	1	Reset LED0 if filter 5 does not apply
	2	Set LED1 if filter 1 does not apply
	3	Set LED1 if filter 2 does not apply
	4	Set LED1 if filter 3 does not apply
	5	Set LED1 if filter 4 does not apply
	6	Set LED1 if filter 5 does not apply
	7	Reset LED1 if filter 1 does not apply
3	0	Reset LED1 if filter 2 does not apply
	1	Reset LED1 if filter 3 does not apply
	2	Reset LED1 if filter 4 does not apply
	3	Reset LED1 if filter 5 does not apply
	4	Set LED2 if filter 1 does not apply
	5	Set LED2 if filter 2 does not apply
	6	Set LED2 if filter 3 does not apply
	7	Set LED1 if filter 4 does not apply

Byte	Bit	Description
4	0	Set LED1 if filter 5 does not apply
	1	Reset LED2 if filter 1 does not apply
	2	Reset LED2 if filter 2 does not apply
	3	Reset LED2 if filter 3 does not apply
	4	Reset LED2 if filter 4 does not apply
	5	Reset LED2 if filter 5 does not apply
	6	Reserved
	7	Reserved

x72-LED3\_LED4\_Filter\_MaskReg

	Byte	Bit	Description
аѕккед	1	0	Set LED3 if filter 1 applies
		1	Set LED3 if filter 2 applies
		2	Set LED3 if filter 3 applies
		3	Set LED3 if filter 4 applies
		4	Set LED3 if filter 5 applies
		5	Reset LED3 if filter 1 applies
		6	Reset LED3 if filter 2 applies
		7	Reset LED3 if filter 3 applies
	2	0	Reset LED3 if filter 4 applies
		1	Reset LED3 if filter 5 applies
		2	Set LED4 if filter 1 applies
		3	Set LED4 if filter 2 applies
		4	Set LED4 if filter 3 applies
		5	Set LED4 if filter 4 applies
		6	Set LED4 if filter 5 applies
		7	Reset LED4 if filter 1 applies
	3	0	Reset LED4 if filter 2 applies
		1	Reset LED4 if filter 3 applies
		2	Reset LED4 if filter 4 applies
		3	Reset LED4 if filter 5 applies
		4	Reserved
		5	Reserved
		6	Reserved
		7	Reserved

x71-	
LED3_LED4_Filter_NegRe	g

Byte	Bit	Description
1	0	Set LED3 if filter 1 does not apply
	1	Set LED3 if filter 2 does not apply
	2	Set LED3 if filter 3 does not apply
	3	Set LED3 if filter 4 does not apply
	4	Set LED3 if filter 5 does not apply
	5	Reset LED3 if filter 1 does not apply
	6	Reset LED3 if filter 2 does not apply
	7	Reset LED3 if filter 3 does not apply
2	0	Reset LED3 if filter 4 does not apply
	1	Reset LED3 if filter 5 does not apply
	2	Set LED4 if filter 1 does not apply
	3	Set LED4 if filter 2 does not apply
	4	Set LED4 if filter 3 does not apply
	5	Set LED4 if filter 4 does not apply
	6	Set LED4 if filter 5 does not apply
	7	Reset LED4 if filter 1 does not apply
3	0	Reset LED4 if filter 2 does not apply
	1	Reset LED4 if filter 3 does not apply
	2	Reset LED4 if filter 4 does not apply
	3	Reset LED4 if filter 5 does not apply
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved

Byte	Bit	Description
4	0	Reserved
	1	Reserved
	2	Reserved
	3	Reserved
	4	Reserved
	5	Reserved
	6	Reserved
	7	Reserved

### TAP configuration register

Byte	Bit	Description
1	0	Con A $\rightarrow$ all frames are transmitted, irrespective of the filtering high-active, prioritized lower than Bit 4
	1	Con B $\rightarrow$ all frames are transmitted, irrespective of the filtering high-active, prioritized lower than Bit 5
	2	Con C $\rightarrow$ all frames are transmitted, irrespective of the filtering high-active, prioritized lower than Bit 6
	3	Con D $\rightarrow$ all frames are transmitted, irrespective of the filtering high-active, prioritized lower than Bit 7
	4	Con A $\rightarrow$ no frames are transmitted, irrespective of the filtering high-active, prioritized higher than Bit 0
	5	Con B $\rightarrow$ no frames are transmitted, irrespective of the filtering high-active, prioritized higher than Bit 1
	6	Con C $\rightarrow$ no frames are transmitted, irrespective of the filtering high-active, prioritized higher than Bit 2
	7	Con D $\rightarrow$ no frames are transmitted, irrespective of the filtering high-active, prioritized higher than Bit 3
)	Rese	rved
	Rese	rved
4	Rese	rved

401-ConfigReg

402-extOut\_ConfigReg

B	<b>Syte</b>	Bit	Description
1		0-3	$0001 \rightarrow 0x1 \rightarrow X1.1$ active port for setting the ext. out
			$0010 \rightarrow 0x2 \rightarrow X1.2$ active port for setting the ext. out
			$0100 \rightarrow 0x3 \rightarrow X2.1$ active port for setting the ext. out
			$1000 \rightarrow 0x4 \rightarrow X2.2$ active port for setting the ext. out
		4-7	0001 $\rightarrow$ 0x1-> X1.1 active port for resetting the ext. out
			$0010 \rightarrow 0x2 \rightarrow X1.2$ active port for resetting the ext. out
			$0100 \rightarrow 0x3 \rightarrow X2.1$ active port for resetting the ext. out
			$1000 \rightarrow 0x4 \rightarrow X2.2$ active port for resetting the ext. out
			Output reset via timer must not be activated.
2		0	Activate reset external output via timer (switch-off delay).
			The timer value is entered in 403-extOutTimerReg.
			high-active
		1	Reset external output
			high-active
			Output reset via timer must not be activated.
		2-7	Reserved
3		Reserved	t de la constante de
4		Reserved	k

#### 403-extOutTimerReg

Byte	Bit	Description
1-4	0-31	Delay for resetting the external output
		Input is in 10ns increments.
		For example, 0x1312D00 corresponds to 200 ms.

404-LED\_ConfigReg

Byte	Bit	Description								
1-4	0-5	Reset the LEDs via timer (switch-off delay), high-ac- tive								
		( 000001->LED0, 000010->LED1, 000100->LED2, 001000->LED3,								
		010000->LED4)								
	6-11	Reset the LEDs, high-active								
		Possible only when reset via timer is not active								
		( 000001->LED0, 000010->LED1, 000100->LED2, 001000->LED3,								
		010000->LED4)								
		LED reset via timer must not be activated.								
	12-15	Specify the active port for which LED0 is set.								
		$0001 \rightarrow Con A$								
		$0010 \rightarrow Con B$								
		$0100 \rightarrow Con C$								
		$1000 \rightarrow Con D$								
	16-19	Specify the active port for which LED1 is set.								
		$0001 \rightarrow \text{Con A}$								
		$0010 \rightarrow \text{Con B}$								
		$0100 \rightarrow Con C$								
		$1000 \rightarrow \text{Con D}$								
	20-23	Specify the active port for which LED2 is set.								
		$0001 \rightarrow \text{Con A}$								
		$0010 \rightarrow \text{Con B}$								
		$0100 \rightarrow \text{Con C}$								
	04.07	$1000 \rightarrow \text{Con D}$								
	24-27	Specify the active port for which LED3 is set.								
		$0001 \rightarrow \text{Con A}$								
		$0010 \rightarrow \text{Con B}$								
		$0100 \rightarrow \text{Con C}$								
	00.04	$1000 \rightarrow \text{Con D}$								
	20-31	Specify the active point for which LED4 is set. $0001 \rightarrow Cop A$								
		$0001 \rightarrow \text{Con R}$								
		$0.10 \rightarrow \text{Con C}$								
		$1000 \rightarrow \text{Con D}$								

### 405-LED\_Config2Reg

405-LED_Config2Reg	Byte	Bit	Description
	1-4	0-3	Specify the active port for which LED0 is reset.
			$0001 \rightarrow Con A$
			$0010 \rightarrow \text{Con B}$
			$0100 \rightarrow Con C$
			$1000 \rightarrow Con D$
		4-7	Specify the active port for which LED1 is reset.
			$0001 \rightarrow Con A$
			$0010 \rightarrow Con B$
			$0100 \rightarrow Con C$
			$1000 \rightarrow Con D$
		8-11	Specify the active port for which LED2 is reset.
			$0001 \rightarrow Con A$
			$0010 \rightarrow Con B$
			$0100 \rightarrow Con C$
			$1000 \rightarrow Con D$
		12-1	5 Specify the active port for which LED3 is reset.
			$0001 \rightarrow Con A$
			$0010 \rightarrow \text{Con B}$
			$0100 \rightarrow \text{Con C}$
			$1000 \rightarrow \text{Con D}$
		16-1	9 Specify the active port for which LED4 is reset.
			$0001 \rightarrow \text{Con A}$
			$0010 \rightarrow \text{Con B}$
			$0100 \rightarrow \text{Con C}$
		00.0	$1000 \rightarrow \text{Con D}$
		20-3	1 Reserved
406-LED0_TimerReg	Byte	Bit	Description
	1-4	031	Delay until LED0 is reset.
			Input is in 10ns increments.
			For example, 0x1312D00 corresponds to 200 ms.
407-LED1 TimerReg	Duto	D:4	Description
TOT LEDT_TIMEIT(eg	<b>byte</b>	0-31	Delay until I ED1 is reset
		0.01	Input is in 10ns increments
			For example, 0x1312D00 corresponds to 200 ms.

408-LED2_TimerReg	Byte	Bit	Description	
	1-4	0-31	Delay until LED2 is reset.	
			Input is in 10ns increments.	
			For example, 0x1312D00 corres	sponds to 200 ms.
409-LED3-TimerReg	Byte		Bit	Description
	1-4	0-31	Delay until LED3 is reset.	
			Input is in 10ns increments.	
			For example, 0x1312D00 corres	sponds to 200 ms.
410-LED4-TimerReg	Byte	Bit	Description	
	1-4	0-31	Delay until LED4 is reset	
			Input is in 10ns increments.	
			For example, 0x1312D00 corres	sponds to 200 ms.

# 8 Monitoring the interface

Wireshark is a free analysis program for network communication connections. It allows you to:

- Show data traffic across an Ethernet interface after or during capture in the form of data packets,
- observe individually captured data packets,
- sort data packets according to specific contents,
- extract binary contents (e.g. images),
- create and work-up data flow statistics.

The free program library "WinPcap" permits the transparent capture of data traffic under Microsoft Windows®.

You can use Wireshark on most standard systems. To analyze additional information, however, we currently offer a plugin only for Windows.

### Monitoring an interface with Wireshark

A The Wireshark Network Analyzer	
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help	
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Apply a display filter <ctrl-></ctrl->	Expression +
Welcome to Wireshark	
Capture	
ueine thie filter:	•
Intel(R) 82579LM Gigabit Network Connection: LAN-Verbindung مسلمي	
Learn	
User's Guide · Wiki · Questions and Answers · Mailing Lists	
You are running Wireshark 2.0.2 (v2.0.2-0-ga 16e22e from master-2.0). You receive automatic updates.	
Z Ready to load or capture No Packets	Profile: Default

- ✓ You have installed Wireshark. In the main window under "Capture", you will see all identified Ethernet interfaces.
- Double-click to select the interface you want to monitor.
- $\Rightarrow$  A status window opens. You will now see a recording of the data frame.

#### Status window

	TAP.Ca	pture.p	capng	1																				Ŀ	- 0	Х
File	e Edi	it Vie	w G	0 C	apti	ure	Anal	yze	St	atisti	CS	Tele	pho	ny	Wireless	Tool	s H	elp								
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→ ←	1	9 3.00 9 3.00	3461 3556		19 19	2.10 2.10	68.0. 68.0.	.1	Ð		19 19	2.1 2.1	.68. .68.	0.12 0.1 0.1	•	ICM	IP IP		94 94 04	Echo Echo	(pi (pi	ng) ng)	req	uest ly	id=0x id=0x	0 0
	<ul> <li>Frame 9: 94 bytes on wire (752 bits), 94 bytes captured (752 bits) on interface 0</li> <li>Ethernet II, Src: 00:87:11:28:51:83 (00:87:11:28:51:83), Dst: KunbusGm_00:00:81 (c8:3e:a7:00:00:81)</li> <li>Internet Protocol Version 4, Src: 192.168.0.1, Dst: 192.168.0.129</li> <li>Internet Control Message Protocol</li> </ul>																									
-	<pre>/ Internet control ressage Frotocol // KUBBUS TAP FCS: 0xf0397ff8 Channel: 1 1000 0000 = Port: A (0x80)0 = Alignment Error: no0 = Crc Error: no0 = Lost Packet : no0 = Lost Packet : no0 = Short Packet : no Timestamp: 0x00000952103d6c0</pre>																									
000 003 003 004 004	00 c 10 0 20 0 30 6 40 7 50 a	8 3e 0 3c 0 81 7 68 7 61 7 00	a7 00 2f 2a 08 00 59 6a 52 63 01 17	00 00 23 6b 64 80	81 00 dc 6c 65 00	00 8 80 0 60 0 66 6 66 6	87 1 91 8 91 2 5e 6 57 6	1 2 9 c 9 7 6 7 8 6 3 2	8 5 4 c f 6 0 7 9 f 1 e	1 83 0 a8 1 62 1 72 8 71 5 09	3 08 3 00 2 63 2 73 F 39 9 00	00 01 64 74 f0 00	45 c0 65 75 c8	00 a8 66 76 3e	.> . *.<br ghijk wabco	: ) :lmn o lefg h	(Q .abco pqrst i9	.E. def tuv >								
0	7	KUNBU	S TAP (	(tap),	20 b	ytes								Pad	kets: 12	B • Displ	ayed:	123 (	100.	0%) ·	Load	time	: 0:0.	2   Р	rofile: Def	ault

The status window consists of 3 areas:

- Packet list,
- Packet details,
- Packet raw data.

Wireshark displays all data packets in chronological order here. As soon as the KUNBUS TAP spy plugin is activated, Wireshark will apply in the "Time" column the highly-precise time stamp from TAP CURIOUS instead of the timestamp from the operating system.

Specific values from TAP CURIOUS can be displayed in additional columns. Open the "Edit > Preferences > Columns" menu in the "Properties" section and click on the "Add" button to create a new column. Now select "Custom" from the drop-down list.

as the "Field type". You can enter "TAP.port", for example, as the "Field name". As soon as "TAP." is entered, the plugin will suggest values for selection.

To precisely analyze traces, Wireshark offers a filter function. As a result, the display and the analysis can be limited to the most informative frames for the analysis. The filter allows you to observe the inbound and outbound data traffic for your own IP address or solely ping commands. When using TAP CURIOUS, it makes sense to filter by TAP additional information. Wireshark uses the filter expression "TAP.port == a" to show, for example, only those packets that TAP CURIOUS has received at Port A.

Packet list

Packet details

Once the TAP plugin is activated and Wireshark has captured the Ethernet packets via TAP CURIOUS, you can see additional information in the lowermost line in the "KUNBUS-TAP" section:

Anzahl der Bytes	Inhalt								
4 Byte	FCS (original checksum).								
6 Byte	Identifier	ldentifier C8 3E A7 00 01 61.							
1 Byte	Port on w	which the frame was received.							
1 Byte	Port	Value in Hex.							
8 Byte	Con A	0x80							
	Con B	0x40							
	Con C	0x20							
	Con D	0x10							
1 Byte	Error mes	ssages							
	Bit	Error message							
	Bit 7	Receive Error							
		Signal not decoded.							
	Bit 6	Wrong Preambel							
		Preamble does not conform to standard IEEE 802.3.							
	Bit 5	Wrong IFG							
		Minimum waiting time of 96 bit times not reached.							
	Bit 4	Alignment Error							
		The total number of bits in a frame is not divisible by 8.							
	Bit 3	CRC Error							
		The received frame is faulty.							
	Bit 2	Lost Frame							
		Frame has gone astray.							
	Bit 1	Long Frame							
		The maximum length of 1518 bytes/frames has been exceeded.							
	Bit 0	Short Frame							
		Minimum length of 64 bytes/frame not reached.							
8 Byte	Timestan	np in ns.							

Packet raw data

This section shows the packet data in hexadecimal form and as ASCII text. The last 20 bytes in the packets contain the additional information that TAP CURIOUS has added to the data packets.

# 9 Refreshing the web server

You can refresh the web server whenever an update is available.

Requirements:

- ✓ TAP CURIOUS is connected to your PC.
- ✓ You have installed an FTP client on your PC.
- ✓ You have Internet access.
- Download the update from our website. The latest version can always be found at: http://tap.kunbus.de.
- Save the update files on your PC.
- Open your FTP client.

Note! In this example, we use FileZilla. If you use a different FTP client, the steps you see may differ due to the software.

- Click on "File".
- Select "Server manager".

🔁 FieZila 🦾 🛶 🖉					
Datei Bearbeiten Ansicht Transfer Server Lesezeiche	n Hilfe				
Servermanager	CTRL+S				
Aktuelle Verbindung in Servermanager aufnehmen			Port:	Ver	rbinden
Neuer Tab	CTRL+T				
Tab schließen	CTRL+W				
Export					
Import					
Anzeigen der gerade bearbeiteten Dateien	CTRL+E				
Beenden	CTRL+Q				
Lokal: C:\web\				•	Server:
web Windows WIRIN wampp Diamon Di (Daten) WIRIN wampt WIRIN wampt wam				A III V	
Dateiname	D	lateigröße	Dateityp	Zuletzt	Dateiname Dateigröße Dateityp Zuletzt geändent Berechtigu Besitzer/Gr
₩ - index.html		13.200 ;	shtmifile	14.06.20	Dezet at kanen Sever vefunden

#### • Click on "New server".

Servermanager		x
Eintrag auswählen:	Allgemein Erweit	tert Transfer-Einstellungen Zeichensatz
	Server:	192.168.1.120 Port:
- 100p	Protokoll:	FTP - File Transfer Protocol
	Verschlüsselung:	Unverschlüsseltes FTP verwenden 🔻
	Verbindungsart:	Normal
	Benutzer:	Admin
	Passwort:	••••
	Konto:	
	Kommentare:	
Neuer Server Neues Verzeichnis		<b>^</b>
Neues Lesezeichen Umbenennen		
Löschen Kopieren		<b>T</b>
Verbinden	ОК	Abbrechen

• Enter a name for the server (e.g. TAP CURIOUS).

Servermanager						×
Eintrag auswählen:	Allgemein	Fauntito		Transfer Cinetally		Zeicheneste
Eigene Server ICPN revpi TAP CURIOUS	Aligemein Server: Protokoll: Verschlüsse	Erweite ( elung: (	ert 192. FTP Unve	Transfer-Einstellung 168. 1. 120 - File Transfer Proto erschlüsseltes FTP v	gen Port ocol verwe	Zeichensatz : enden V
5	Verbindungsart: Normal Benutzer: Admin Passwort: •••• Konto:					<b></b>
	Kommenta	e:				
Neuer Server Neues Verzeichnis						*
Neues Lesezeichen Umbenennen						_
Löschen Kopieren						×
Verbinden	ОК		Abbre	echen		

 $\circ$  Enter the following values in the "General" register:

It might not be possible to establish a connection due to the proxy settings. If this is the case, click on the "Advanced" register and check the "Bypass proxy" box.

- Click on "Edit".
- Select "Settings".

Datei Bearbeiten Ansicht Transfer Server Lesezeichen Hilfe												
Netzwerkkonfigurations-Assistent	B <sup>a</sup> N											
Server Persönliche Daten löschen Passwort: Port: Verbinden 💌												
Einstellungen												
N.												
Nicht verbunden X Nicht verbunden X												

#### • Click on "Transmit".

Einstellungen				×						
Seite auswählen:	Gleichze Maximal Maximal Maximal	itige Übertragungen e Anzahl gleichzeitiger Übertragu e gleichzeitige Downloads: e gleichzeitige Uploads:	ngen: 1 0 0	(1-10) (0 für unbegrenzt) (0 für unbegrenzt)						
SFTP	Geschwi	Geschwindigkeitsbegrenzungen								
Übertragungen Dateitypen	Begrenz	ung der Downloadgeschwindigkei	it: 100	(in KiB/s)						
Aktion bei existierender Datei	Begrenz	ung der Uploadgeschwindigkeit:	20	(in KiB/s)						
Designs Datums- und Zeitformat	Burst-To	leranz:	Normal	<b>_</b>						
Dateigroßenformat Dateilisten	Ungültig	Ungültige Zeichen in Dateinamen filtern Ø Filtern ungültiger Zeichen aktivieren								
Bearbeiten von Dateien	Wenn al werden,	Wenn aktiviert, werden Zeichen, die vom lokalen Betriebssystem in Dateinamen nicht unterstützt werden, beim Download ersetzt.								
ОК	Ungültig	Ungültige Zeichen ersetzen durch:								
Abbrechen	Die folge	enden Zeichen werden ersetzt:	/:*?"<>							

- Enter a "1" into the "Maximum number of simultaneous transmissions" box.
- Click on "OK"
- Click on the selection arrow next to the network settings.
- Select the connection for TAP.

🛃 File	Zilla	-	1.000							
Datei	Bearbeiten	Ansicht	Transfer	Server	Lesezeichen	Hilfe				
			1 🐺 🕅	* *	E 🕺 🖗	ñ				
	ICPN		Benutzern	ame:		Passwort:	Port:	Ver	binden	•
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	TAP CURIOU	S								
	μŗ		-							
Nicht	verbunden >	< Nicht ve	erbunden	×						
Lokal:	C:\web\							•	Server:	
		/stem Volu	ıme Inforn	nation				*		
	🗄 🛄 Te	emp								
	🗄 🌗 U	sers								
				- 111						

Click on "Connect".

#### Move the update files to TAP CURIOUS via drag&drop



 $\Rightarrow$  The update files will now be copied to your TAP CURIOUS.

FileZilla allows you to track progress in the queue. You can also see which files have been successfully transmitted and which encountered an error.

Selection to the selection of the select	er Hole (102, 104, 1, 120, 16, 19). Verside data connection for ferences. Decomposition (1) and the second connection for fitter, (s. The second connection for fitter, (s. Territoria data connection for fitter, (s. <b>Territoria data connection for fitter, (s. Territoria data connection for fitter, (s. <b>Territoria data connection for fitter, (s. Territoria data connection for fitter, (s. <b>Territoria data connection for fitter, (s. <b>Territoria data connection for fitter, (s. </b> <b>Territoria data connection for fitter, (s. )</b></b></b></b>	waicifiter.ja		Server   / to b / a-b web						
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<	n.									
1 Verzeichnis ausgewählt.				1 Verzeichnis ausgewählt.						
Server/Lokale Datei F	Richtung Datei auf Server		Große Prio	ikat Status						
Admin@192.168.1.120 O:\Dokumentation\TAP\t 00:00:00 vergangen O:\Dokumentation\TAP\t	>> /web/filter_basic/filter_js verbleibend 100.0%	81.026 Bytes (? B/s)	81.026 Non	mel Wird übertragen						
01Dokumentation)TARIt	with an and the second second	~	740 Non	nel						
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O:\Dokumentation\TAP\t	>> /web/filter_basic/old_registers.	son	2.475 Non	mal						
O:\Dokumentation\TAP\t	>> /web/filter_basic/registers.json		2.536 Non	mai						
- ALA										
Zu übertragende Dateien (95)	Fehlgeschlagene Übertragungen E	folgreiche Übertragungen (	15)							

# 10 Errors and problems

Problem	Solution
No link between the de- vices.	The TX and RX lines are interchanged between the ports (crossover). If the used devices do not have Auto-MDI-X, a crossover cable has to be used on one side
Wireshark does not show all packets.	In the "Capture & Options" configuration dialog, activate "Capture packets in pro- miscuous mode". Some network cards filter out certain packet types that Wire- shark is unable to display. This can be solved only by using a card from a dif- ferent manufacturer.
Wireshark does not show large packets.	TAP attaches 20 bytes of additional in- formation to the packets. If large pack- ets containing more than 1480 bytes of useful data are transmitted, the maxi- mum packet length of 1500 bytes (1518 bytes, incl. Ethernet header and CRC) is exceeded and the packet will nor- mally be rejected by the Ethernet card in the computer on which Wireshark is running. This can be avoided by activat- ing "Jumbo packets" in the driver.
Wireshark shows packets as faulty.	If the TAP plugin is not activated, Wire- shark (or a different analysis program without TAP plugin) might show a checksum error. This is due to the addi- tional data that TAP CURIOUS has at- tached to the data packet.
Wireshark shows additional packets.	You can ignore this error message It could be that the PC on which Wire- shark is running is sending additional broadcasts over the used interface. You can avoid this by deactivating all ele- ments (Client for Microsoft networks, In- ternet protocol (TCP/IP), etc.) in the LAN adapter properties under Windows.
Negative time stamp.	If the network becomes overloaded, the network card may not output the frames in the correct sequence. This can be be- cause the number of RSS queues in the network card is greater than one. To remedy the problem, the number of queues must be set to one.

Problem	Solution
Changed port number (auto crossover)	Due to the auto crossover function, the cable assignment through the listening devices is random. As a result, frames from device A (connected to Con A port) can be detected when frames have been received on Con B port.
Non-compliant Ethernet in- terface	You can recognize a non-compliant Eth- ernet interface by the error messages "Receive Error" or "Crc Error".
	To solve this problem, you must decouple the Ethernet interface with a switch.
	More information can be found in the section
	"Decoupling non-compliant Ethernet in- terfaces [} 67]"

#### Also see about this

Decoupling non-compliant Ethernet interfaces [] 67]

### 10.1 Decoupling non-compliant Ethernet interfaces

In order to measure reliably with the TAP, the Ethernet connections must meet the requirements of 100Base TX IEEE 802.3:

Differential Impendence	100Ω ±~16Ω ≤30 MHz
	100Ω + 64Ω, -40Ω @ 60 MHz
Return loss at the interface	≤~ -21,5 dB ≤30MHz
	≤~ -12 dB ≥60MHz

If this is not the case, it is possible that the line cannot be measured and the error message "Receive Error" or "Crc Error" is displayed:

$\triangleright$	Fram	e 2	23:	80	by	tes	on	wi	re (	640	bi	ts)	, 8	0 b	yte	s c	aptu	ured (640 bits) on interface 0
$\triangleright$	Ethe	rne	et :	II,	Sn	c: :	Sie	men	s_3d	:4d	:58	(a	c:6	4:1	7:3	d:4	d:58	8), Dst: SiemensN_9d:34:66 (08:00:0
$\triangleright$	PROF	INE	ET (	cyc	lic	Re	al-	Tim	e, R	TC1	, I	D:0	x80	21,	Le	n:	40,	, Cycle:14624 (Valid,Primary,Ok,Run
	PROF	INE	ET :	10	Cyc	lic	Se	rvi	ce D	ata	Un	it:	40	by	tes			
4	KUNB	US	TA	Р														
	F	cs:	0	x57	806	f76												
	C	har	nne]	1: :	1													
	0	100	0	800	=	Port	t: (	Con	в (	0x4(	3)							
	1	· N. ·			=	Rece	eiv	еE	rnor	: ye	es							
		0.3			= 1	Iroi	ng I	Pre	ambl	e: r	10							
		.0.			=	Iroi	ng	IFG	: no									
		e			= /	Ali	gnme	ent	Enn	or:	no							
			1		= [	Crc	Er	ror	: ye	S								
				Ø	= 1	Los	t Pa	ack	et: I	no								
				.0.	=	Lon	g Pa	ack	et: I	no								
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To solve this problem, you must decouple the Ethernet interface with a switch.



If two connected devices have a non-compliant Ethernet interface, you must decouple both lines with a switch.



If a connected device has a non-compliant Ethernet interface and the differential impedance deviates more from the standard, you must decouple the relevant line with a switch.

# 11 Technical Data

91.4 mm
139.7 mm
27.9 mm
approx. 150 g
0°C+55°C
-25°C+85°C
95%, non-condensing
IP20
24 V DC ± 20% or 230 V AC with mains connector
External power supply 24 V DC ± 20% Maximum output current of 50 mA Pulse length of 1 ms
Electrically isolated
4 for recording 2 lines
up to 1 GBit/s (1000BASE-T Eth- ernet, RJ45 port)
up to 100 MBit/s (100BASE-TX Ethernet, RJ45 port), full and half duplex
100Ω ±~16Ω ≤30 MHz
100Ω + 64Ω, -40Ω @ 60 MHz
≤~ -21,5 dB ≤30MHz
≤~ -12 dB ≥60MHz
IP20
∼ 0 µs (zero delay)
1 ns
3 LEDs per channel
6 LEDs for filter and overflow

CE-approved