100BASE-T1 SPY-12 Port

USER MANUAL

July 2019

Manual-Version: 2.2

Hardware-Version: v1.3

CONTENT

1 GENERAL INFORMATION

1.1 Functionality and Features of the 100BASE-T1 SPY-12 Port

Figure 1-1: 100BASE-T1 SPY-12 Port

The **Technica Engineering 100BASE- T1 SPY-12 Port** samples data frames directly on the bus without influence of the original network. The data Frames are enhanced with additional information as an exact timestamp and the bus port the data was originally sent on. All data can be recorded on a PC or datalogger for detailed offline analysis.
Timestamps are in 0.04 µs resolution and synchronous to all connected lines.

Features:

- 12x BroadR-Reach Ports Fullduplex 100 Mbit/s, with Master/Slave selection
- 1x FlexRay Channel A (option for transmission of StartUp & Sync Frames)
- 5x CAN / CAN-FD Ports
- 1x LIN, 1x SMA Trigger
- 4x Gigabit Ethernet Ports for Logging data output
- 1x Fast Ethernet Port for status output, configuration and webserver access
- 802.1AS synchronization through Gigabit Ethernet
- 1x SD Card for configuration and storage of trigger events
- Stainless steel case

General Information:

Power requirement:	12 Volt DC Nominal (7-16 Volt)
Power consumption:	10 Watt
Size:	147 x 124 x 26mm
Weight:	0,9 kg
International Protection:	IP 2 0
Operating temperature:	-40° to +80 °Celsius

LINKS:

The User can download the latest firmware and documentation for the 100BASE-T1 SPY-12 Port here:

https://technica-engineering.de/produkt/100base-t1-spy_12-port/

1.2 Warranty and Safety Information

Before operating the device, read this manual thoroughly and retain it as a reference.
The latest documentation for the 100BASE-T1 SPY-12 Port can be downloaded here:
https://technica-engineering.de/produkt/100base-t1-spy_12-port/

Use the device only as described in this manual.
Use only in dry conditions.
Do not apply power to a damaged device.

Do not open the device. Otherwise warranty will be lost.

This device is designed for engineering purpose only.
Special care has to be taken for operation.
Do not use this device in a series production car.
As this device is likely to be used under rough conditions, warranty is limited to 1 year.
Manufacturer liability for damage caused by using the device is excluded.

1.3 Declaration of conformity

EG-Konformitätserklärung

gemäß der EG-Richtlinie 2004/108/EG (elektromagnetische Verträglichkeit) vom 15. Dezember 2004

Hiermit erklären wir, dass das nachstehend bezeichnete Gerät in seiner Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie 2004/108/EG entspricht. Bei einer mit uns nicht abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit.

Hersteller: Technica Engineering
Leopoldstr. 236
80807 München

Bevollmächtigter: Joseba Rodriguez

Beschreibung des Gerätes:
100BASE-T1 SPY_12 Port

Datum der Erklärung: 11.07.2016

Name des Unterzeichners: Joseba Rodriguez

Unterschrift: .....

Figure 1-2: Declaration of conformity

1.4 Scope of Delivery

The delivery includes:

- 1x 100BASE-T1 SPY 12 port
- 1x 1m Ethernet Cable
- 1 x Cableset (incl. connectors, crimps, cables and banana plugs)

2 HARDWARE INTERFACES

2.1 Connectors

On the label on top of the device the user can see an overview about all HW-Interfaces of the 100BASE-T1 SPY-12 Port.

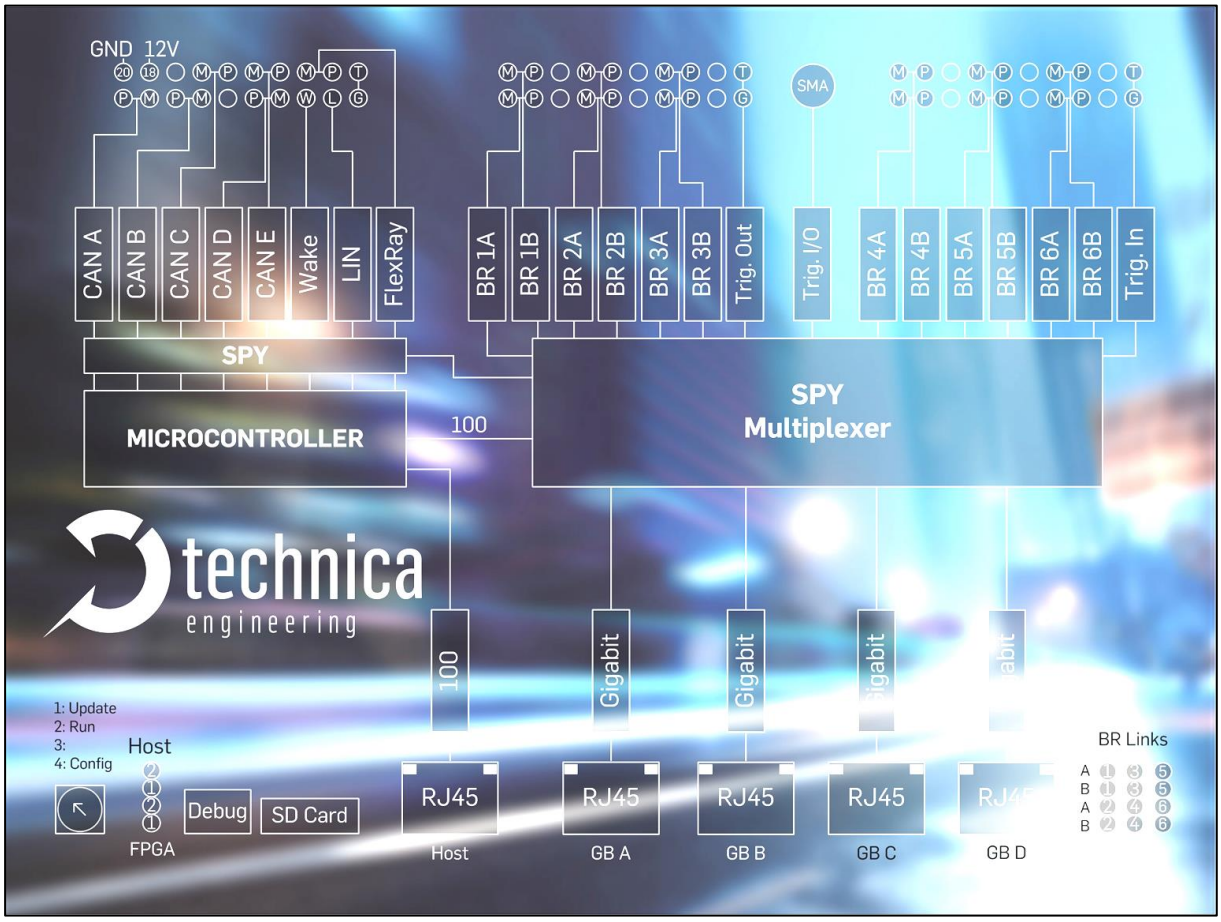

Figure 2-1: Label of 100BASE-T1 SPY-12 Port with pinning information

2.1.1 Black nanoMQS Connector – Power Connector (top left)

The pinning of the connector is listed on the label on top of the device as well. (See FIGURE 2-1Figure 1-2***Fehler! Verweisquelle konnte nicht gefunden werden.***).

The Connector color is black.

The power supply for the device is supplied by Pin 18 (12Volt) and Pin 20 (Ground). Requirements for the 100BASET1_SPY itself: 12 Volt DC up to 1 Ampere (typical 600mA)

Warning: If a voltage higher than 16 Volt is applied, the device will be damaged!

A wakeup-line may be connected on PIN 5. The wakeup-line should have the same voltage level as the power supply (12 Volt). A high level on one of these pins wakes up the ECU from sleep mode and keeps it active.
Alternatively, the "*Prevent sleep*" checkbox in the control panel of the website can be enabled.

The CAN, LIN and FlexRay interfaces can be used to communicate with the CAN/CAN-FD, LIN and FlexRay buses. For LIN and FlexRay buses, no data transmission is possible.
The Tyco Electronics (TE) Nano Micro Quad Lock System (nanoMQS) is used.

Name	Picture	Part Number
20POS NANOMQS REC HSG CODE A		2141404-1
NANOMQS RECEPTACLE TERMINAL		2-1703930-1

Table 2-1:Parts of black nanoMQS connector

Pin	Function	Pin	Function
1	GND Reference for Trigger	**2**	Host Trigger Line
3	LIN Bus.	**4**	FlexRay Channel A BP
5	Wake Line	**6**	FlexRay Channel A BM
7	CAN D / 5 Minus (Low)	**8**	CAN E / 1 Plus (High)
9	CAN D / 5 Plus (High)	**10**	CAN E / 1 Minus (Low)
11	n.c.	**12**	CAN C / 2 Plus (High)
13	CAN B / 4 Minus (Low)	**14**	CAN C / 2 Minus (Low)
15	CAN B / 4 Plus (High)	**16**	n.c.
17	CAN A / 3 Minus (Low)	**18**	Battery +12 Volt Input
19	CAN A / 3 Plus (High)	**20**	Battery Ground Input

Table 2-2: Pinning of black MQS connector

2.1.2 Black nanoMQS Connectors – 100BASE-T1-Ports

The pins marked with (P) or (M) are used for the 100BASE-T1 ports.
The user must connect the (P) pin to the (P) pin of the periphery device. The user must connect the (M) pin to the (M) pin of the periphery device.

Note: If these two pins are swapped, the link LED may be lit on the 100BASE-T1 slave side, but no data transmission will be possible.

Pin	Function	Pin	Function
1	GND Reference for Trigger	**2**	FPGA Trigger Line OUT1
3	n.c.	**4**	n.c.
5	100BASE-T1 Port 3A / 5, P (Positive)	**6**	100BASE-T1 Port 3B / 6, P (Positive)
7	100BASE-T1 Port 3A / 5, M (Negative)	**8**	100BASE-T1 Port 3B / 6, M (Negative)
9	n.c.	**10**	n.c.
11	100BASE-T1 Port 2A / 4, P (Positive)	**12**	100BASE-T1 Port 2B / 3, P (Positive)
13	100BASE-T1 Port 2A / 4, M (Negative)	**14**	100BASE-T1 Port 2B / 3, M (Negative)
15	n.c.	**16**	n.c.
17	100BASE-T1 Port 1A / 1, P (Positive)	**18**	100BASE-T1 Port 1B / 2, P (Positive)
19	100BASE-T1 Port 1A / 1, M (Negative)	**20**	100BASE-T1 Port 1B / 2, M (Negative)

Table 2-3: Pinning with middle connector

Pin	Function	Pin	Function
1	GND Reference for Trigger	**2**	FPGA Trigger Line IN1
3	n.c.	**4**	n.c.
5	BroadR-Reach Port 6A / 9, P (Positive)	**6**	BroadR-Reach Port 6B / 12, P (Positive)
7	BroadR-Reach Port 6A / 9, M (Negative)	**8**	BroadR-Reach Port 6B / 12, M (Negative)
9	n.c.	**10**	n.c.
11	BroadR-Reach Port 5A / 8, P (Positive)	**12**	BroadR-Reach Port 5B / 11, P (Positive)
13	BroadR-Reach Port 5A / 8, M (Negative)	**14**	BroadR-Reach Port 5B / 11, M (Negative)
15	n.c.	**16**	n.c.
17	BroadR-Reach Port 4A / 7, P (Positive)	**18**	BroadR-Reach Port 4B / 10, P (Positive)
19	BroadR-Reach Port 4A / 7, M (Negative)	**20**	BroadR-Reach Port 4B / 10, M (Negative)

Table 2-4: Pinning with outer connector

2.1.3 RJ45 Ethernet Connectors

There are four RJ-45 Standard Ethernet connectors of the front side for Gigabit Ethernet. GB-A to GB-D.
There is one RJ-45 Standard Ethernet connector of the front side for Fast Ethernet (100 Bit/s). HOST-Port.

2.2 Other Interfaces

2.2.1 SMA Connectors

There is one shielded SMA Connector for one Trigger Input/Output Line.

2.2.2 Status LEDs

The 100BASET1_SPY 12 port has several status LEDs at the front side of the case.

The **"Host" LED1** can toggle at three different speeds:

- Slow toggle (approx. 0.5 sec) during normal operation to show that the microcontroller is running in normal mode.
- Fast toggle (approx. 0.1 sec) when the microcontroller is in bootloader mode. The bootloader mode is used for firmware update only (see below in this manual). The user cannot access the website when the device is in bootloader mode.

When the device is in Bootloader-Update Mode the LED toggles with moderate frequency (approx. 0.25 sec).
The **"Host" LED2** should be normally off. If it toggles at high speed (approx. 0.1 sec) an error has been detected by the Host.

The "FPGA" LED2 can toggle at two different speeds:

- Slow toggle (approx. 0.5 sec) during normal operation to show that the FPGA is running in normal mode.
- Fast toggle (approx. 0.1 sec) : TBD

The "FPGA" LED1 should be normally off. If it toggled at high speed (approx. 0.1 sec) an error has been detected by the FPGA.

The 12 port **Status LEDs 1A to B6** monitor the link status of the corresponding port. The LEDs are lit when there is BroadR-Reach link detected.

Note: There is an issue when P/N of the bus are swapped. The LED may be on in this case on 100BASE-T1 slave side, but there will be no data transmission possible.

The built-in LEDs in RJ45 connector shows the status of the gigabit ports. The left (orange LED) is lit by a link-up. The right (yellow) will blink on data traffic.

2.2.3 Rotary Switch

The Rotary DIP Switch has no functionality.

3 CONFIGURATION WEBSITE

The user can access the configuration website with a standard web browser.

Note: Firefox is recommended; Chrome is **not** recommended.

- Set IP-Address of the networkadapter of the PC in the same range as the 100BASE-T1 SPY mini 12 Port but not the same IP-address.
- Connect the PC to the “Host” RJ45 connector.
- The default IP address of the device is 192.168.0.49 and subnet mask 255.255.255.0

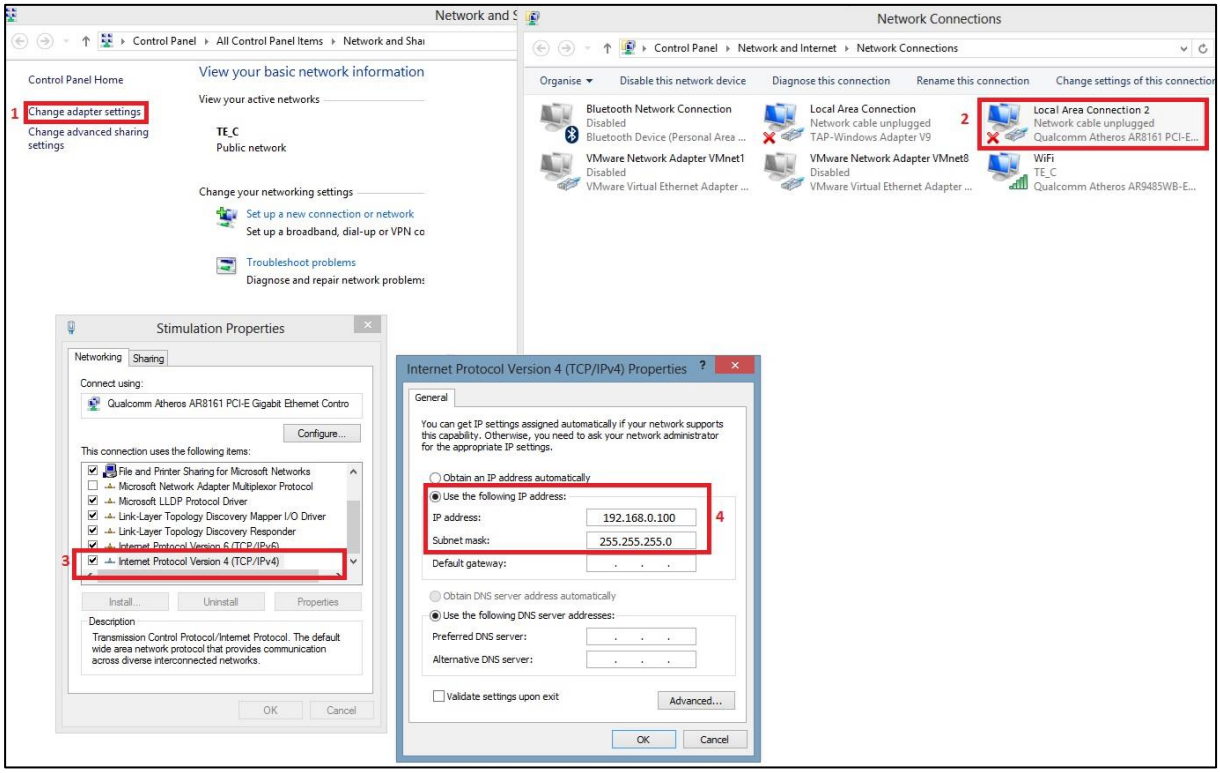

Figure 3-1: Steps for setting up IP Address to access the device’s web page

Note: Please, make sure that the Internet Protocol Version 6 (TCP/IPv6) option is disabled.

3.1 Website Home

Figure 3-2: Home Page after accessing the device

With the first access to the website The home screen will be shown. Please select one of the tabs for further configuration.

3.2 System Information Tab

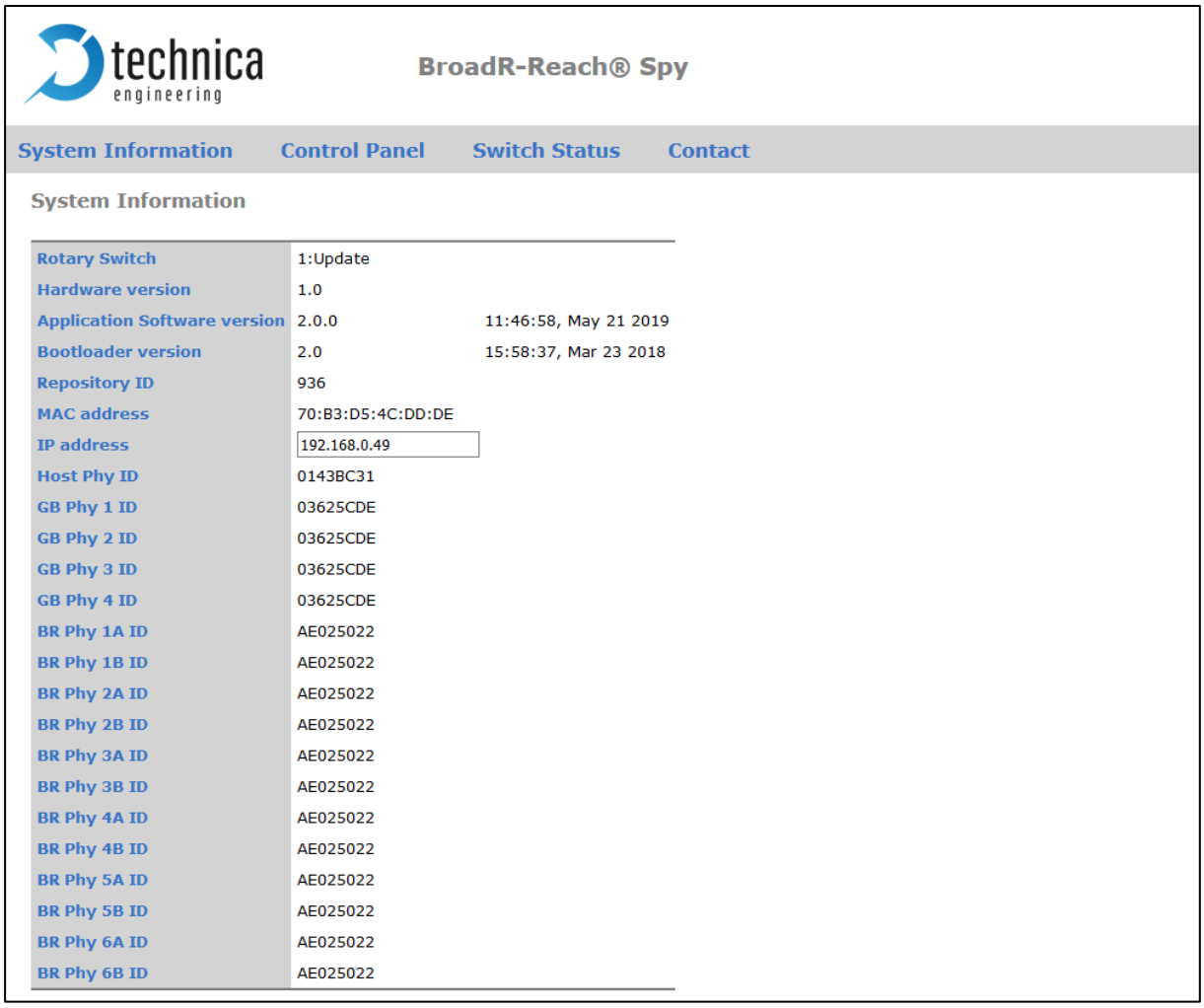

Figure 3-3: Details in System Information Tab

On the tab „System Information“ some status information about the device is displayed. The user can check the version number of the application firmware and the bootloader or the unique MAC adress of the device. The version number registers of the switch and phy chips are displayed for information only.
The MAC adress should be the same as on the label on the bottom of the device.

The IP adress of the host microcontroller (Webserver) can be changed here. If the user wants to use multiple devices in one network, an unique IP adress for each device must be set here.

Note: Before installing a new firmware, please restore the IP Address to the default one: 192.168.0.49 or restore it by setting it to “default on Control Panel” tab

3.3 Control Panel Tab

Figure 3-4: Details in the Control Panel Tab

On the „Control Panel“ tab the user can make a soft-reset *(Restart)* of the system.

Also the configuration settings of the device can be *imported* and *exported* to a file (*.cfg) on a computer connected to the RJ45 Port. The user must restart the device to use the new configuration.

The user can reset the configuration settings to *Default*. All the configuration stored will be set to its default values.

After one minute without linkup in any of the 100BaseT1 ports, the device will enter on Sleep Mode. In order to wake up the device again, the user can use the WakeUp line or power off the device. Another way to avoid the device enter on this Sleep Mode is to activate the *Prevent sleep* checkbox. This will keep the device running without entering on the Sleep Mode.

3.4 Switch Status Tab

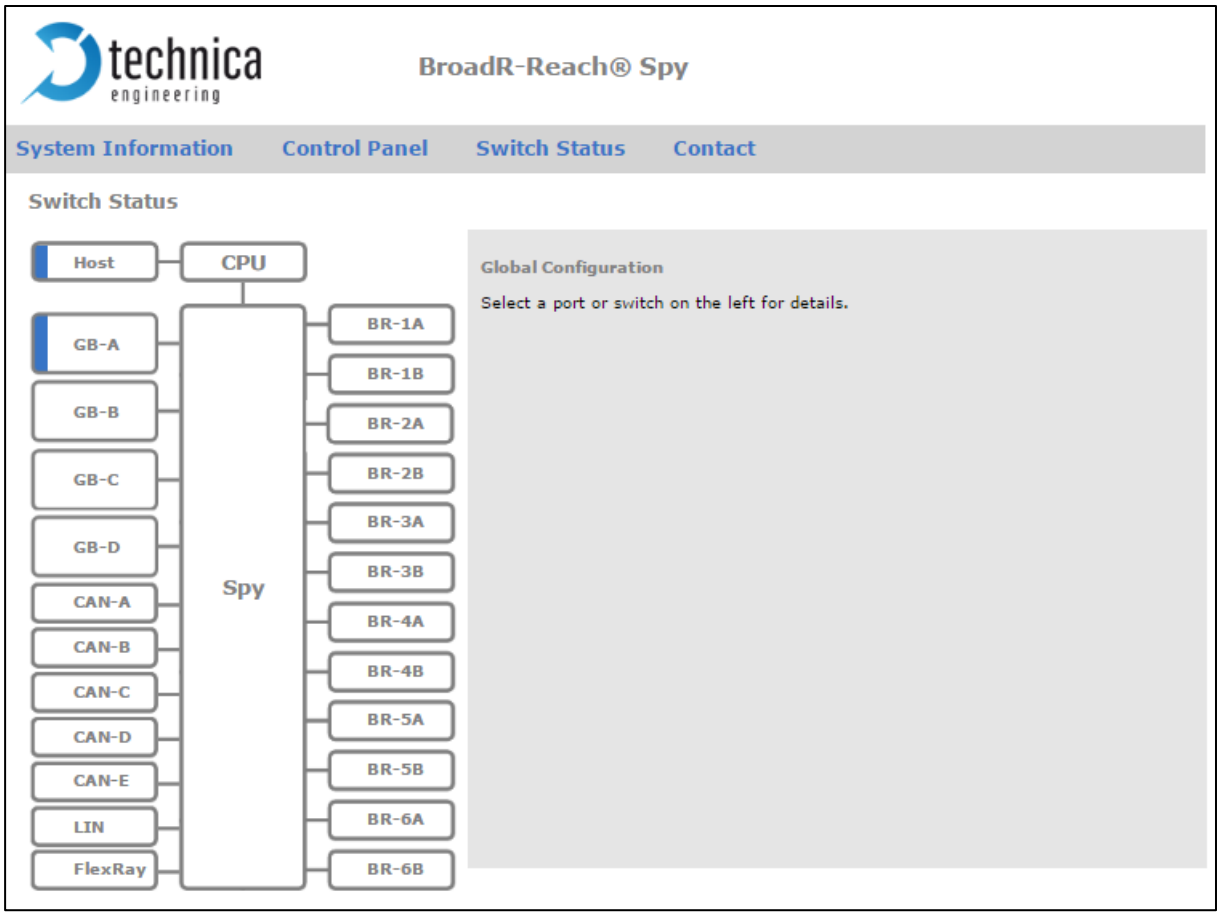

Figure 3-5: Details in the Switch Status Tab

The main configuration of the switch is done in the „Switch Status“ tab.
Here the user can configure details about each port and get some status information about the ports and switch states.
On the left side of the page the user can see an overview of all available ports. A blue bar at the side of a Gigabit or a 100Base-T1 port label indicates an active link.

Note: There is no link status information about CAN, LIN or FlexRay ports on the Website.

Note: In firmware 2.0 there are only three CAN-Ports available (CAN-A to CAN-C) due to perfomance. CAN-D and CAN-E can be activated by another Firmware, but then there is 100BASE-T1 functionallity not avaliable anymore. For further inforamtion please contact support@technica-engineering.de.

If the user clicks on „Switch Status“ tab and no port or switch is still selected, **Global configuration** will appear.

3.4.1 Spy Multiplexer

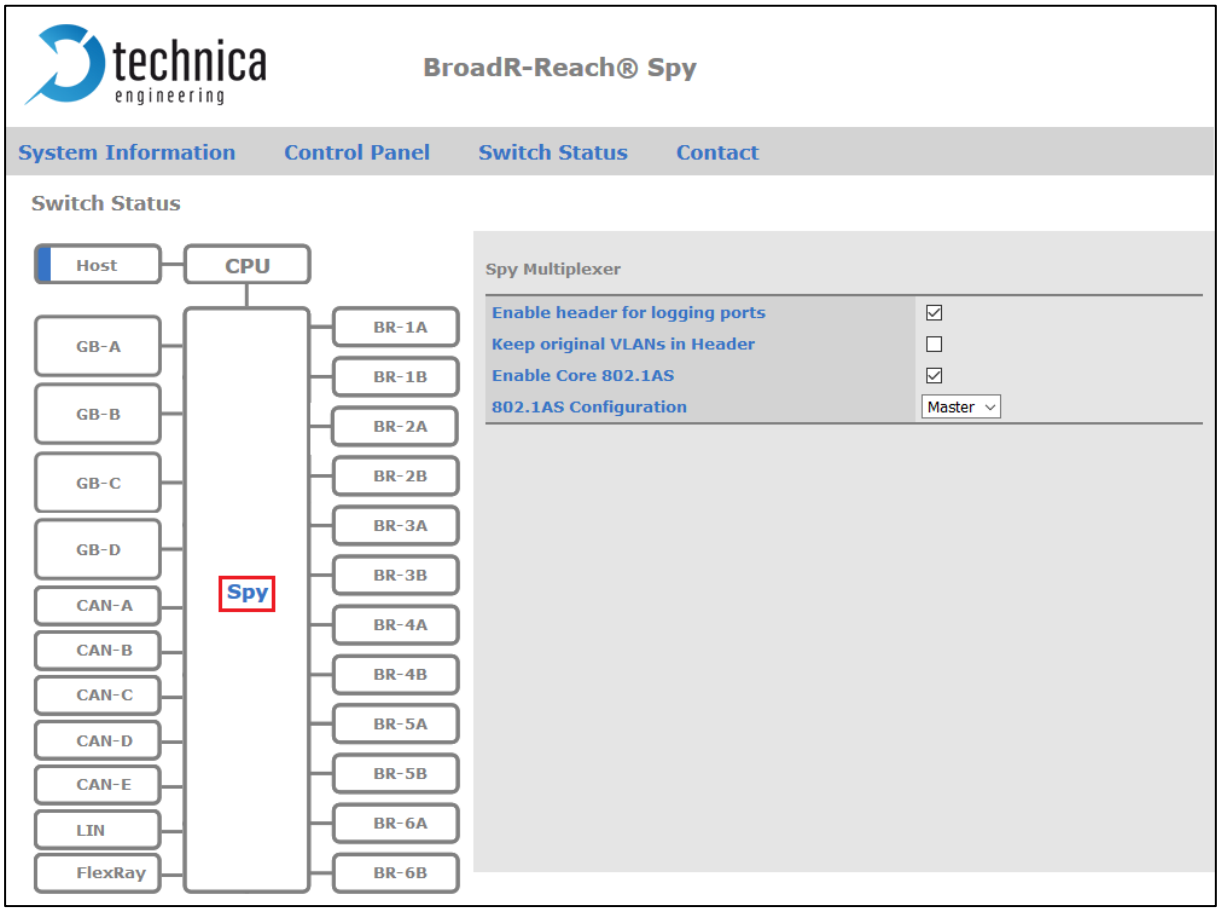

Figure 3-6: Configuration parameters when clicked on SPY label

Click on the central „**Spy**“ label to configure general *Spy Multiplexer* settings.

Options of showed page:

- **Enable header for logging ports:** This option enables the Header Mode of the 100BASET1_SPY.

  For BroadR-Reach Ports the original Ethernet frames will be wrapped in a new Ethernet Frame. This new frame will contain additional data (timestamp, ingress port, …) and the original RAW frame. The new Frame will be transmitted through the selected Gigabit Port. See frame format information in CHAPTER 4

Note: For CAN, LIN and FlexRay frames the wrapper is necessary for the data to be recognized as Ethernet frame.

- **Keep original VLANs in Header:** This option adds to the 100BASET1_SPY header the VLANs of the original packet, in the case that the BroadR-Reach received packet is VLAN tagged. In CHAPTER 4.2, the user can find how this option affects to the 100BASET1_SPY header.

Note: When the user performs any change in the configuration of any port, the **Save Configuration** option will appear. Please select the **Restart after saving** option before saving configuration.

When the **Save and Restart** option is enabled, and the user presses the **Save Configuration** button, the **Restarting…** message should be shown on the website:

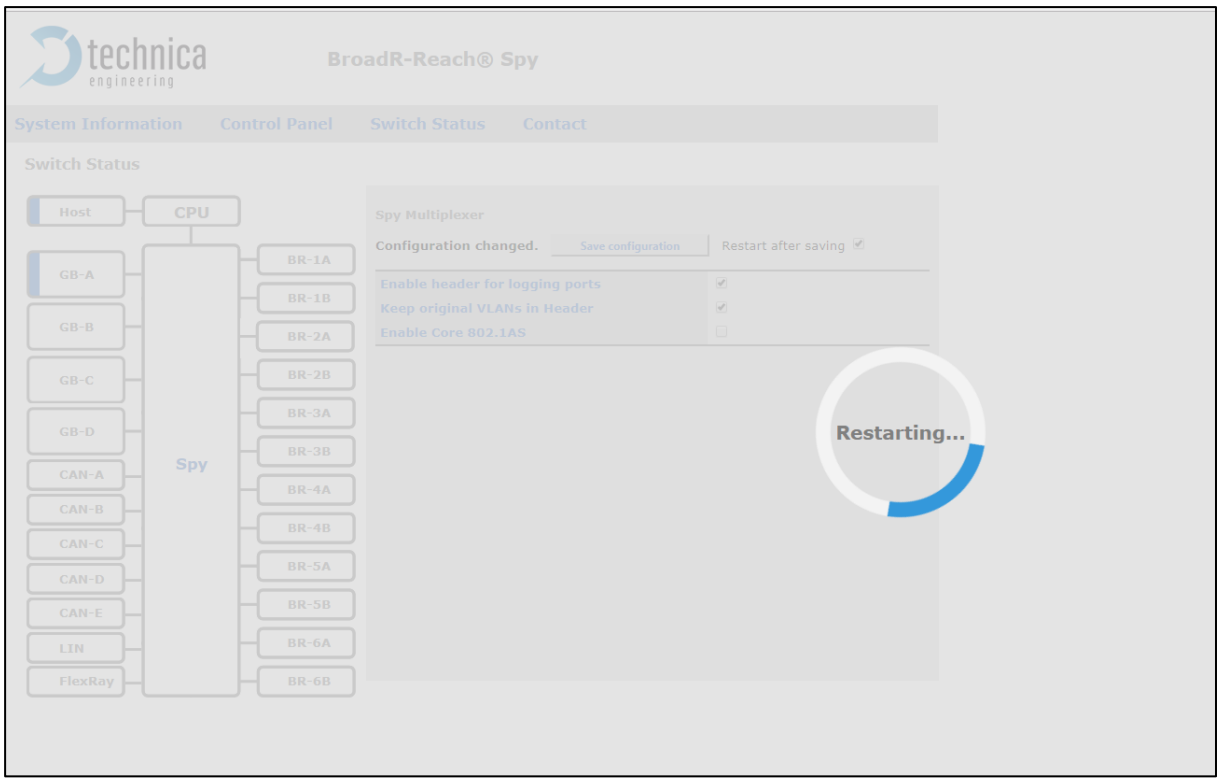

Figure 3-7: Prompt for restarting the device

3.4.2 Gigabit Ethernet Ports

There are four Gigabit Ethernet Ports for data logging output at the front of the device. On the website the user can see the status by clicking on the GB-A to GB-D labels on the left side.

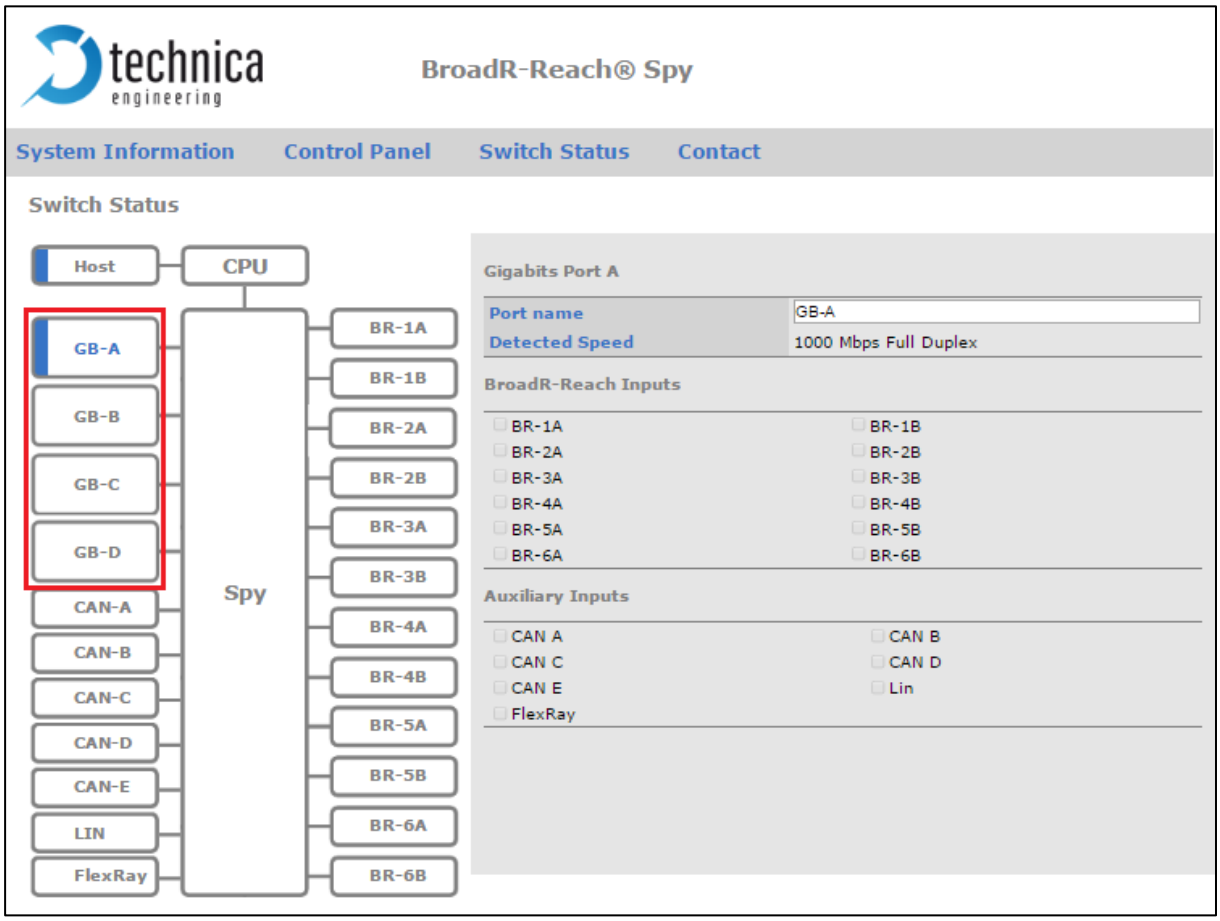

Figure 3-8: Parameters for setting the Gigabit ports

Detected speed: Shows the result of link negotiation. Speed and half/full duplex information.

BroadR-Reach Inputs: This is a configuration status information. It shows which BroadR-Reach ports are connected to the selected Gigabit port.
Auxiliary Inputs: This shows which CAN, LIN and FlexRay ports are connected to the selected Gigabit port.

3.4.3 100BASE-T1 Port

The BR-1A to BR-6B labels on right side allow the user to configure BroadR-Reach Port settings:

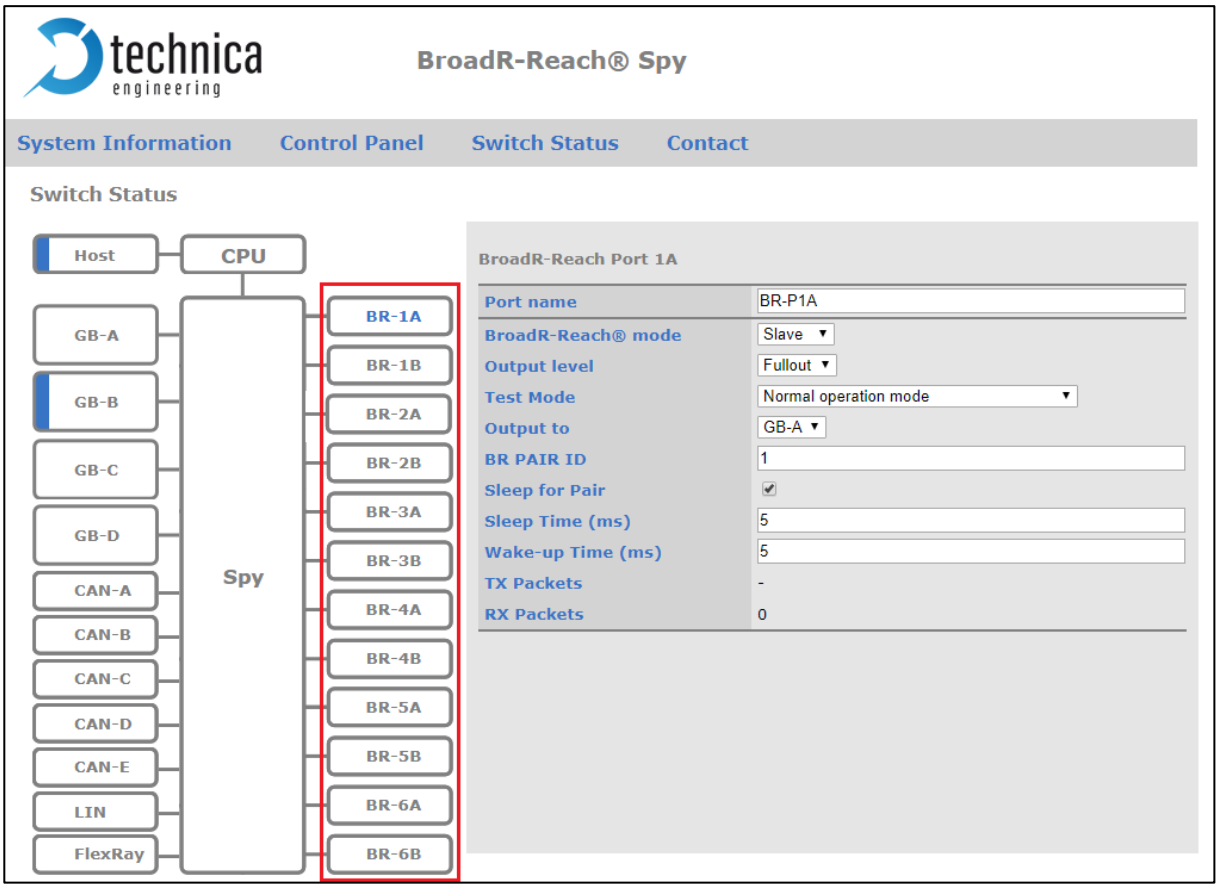

Figure 3-9: Parameters to set in BroadR-Reach Ports

BroadR-Reach mode: Here the user can select Master/Slave Mode of the selected Port. On each BroadR-Reach link there has to be one *master* and one *slave* device.

Please set the "BroadR-Reach mode" to the opposite of what the device which is connected to this port.

Output level: The "Output Level" is the amplitude level of the BroadR-Reach signal. The user can set Full level (Fullout = default) or half amplitude.

Note: Both devices of one BroadR-Reach link have to use the same level. Otherwise the user will get an instable link. **FullOut** Level is always recommended.

Test Mode: For BroadR-Reach Ports it is possible to set a *BroadR-Reach Physical Layer Test Mode*. There are five test modes defined in the BroadR_Reach Specification to check the compliance of a port.

Warning: When a test mode has been selected there is no communication possible for this port.
Note: For compliance testing an oscilloscope with special test software is necessary.

Output to: The BroadR_Reach Ports are always connected A-B for each channel pair. This setting allows a copy of the A-B communication to be sent to a Gigabit port. Choose here which Gigabit port will be connected with the selected BroadR-Reach port.
BR PAIR ID: Specifies the multiplexing between two BroadR-Reach ports. For example, if the user wants to connect BR-1A with BR-5A, **BR PAIR ID** in both ports must have the same value.

Note: If more than two BroadR-Reach ports have the same **BR PAIR ID**, only the two first ports found following the order 1A, 1B, 2A, 2B… will be connected. For example, if BR-1A, BR-1B and BR-2A have the same **BR PAIR ID**, only BR-1A and BR-1B will be connected between them.

Note: The **BR PAIR ID** value must be greater than 0. If two BroadR-Reach ports have this field set to 0, those ports will be not connected.

SLEEP FOR PAIR: when the user selects this option, two textboxes will appear:

- **Sleep Time (ms):** time that the master-ECU has to be sleeping (no lunkup on BroadR-Reach link) for the 100BaseT1_SPY to deactivate the link with the slave-ECU
- **Wake-up Time (ms):** time needed after disabling the link with the slave-ECU to be possible to detect a linkup with the master-ECU

Use case: If Device_A (Master) goes to sleep for a time greater than Sleep Time (ms), 100Base-T1 SPY will disable the PHY2, connected to Device_B, and this device will go to sleep.

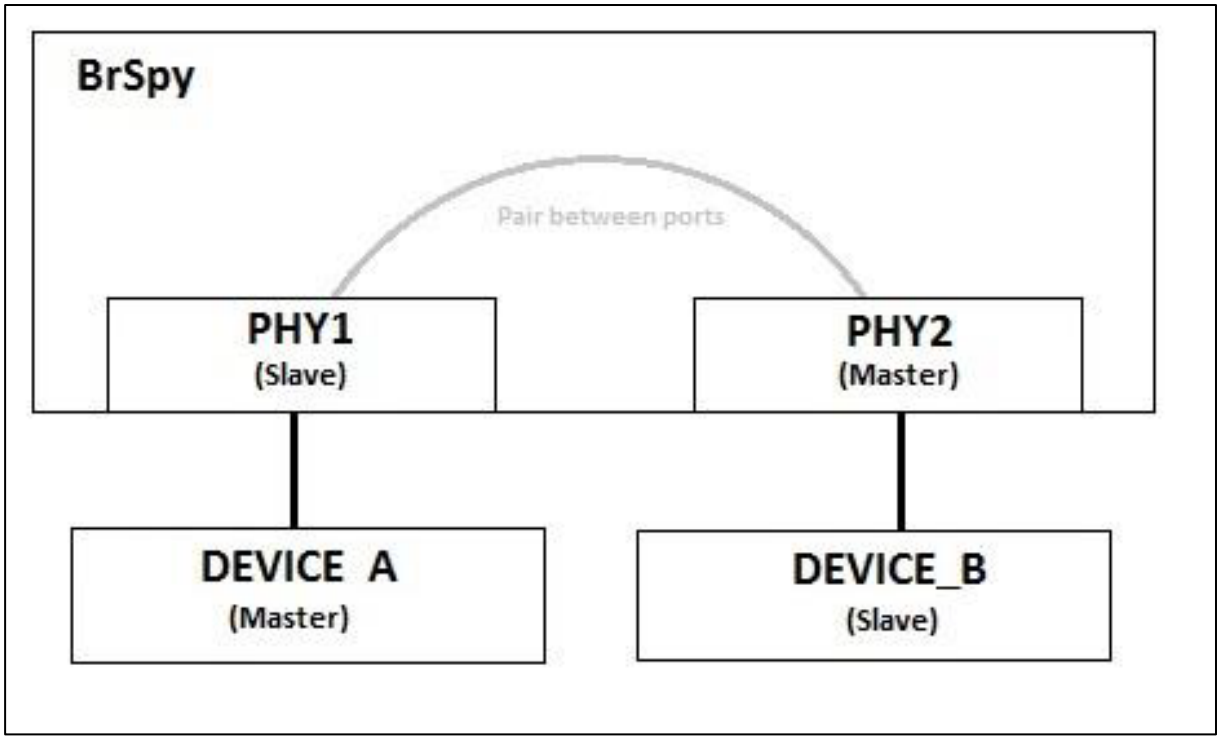

Figure 3-10: Sleep time between Master and Slave

As soon as there is a LinkUp recognized in Device_A, connected to PHY1, PHY2 will be enabled again and the communication will be possible.

Note: the SLEEP FOR PAIR functionality works according to the BR PAIR ID option. If there are more than two devices with the same **PAIR ID** and the **SLEEP FOR PAIR** functionality is enabled, the ports taking on this functionality will be the first two ports found following the order 1A, 1B, 2A, 2B,…

Note: The values for the timings for the pair are set if the BroadR-Reach port is set as slave (connected to master-ECU). But in order to make this functionality enable, the SLEEP FOR PAIR functionality must be enabled in both ports (Master and Slave) configured with the same BR PAIR ID. In the case of 100Base-T1 SPY BroadR-Reach Master port, the timing options will not appear.

TX/RX Packets: These two counters show the number of transmitted and received packets through the selected BroadR-Reach port.

Note: In this release, the TX Packets counter doesn't work.

3.4.4 CAN Port

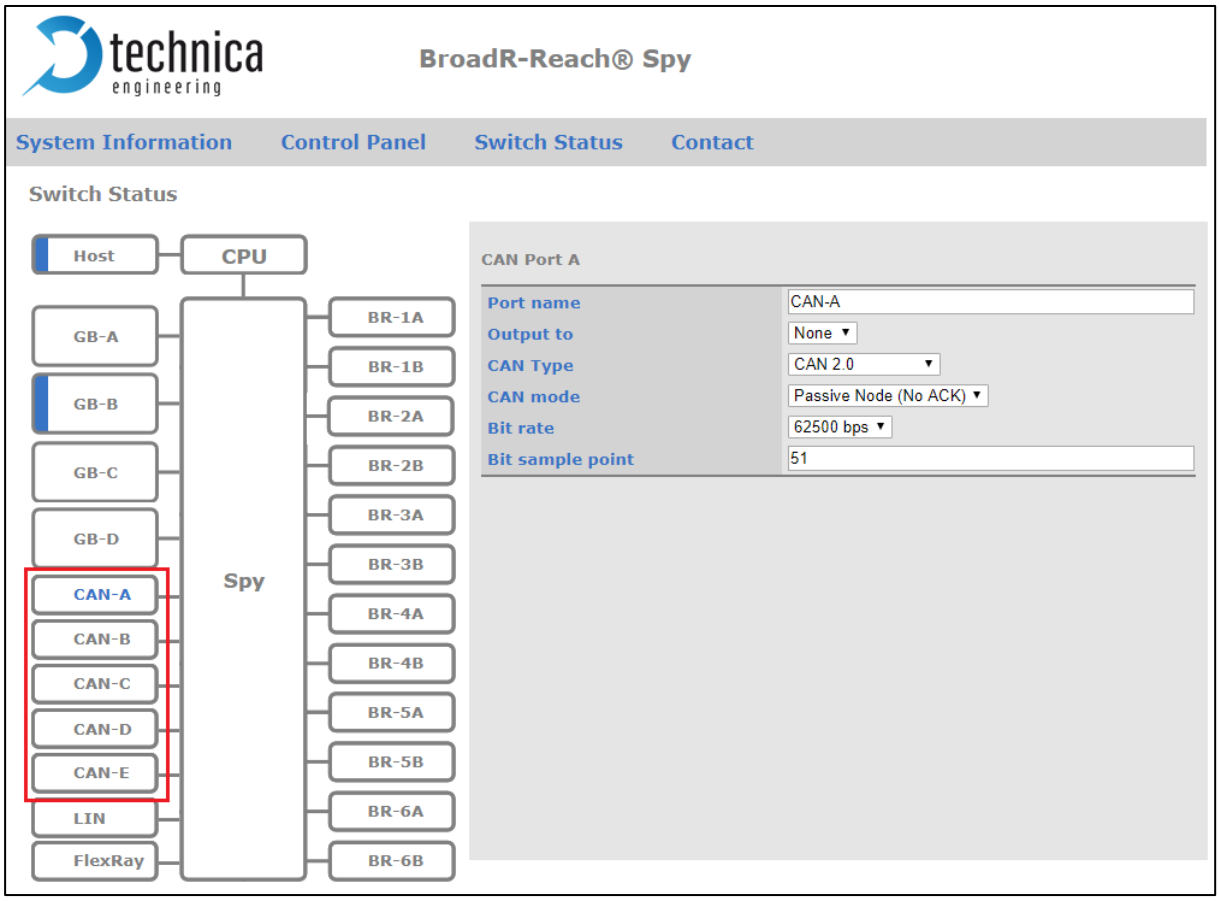

Figure 3-11: Parameters to set in CAN Ports (in figure CAN-A Port)

The CAN-A to CAN-E labels on the left allow the user to configure:

Note: In firmware 2.0 there are only three CAN-Ports available (CAN-A to CAN-C) due to perfomance. CAN-D and CAN-E can be activated by another Firmware, but then there is 100BASE-T1 functionallity not avaliable anymore. For further information please get in contact with support@technica-engineering.de.

Output to: Allows to select which Gigabit port will be used to output logging data of selected CAN port. To activate the port logging, the Header must be enabled in the *Spy Multiplexer* page (see Chapter 5.4.2.)

CAN Type: Allows to select between CAN 2.0, nonISO or ISO CAN-FD operation mode.

CAN mode: Allows to select if the CAN port is working as Passive or Active Node. In both modes, the 100BASET1_SPY 12 Port will log the information. In the Passive Node mode the device will not send ACK signals.

Bit Rate: Allows to select the CAN 2.0. Bit Rate. Available options: 62500bps, 100kbps, 125kbps, 250kbps, 500kbps, 1Mbps.

When nonISO or ISO CAN-FD types are selected, the **FD Rate** will be selectable. In CAN-FD, the **Bit Rate** determines the Arbitration-Phase Bit Rate in CAN-FD protocol, while the FD Rate determines the Data-Phase Bit Rate in CAN-FD protocol. The available options in FD Rate are 2Mbps and 5Mbps.

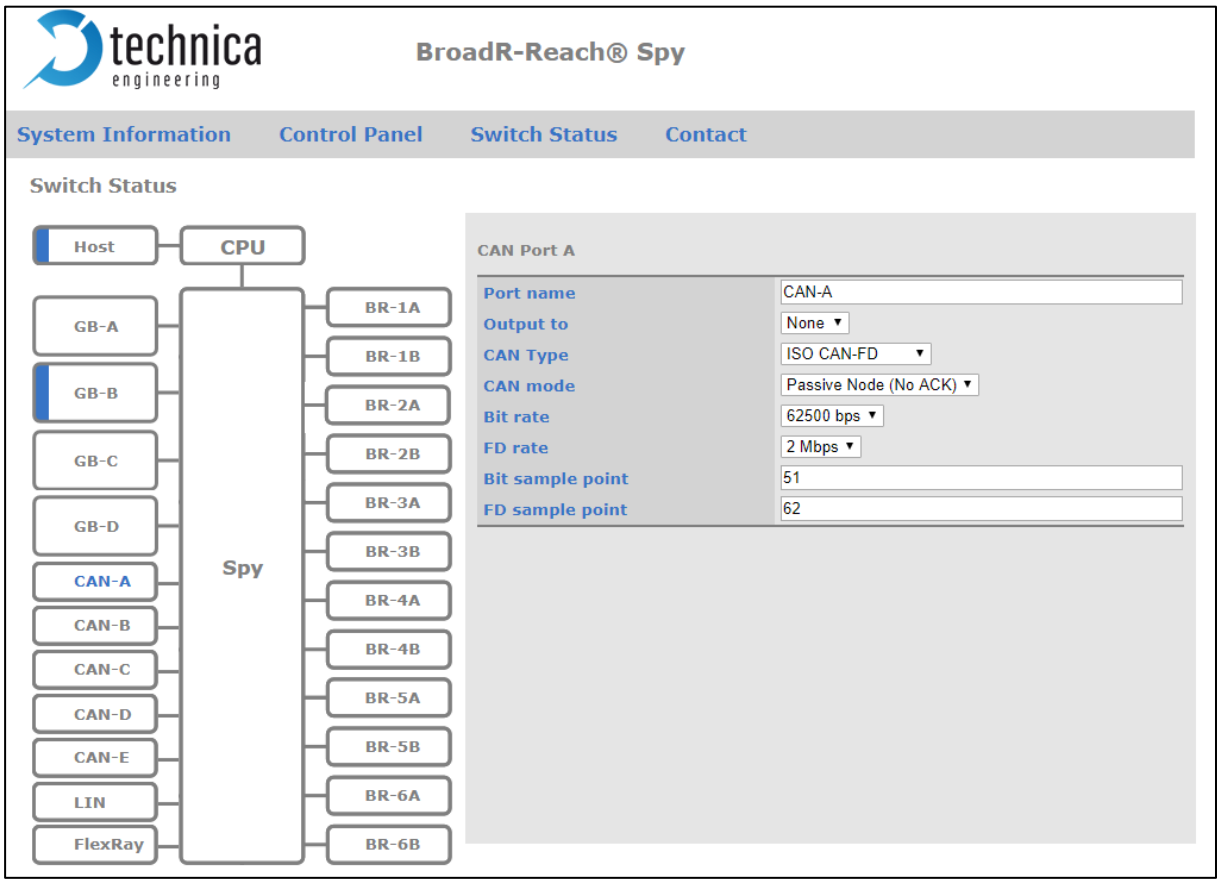

Figure 3-12: CAN Type ISO CAN-FD in CAN Port A

Bit sample and **FD sample point:** These two options allow the user to configure the sample points for the selected CAN Type protocol. In the case of **nonISO** or **ISO CAN-FD, FD sample** point will appear, in order to select the data phase sample point**. Bit sample point** will be applied for CAN2.0 or the arbitration phase on CAN-FD.

Note: The CAN ports are able to work like receivers and transmitters.

Note: Please set the **Bit Rate**, **FD Rate** and the sample points to the same value of what the device is connected to this port.

Note: The **Bit sample point** is in the range [51, 90]. For **FD sample point**, the range is [51, 85] for **FD Rate** 2Mbps. For **FD Rate** 5Mbps, only two FD sample points will be

available, 62 and 75, and if the user selects any other value, it will adjust to the most approach allowed value.

Warning: If the 5Mbps FD Rate needs to be used, please make sure that the transceiver of the opposite device can work with rates higher than 2Mbps.

3.4.4.1 CAN Transmission data use case

In the Passive or Active Node modes, any of the 100BASET1_SPY CAN port can act as transmitters according with the CAN protocol communication. In this case, a specific Ethernet frame received on GB Port A will be sent through a specific CAN Port. The following table shows the structure of the Ethernet CAN Transmission data frame used for this purpose:

Field Name	Nº of Bytes	Value
Destination Mac Address	6	FF:FF:FF:FF:FF:FF
Source Mac Address	6	It depends on the source Ethernet Adapter
Ethertype	2	0x2085
Direction	1	0x00 (TX Frame)
Port Number	1	From 0x01 to 0x05
Message ID	1	From 0 to 255
Frame Length	2	Length of the whole Ethernet frame (bytes)
CAN ID	4	CAN ID
CAN Length	1	Length of the CAN frame (bytes)
CAN Payload	0 to 64	Its length depends on the Length field

Table 3-1: Table for example values in an Ethernet CAN Transmission data frame

Note: All the values are expressed in hexadecimal.

Note: The value of the *Port Number* depends on the CAN port where the user wants to send the CAN frame. Its values can be the following:

Port	Value
CAN A	0x01
CAN B	0x02
CAN C	0x03
CAN D	0x04
CAN E	0x05

Table 3-2: Table for values of CAN Port

Warning: In this release version, only CAN A, CANB and CANC can send CAN frames. If all CAN ports are neede please flash the Firmware 1.12.0

Note: The value of the *ID* will determine if the CAN frame is standard (lower than 0x0FFF) or extended (higher than 0x07FF).

Note: According with the CAN/CAN-FD specification, only 16 Lengths can be set. The values in hexadecimal that can be used in the *Length* field are the following:

Length (bytes)	Value in Length field (hexadecimal)
From 0 to 8	0x00 to 0x08
12	0x06
16	0x10
20	0x14
24	0x18
32	0x20
48	0x30
64	0x40

Table 3-3: Table of values in Length Field

Note: When the *Length* field is 0x00, the CAN frame will be sent like a remote frame. In CAN-FD there is not remote frames according with the CAN-FD specification.

Note: The 100BASET1_SPY_12_Port is not able to send CAN frames with ID priority. The user must assure that the Ethernet data rate used for CAN Transmission functionality is lower than the configured CAN Bit Rate on the CAN options. Otherwise, the CAN packets will be dropped.

Warning: **Frame length** field must be the length of the entire Ethernet packet, and it must be in any case greater than the **CAN Length** field. If not, the packet can be discarded by the 100BASE-T1_SPY_12_Port device.

Note: In the case that the 100BASE-T1_SPY_12_Port tries to send a packet and there is a collision on the CAN bus with another node, the device will try to send the frame again three times. After three times, the packet will be discarded.

3.4.4.2 CAN Transmission Event Message

When a CAN frame is sent through a CAN port, the 100Base-T1_SPY device will receive the CAN frame as well. In this case, an Ethernet Frame is sent through the Gigabit Port specified in the Output To field for that CAN port (see section 3.4.5). This CAN Event Message contains information about the state of the received CAN frame, as is described in the following table:

Field Name	N° of Bytes	Value
Destination MAC Adress	6	FF:FF:FF:FF:FF:FF
Source MAC Address	6	MAC Address of the device
Ethertype	2	0x2085
Direction	1	0x11 (TX Event)
TimeStamp	6	Time when the CAN frame is received
Port Number	1	From 0x01 to 0x05
Message ID	1	0 to 255
Frame Length	2	Length of the rest of the Ethernet frame from this point
Control Field	1	Contains information about CAN reception state
Identifier	4	Received CAN Identifier
Length	1	Length of the CAN frame payload (in bytes)
Payload	0 to 64	Received CAN Payload
CRC	3	Received CAN CRC
Zero Padding	X	

Table 3-4: Contents of CAN Event Message

Note: Since 100BASE-T1_SPY_12_Port logs any CAN frame received on the bus, this includes also the transmitted ones by the device. As it is shown in TABLE 3-4, the CAN Transmission Event message has the same format than a 100BASE-T1_SPY_12_Port CAN Raw Frame (See CHAPTER 4.3), but changing the **Direction field** and introducing the **Message ID** of the original CAN Transmission Frame. If the CAN Transmission Event is received on the PC, this means that the CAN frame was successfully sent by the device.

The following figures show an example of a CAN Transmission Message and its associated CAN Transmission Event Message:

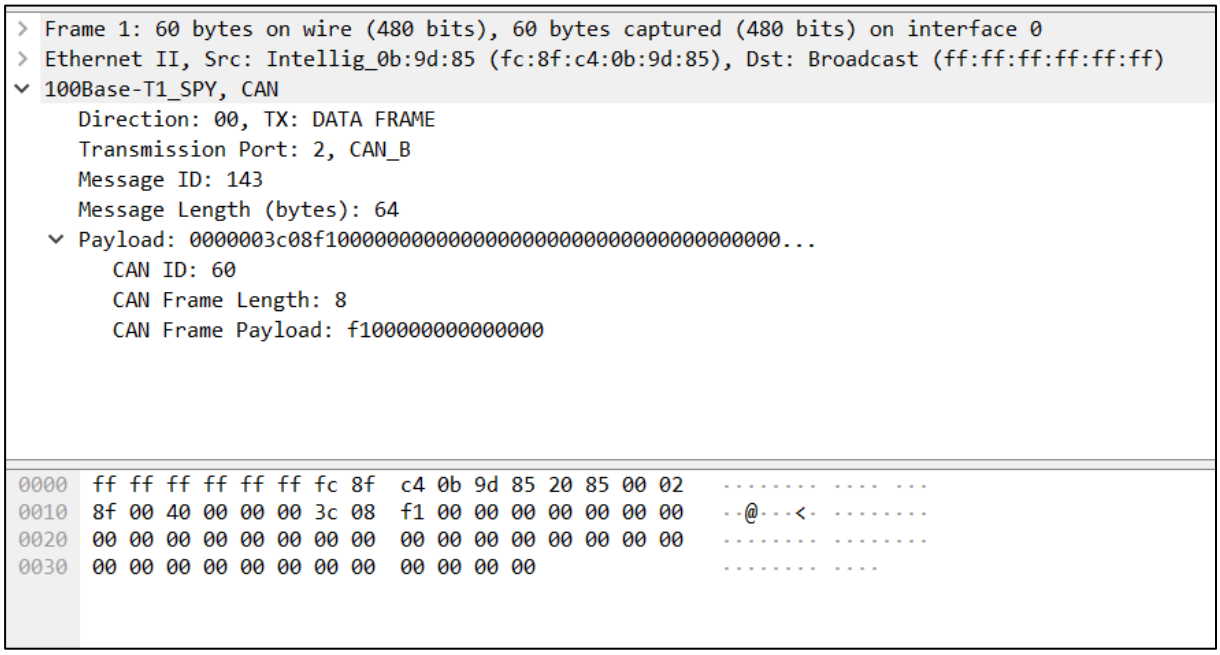

Figure 3-13: CAN Transmission Frame

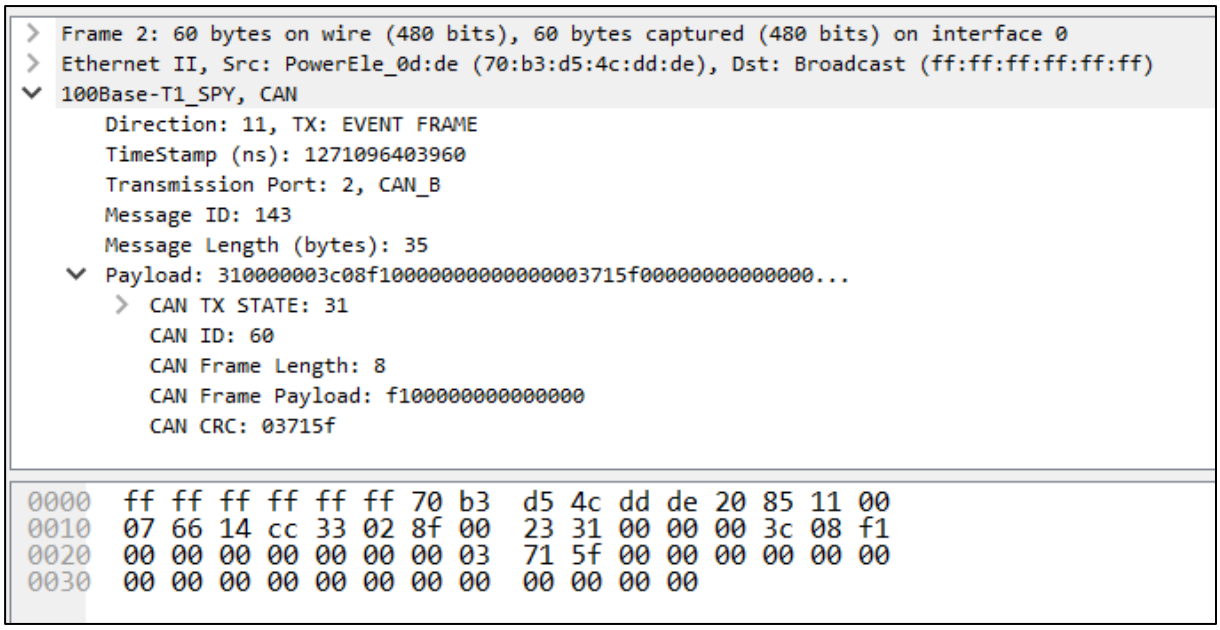

Figure 3-14: CAN Transmission Event Message

3.4.5 LIN Port

By clicking on the *LIN* port label allows to configure:

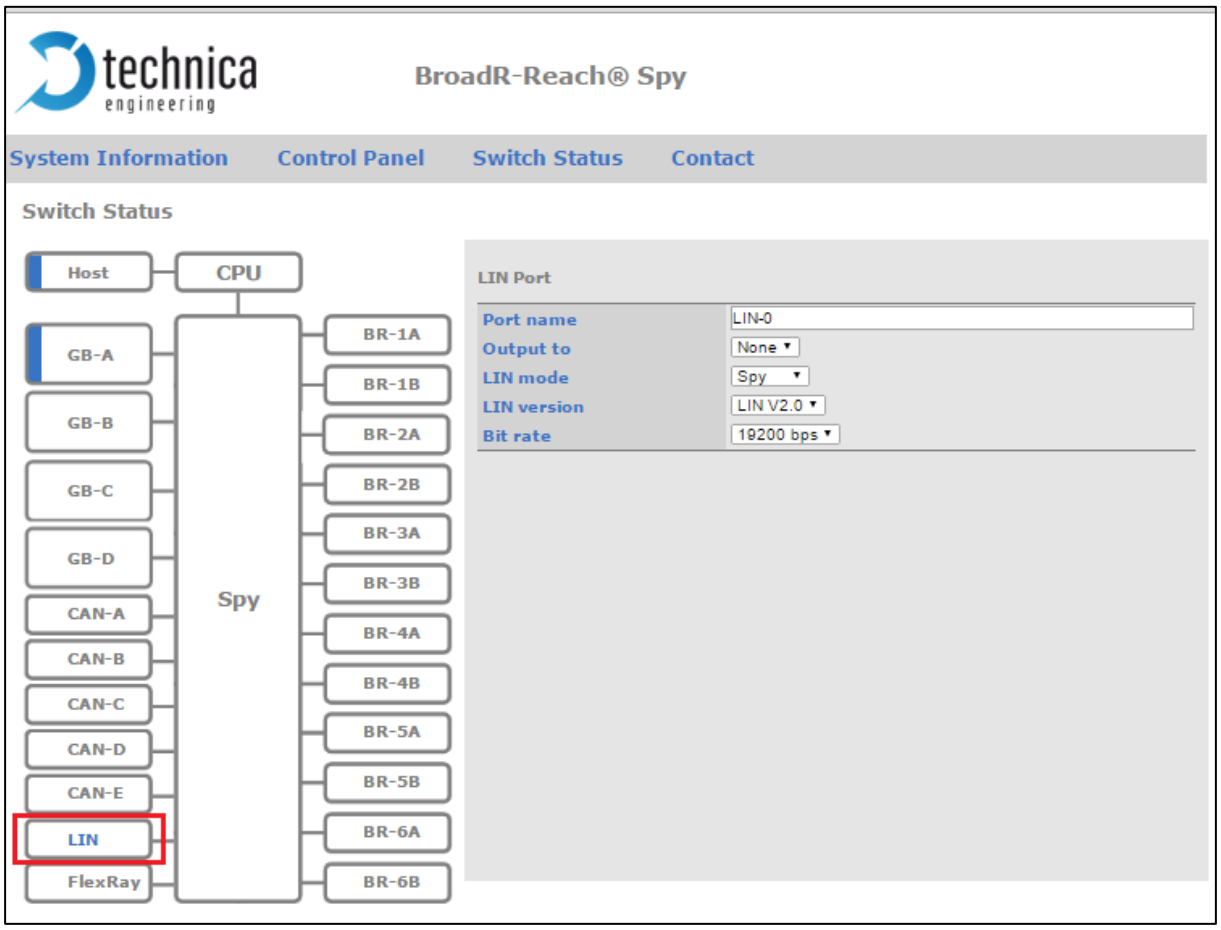

Figure 3-15: Parameters to set in LIN Port

Output to: This allows the user to select which Gigabit port will be connected to the LIN port. To activate the port logging, the Header must be enabled in the *Spy Multiplexer* page (see Chapter 5.4.2.)

LIN mode: Allows to select if the LIN port is working as Master, Spy or in Slave mode.

Note: In the Master mode, the 100BASET1_SPY will send the information from Gigabit to LIN port, when it receives a specific Ethernet frame (see Chapter 5.4.6.1).

Note: In the Spy mode, the 100BASET1_SPY will log the information - only if the Header is enabled in *Spy Multiplexer* (see section 5.4.2) - through the Gigabit Port selected in the field *Output to*.

Note: In the Slave mode, the 100BASET1_SPY will answer to a request, that has been sent by a Master, without logging the information through the selected Gigabit Port in *Output to.* The payload, length and ID for the slave response will be set through the Fast Ethernet Port in 100BASET1_SPY.

Lin Version: Allows to select LIN Version 1.3 or LIN Version 2.0. The difference between both modes is the Checksum calculation method.

Bit Rate: Allows to select the LIN Bit Rate. Available options: 1200bps, 2400bps, 4800bps, 9600bps, 19200bps.

Note: The device which is connected to this port must have the same Bit Rate and Version.

3.4.5.1 LIN Master Mode

In the LIN Master Mode, the 100BASET1_SPY LIN port acts as the Master in the LIN protocol communication. In this case, a specific Ethernet frame received on GB Port A will be sent through the LIN port. The following table shows the structure of the Ethernet LIN Master frame used for this purpose:

Field Name	Nº of Bytes	Value
Destination Mac Address	6	FF:FF:FF:FF:FF:FF
Source Mac Address	6	It depends on the source Ethernet Adapter
Ethertype	2	0x2084
Direction	1	0x00 (TX)
Port Number	1	0x01
LIN ID	1	LIN ID without parity protection
Length	1	In bytes
LIN Payload	1 to 8	It is length depends on the Length field

Table 3-5: Contents of LIN Master Frame

Note: In this mode, the devices connected to the 100BASET1_SPY LIN port must be configured as Slave, with the same Bit rate and LIN version.

Note: If the Length field is set to 0x00, the frame will be sent without data, corresponding in this case with a LIN Master Request, according to LIN specification.

Note: The user must assure that the Ethernet data rate used for LIN Transmission functionality is lower than the configured LIN Bit Rate on the LIN options. Otherwise, the LIN frames will be dropped.

Warning: LIN MASTER mode is not working on the current release.

3.4.5.2 LIN Slave Mode

In the LIN Slave Mode, the 100BASET1_SPY_12_Port LIN port acts as the Slave in the LIN protocol communication. In this case, the 100BASET1_SPY LIN port will answer to a Master LIN ID, according to an internal ID table. If the Master ID request is not in that table, there will not be any answer from 100BASET1_SPY LIN port. The information of that table can be updated setting the ID, the Length and the payload. The following table shows the structure of the Ethernet LIN Slave Configuration frame used for this purpose:

Field Name	N° of Bytes	Value
Destination Mac Address	6	FF:FF:FF:FF:FF:FF
Source Mac Address	6	It depends on the source Ethernet Adapter
Ethertype		0x1984
LIN Protocol Version	2	0x02
LIN Status	1	0x02 (LIN Slave Response Mode)
LIN TX/RX	1	0x00 (LIN TX)
LIN ID	1	From 0x00 to 0x3B
Length	1	From 0x01 to 0x08
Payload	1 to 8	It is length depends on the Length field

Table 3-6: Contents of LIN Slave Frame

Note: The configuration must be set through the 100BASET1_SPY Fast Ethernet Port (Host).

Figure 3-16: RJ45 interface for 100 BaseT1 SPY configuration

Note: The IDs from 0x3C to 0x3F are reserved according to the LIN specification, and cannot be used.
Warning: LIN SLAVE mode is not working on the current release.

3.4.6 FlexRay Port

The *FlexRay* port allows the user to configure:

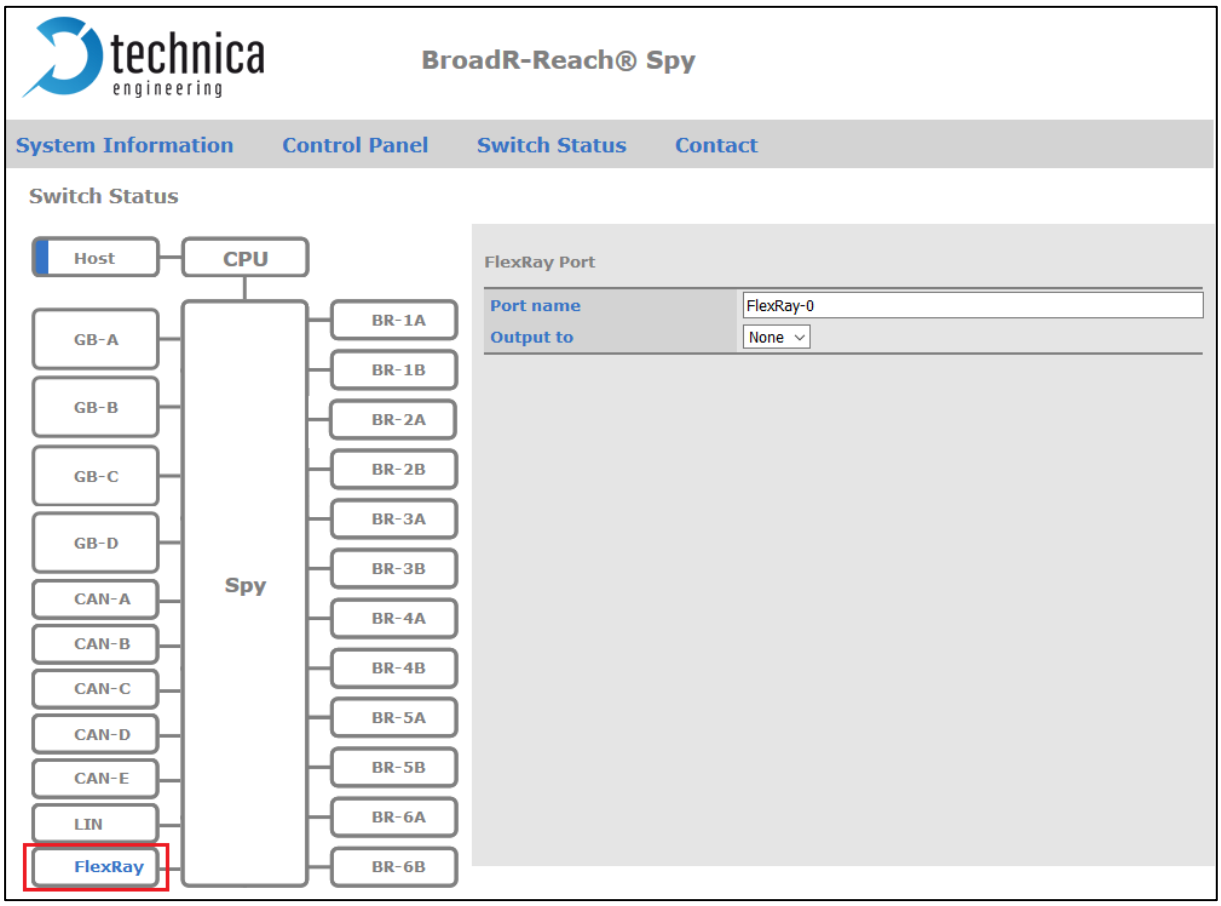

Figure 3-17: Parameters to set in FlexRay Port

Output to: Allows to select which Gigabit port will be connected with theFlexRay port. To activate the port logging, the Header must be enabled in the *Spy Multiplexer* page (see Chapter 5.4.2.)

Note: By default, the FlexRay functionality is disabled. In order to enabled it, an additional Fibex Configuration Tool must be used. Please, contact support@technica-engineering.de in order to have more information.

4 STRUCTURE OF AN ETHERNET 100BASE-T1_SPY RAW FRAME.

4.1 Structure of Header

In *Switch Status*, when the user selects a Gigabit Port in the *Output To* field, the packet received in the selected BroadR-Reach, CAN, LIN of FlexRay port will be logged through the selected Gigabit Port into an Ethernet RAW frame. The following picture shows the structure of an Ethernet 100BASET1_SPY RAW frame, in the case that the Header is enabled in the *Spy Multiplexer* page (see Chapter 5.4.2.), but with the *Keep original VLANs in Header* option disabled.

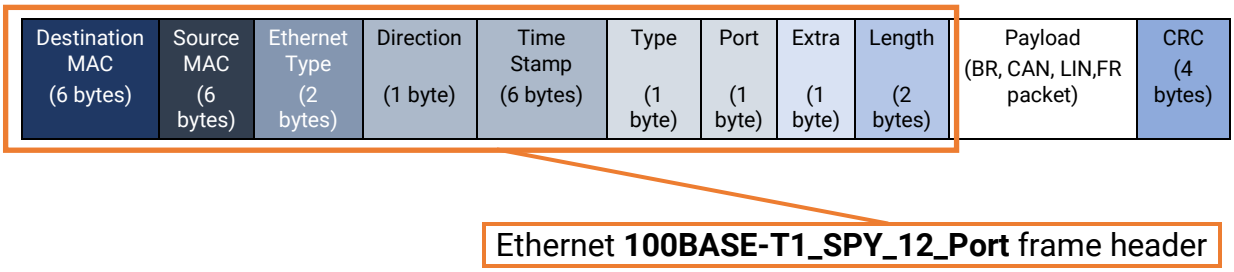

Figure 4-1: Structure of Ethernet 100BASE-T1 SPY_12_Port Raw Frame

Field Name	Nº of Bytes	Value
Destination Mac Adress	6	FF:FF:FF:FF:FF:FF
Source Mac Address	6	MAC Address of the device
Ethernet type	2	0x2085 (for CAN/CAN-FD)
Direction	1	0x01 (RX frame)
Time Stamp	6	Time when the packet was received
Port	1	0x01-0x05 (CANA-CANE)
Extra	1	0x00
Length	2	Length of the whole Ethernet frame
Payload	X	CAN encapsulated packet
CRC	4	CRC of the whole packet

Table 4-1: Ethernet 100BASE-T1_SPY_12_Port Raw Frame

Note: The data Frames are enhanced with additional information as an exact timestamp and the bus port the data was originally sent on. Timestamps are in 0.04 µs resolution and synchronous to all connected lines.

Note: The Direction field specifies if the frame is being received (Direction 0x01.

Note: In the case of BroadR-Reach port, there will be always an Ethernet frame in the selected Gigabit port. If the Header is disabled in *Spy Multiplexer* (see section 5.4.2), the sent Ethernet frame will be and standard UDP RAW Ethernet frame. If that Header is enabled, the Ethernet frame will have the format shown in the table.

Note: The number of bytes of the payload depends on the Length field.

Note: In the case of CAN, LIN and FlexRay, the generated Ethernet frame will be sent only if the Header is enabled in *Spy Multiplexer* (see section 5.4.2).

The following table shows the values of *Ethertype* field:

Field Name	Value
BroadR-Reach	0x2082
FlexRay	0x2083
LIN	0x2084
CAN	0x2085

Table 4-2: Ethertype values

The following table shows the values of *Port* field when *Ethertype* is 0x2082 (BroadR-Reach frames):

Port	Value
BR 1A	0x01
BR 1B	0x02
BR 2A	0x03
BR 2B	0x04
BR 3A	0x05
BR 3B	0x06
BR 4A	0x07
BR 4B	0x08
BR 5A	0x09
BR 5B	0x0A
BR 6A	0x0B
BR 6B	0x0C

Table 4-3: Port Field Values for Ethertype 0x2082

The following table shows the values of *Port* field when *Ethertype* is 0x2085 (CAN frames):

Port	Value
CAN A	0x01
CAN B	0x02
CAN C	0x03
CAN D	0x04
CAN E	0x05

Table 4-4: Port Field Values for Ethertype 0x2085

In the case that the *Ethertype* value is 0x2083 (FlexRay frames) or 0x2084 (LIN frames), the *Port* field will be 0x01.

4.2 Structure of the BroadR-Reach payload

The following picture shows the structure of an Ethernet 100BASET1_SPY_12_Port RAW frame, in the case that the Header is enabled in the *Spy Multiplexer* page (see CHAPTER 3.4.1), but with the *Keep original VLANs in Header* option enabled.

In the case that the BroadR-Reach packet is VLAN tagged, the Ethernet 100BASET1_SPY RAW format frame is as follows:

Dest MAC (6 bytes)
Source MAC (6 bytes)
TPID of packet received (2 bytes) **0x8100 (in case packet vlan tagged)**
VLAN-ID of packet received (2 bytes) (in case packet vlan tagged)
0x2082 (2 bytes)
Direction (1 byte)
Time Stamp (6 bytes)
Port (1 byte)
Extra (1 byte)
Length (2 bytes)
Payload (BR, packet)
CRC (4 bytes)

In the case that the BroadR-Reach packet is not VLAN tagged, or the *Keep original VLANs in Header* option is disabled, the Ethernet 100BASET1_SPY RAW format frame is as follows:

Dest MAC (6 bytes)
Source MAC (6 bytes)
0x2082 (2 bytes)
Direction (1 byte)
Time Stamp (6 bytes)
Port (1 byte)
Extra (1 byte)
Length (2 bytes)
Payload (BR, packet)
CRC (4 bytes)

The Payload field will consist on the received 100Base-T1 packet, showing an Ethernet frame format, which starts with the MAC Destination field and finishes with the CRC field of the original packet.

The following image shows an example of a 100BaseT1 frame encapsulated in a 100BASET1_SPY RAW frame, with header, and with *Keep original VLANs in Header* option enabled, when the received packet is not tagged with a VLAN. The same packet will be forwarded when the *Keep original VLANs in Header* option is disabled:

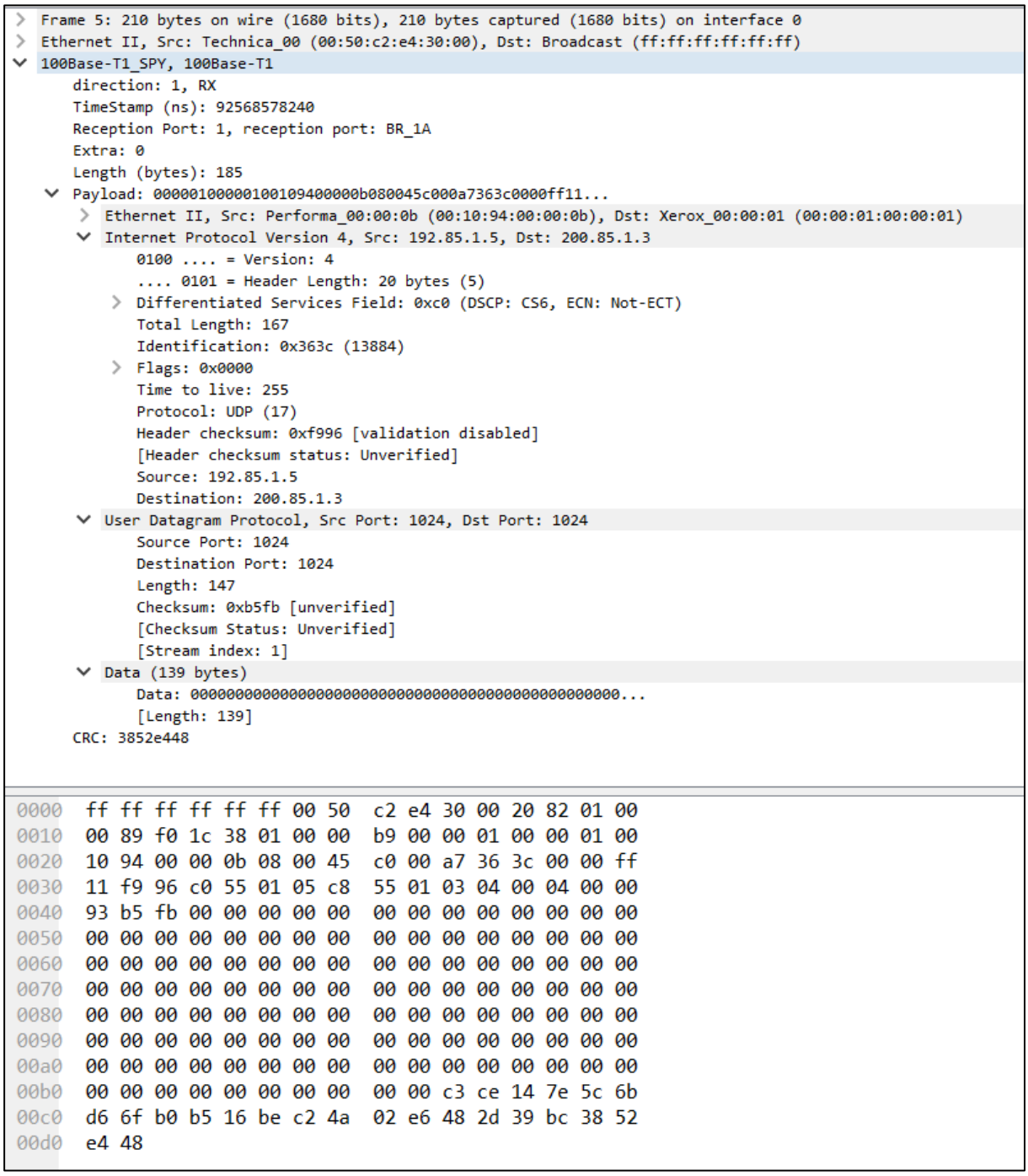

Figure 4-2: Content of 100Base-T1 frame without VLAN encapsulated in 100 Base T1 SPY Raw Frame

The following image shows an example of a 100BaseT1 payload frame encapsulated in a 100BASE-T1_SPY_12_Port RAW frame with header, and when *Keep original VLANs in Header* option is enabled, and in the case that the received BroadR-Reach packet is VLAN tagged:

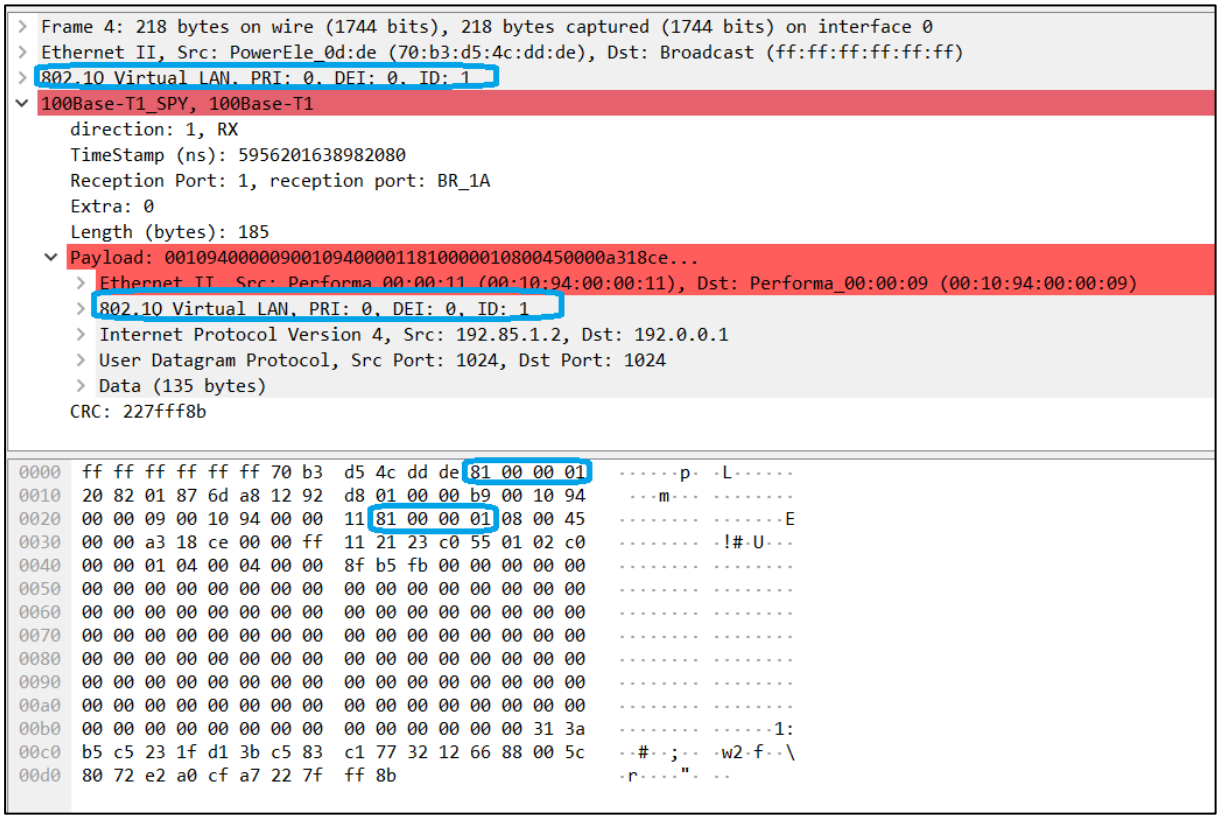

Figure 4-3: Content of 100Base-T1 frame with VLAN Encapsulated in 100 Base T1 SPY Raw Frame

4.3 Structure of the CAN payload

The following table shows the structure of a CAN payload encapsulated in a 100BASE-T1_SPY RAW frame:

Field Name	N° of Bytes	Value
Control Field	1	Contains information about CAN reception state
Identifier	4	Received CAN ID
Length	1	Length of the CAN frame payload (in bytes)
Payload	0 to 64	Received CAN Payload
CRC	3	Received CAN CRC
Zero Padding	X	

Table 4-5: Structure of 100BASE-T1_SPY_12_Port Raw Frame with CAN Payload

Figure 4-4: Structure of 100BASE-T1_SPY_12_Port Raw Frame with CAN Payload

Note: The Control Field byte contains the following information about the CAN reception state:

7	6	5	4	3	2	1	0
Reserved	ESI	BRS	EDL	IDE	RTR	CRC	ACK

Table 4-6: CAN reception state byte

- **ACK**: A '1' value in this bit indicates if there was an acknowledge during the reception of the CAN frame.
- **CRC:** A '1' value in this bit indicates if there was any CAN CRC error during the reception of the CAN frame
- **RTR:** A '1' value in this bit indicates if the CAN frame is a remote frame. In this case, the LENGTH field will be 0x00, and there is no any payload.
- **IDE:** A '1' value in this bit indicates if the CAN frame ID is in standard (11 bits) or extended format (29 bits).
- **EDL**: A '1' value in this bit indicates if the received CAN frame is CAN-FD.
- **BRS:** A '1' value in this bit indicates if there was a Bit Rate Switch on the original CAN-FD frame.
- **ESI:** A '1' value in this bit gives information about the ESI bit in CAN-FD protocol.

Note: The Zero Padding length depends on the Length Field. There will be Zero Padding if CAN Payload length is less than the minimum RAW Ethernet Payload size (46 bytes). There is zero padding if CAN Length is less than 48 bytes.

The following image shows an example of a CAN payload frame encapsulated in a 100BASET1_SPY RAW frame, without zero padding:

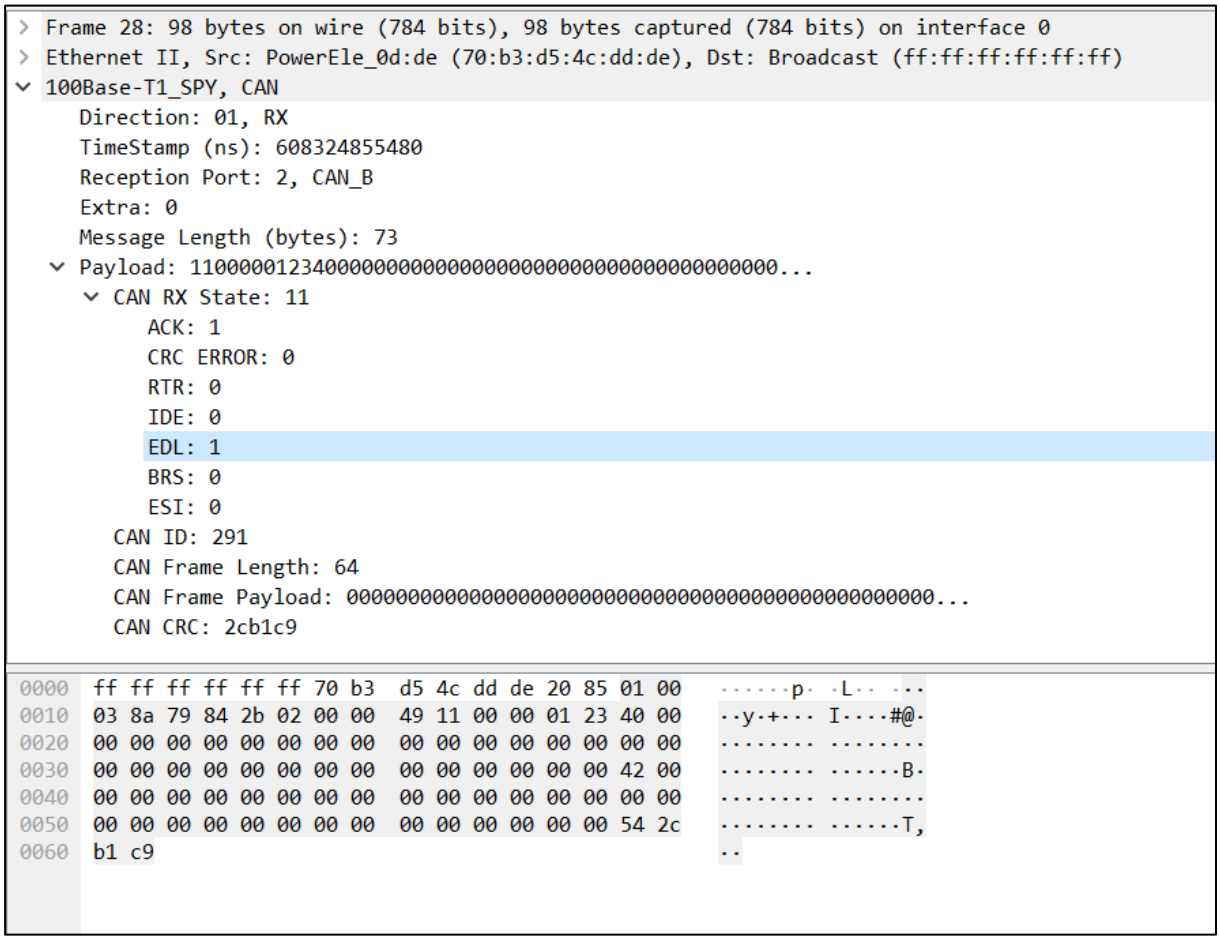

Figure 4-5: Content of CAN frame encapsulated in 100BASE-T1_SPY_12_Port Raw Frame

4.4 Structure of the LIN payload

The following table shows the structure of a LIN payload encapsulated in a 100BASET1_SPY RAW frame:

Field Name	Nº of Bytes	Value
Error Field	1	Contains information about the LIN reception error state
Identifier	1	Received LIN Identifier
LENGTH	1	Length of the LIN frame payload (in bytes)
PAYLOAD	1 to 8	Received LIN Payload
Checksum	1	Received LIN checksum
Zero Padding	X	

Table 4-7: Content of LIN Pay Load Encapsulated in 100BASE-T1_SPY_12_Port Raw Frame

Note: The Error Field byte contains the following information about the LIN reception state:

7	6	5	4	3	2	1	0
Reserved	Reserved	Reserved	Reserved	Reserved	Parity-Error	Collision Error	Checksum Error

Table 4-8: LIN Reception State byte

- **Checksum Error:** A '1' value in this bit indicates if there was a checksum error during the reception of the LIN frame.
- **Collision Error:** A '1' value in this bit indicates if there was a collision during the reception of the LIN frame. In this case, the received payload is not valid.
- **Parity Error:** A '1' value in this bit indicates if there is a parity error in the Protected ID.

Note: If the LIN Port is working as SPY/SLAVE, the length will be 0x00 and there will be no payload if there is not any slave response to the LIN Master ID.

Note: The Zero Padding length depends of the Length Field. There will be Zero Padding if LIN Payload length is less than the minimum RAW Ethernet Payload size (46 bytes). There is always zero padding in LIN case due to the LIN maximum length (8 bytes).

The following image shows an example of a LIN payload frame encapsulated in a 100BASET1_SPY RAW frame, in the case of a SLAVE response to a MASTER ID request:

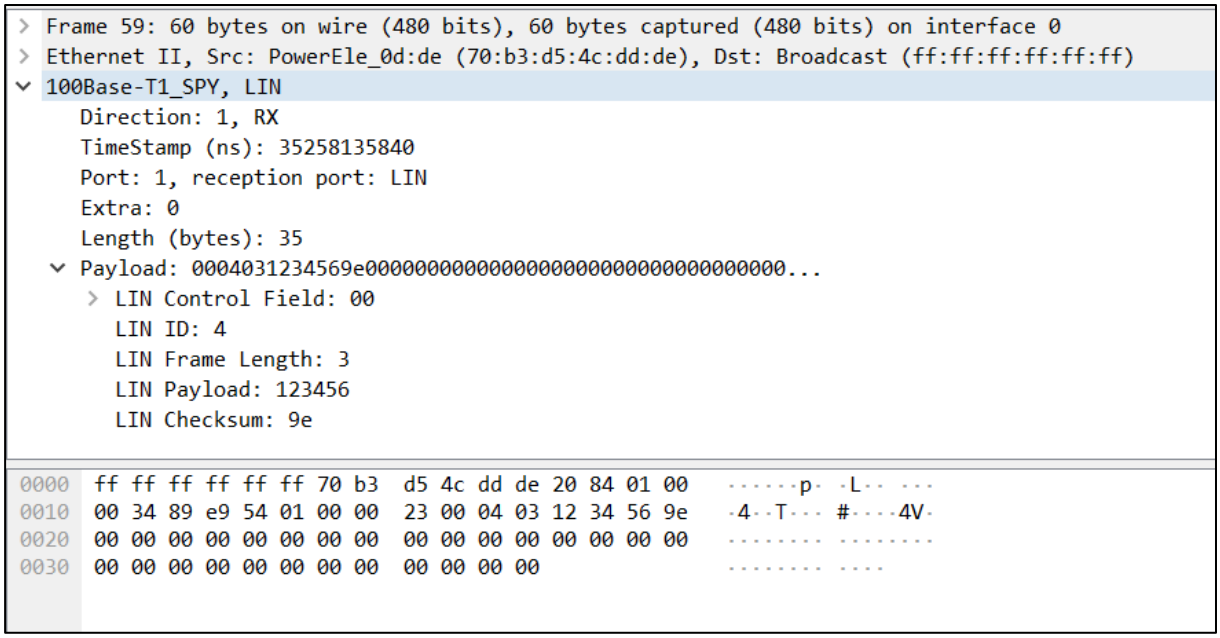

Figure 4-6: Content of LIN frame with payload encapsulated in 100 Base T1 SPY Raw Frame

The following image shows an example of a LIN payload frame encapsulated in a 100BASE-T1_SPY_12_Port RAW frame, in the case that there is not any SLAVE response to a MASTER ID:

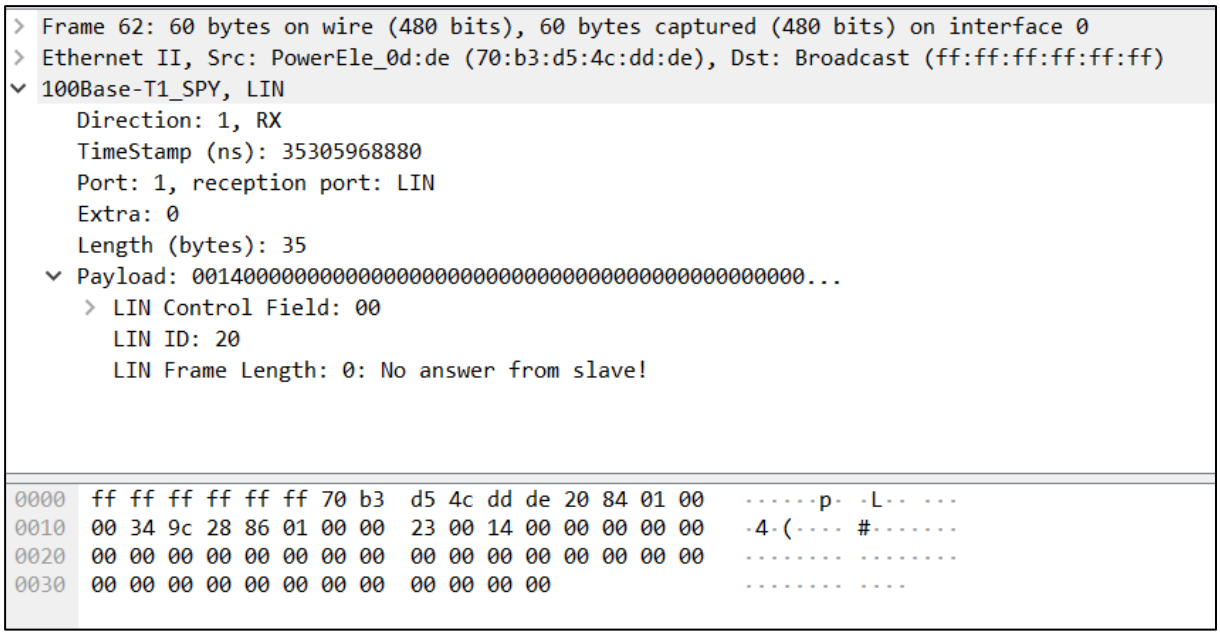

Figure 4-7: Content of LIN frame without payload encapsulated in 100 Base T1 SPY Raw Frame

4.5 Structure of the FlexRay payload

The following table shows the structure of a FlexRay payload encapsulated in a 100BASE-T1_SPY_12_Port RAW frame:

Field Name	N° of Bytes	Value
Cycle	2	Time cycle in which the frame was received
Message word length	2	Length of the whole FlexRay frame payload
Frame ID	2	Received Frame IDs
Direction	1	Frame Direction
Frame word length	1	Length of the FlexRay frame payload for a specific ID
Payload	X	Depends of LENGTH field

Table 4-9: Structure of 100BASE-T1_SPY_12_Port RAW Frame with FR Payload

Note: A single Payload encapsulated in a 100BASET1_SPY RAW Ethernet Frame can have several IDs (See example below). For every single ID, **LENGTH** gives the length of the payload for that specific ID.

Note: **DIRECTION** specifies if the frame is received (DIRECTION '0') or transmitted (DIRECTION '1') for a specific ID. In the case of FlexRay, this field will be 0. The device is not able to transmit FlexRay frames.

The following image shows an example of a FlexRay payload frame encapsulated in a 100BASET1_SPY RAW frame. In this case, the payload contains information about 2 different IDs with the same cycle time.

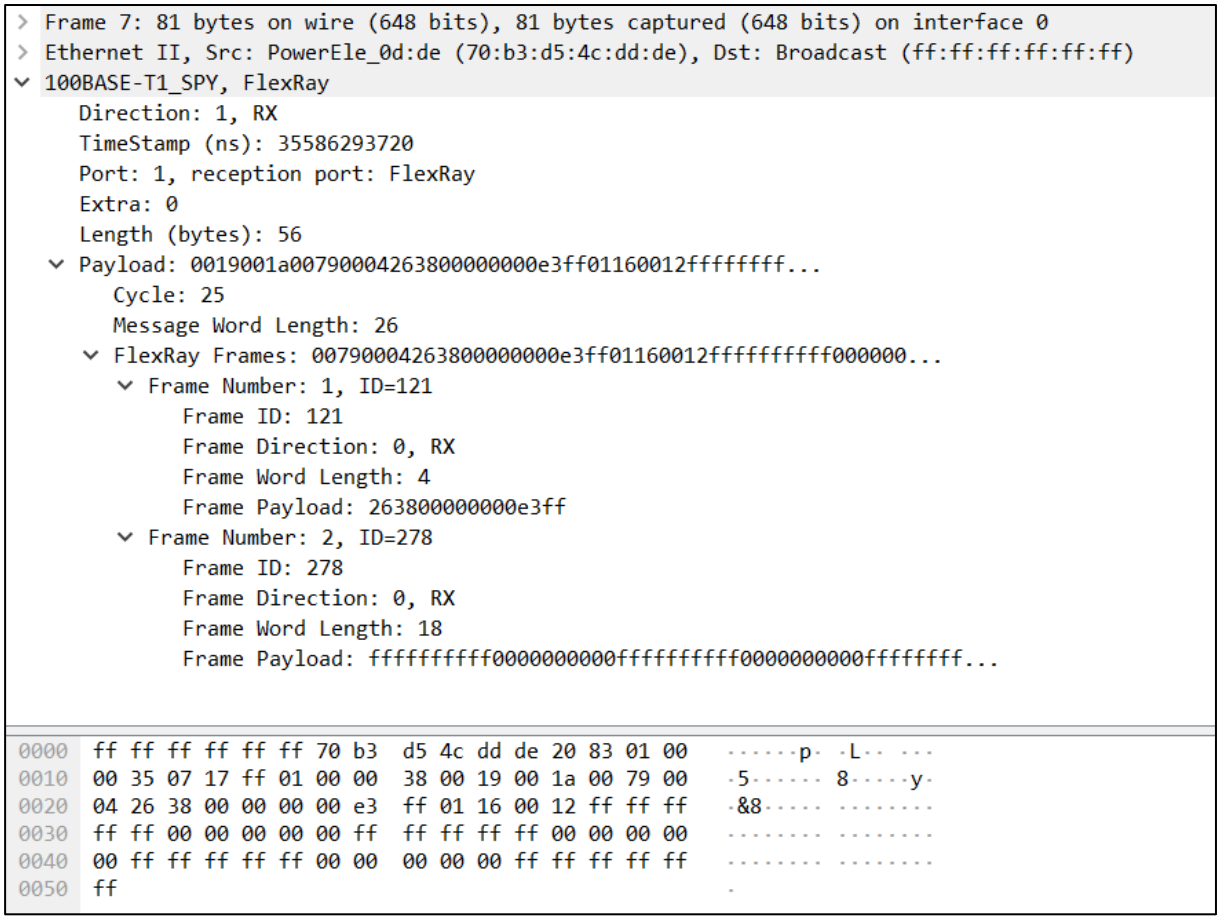

Figure 4-8: Content of FlexRay frame encapsulated in 100 Base T1 SPY Raw Frame

4.6 100BASE-T1 SPY_12_Port LUA Installation Guide

In order to dissect the 100BASET1_SPY RAW Ethernet Frames, a LUA file for Wireshark is available on Technica Engineering website. To install the LUA file in Wireshark, the user must follow the next steps:

1. Close Wireshark in case that the program is running on PC.
2. Download the .ZIP file that contains all the LUA files, through this website: https://technica-engineering.de/produkt/100base-t1-spy_12-port/

3. Extract the downloaded ZIP file. This file should contain the following LUA files:
   BR_SPY_ETH_wrapper_BR.lua
   BR_SPY_ETH_wrapper_CAN.lua
   BR_SPY_ETH_wrapper_FR.lua
   BR_SPY_ETH_wrapper_LIN.lua
4. Copy or move the four LUA files in Wireshark plugins folder. The path should be:
   C:\Program Files\Wireshark\plugins\(Wireshark Version Number).

   Note: Wireshark Version Number depends on the Wireshark version installed on the PC.

5. In order to copy or move the LUA files to the specified Wireshark plugins folder, Administrator rights will be needed. In that case, the following window should appear. Press Continue to proceed with the copy.

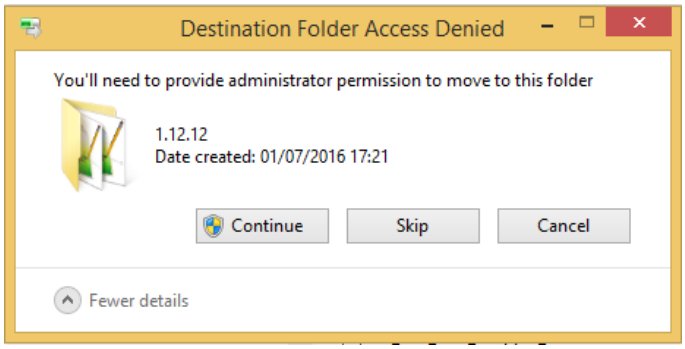

Figure 4-9: Dialog Box For Access

6. Run Wireshark.

5 USE CASES

5.1 100BASE-T1_SPY_12_Port Use Case

The traffic of two BroadR-Reach ECUs is forwarded through the 100BASET1_SPY with a constant delay of only 1.4µs.
The delay is independent of the frame size of the Ethernet packets.
There is no time jitter on the delay.
The used bandwidth has no influence on the delay.

The traffic of two pairs of BroadR-Reach (so a total of four ports) is forwarded to one Gigabit Port.
The PC/Datalogger is not able to send data. The RJ45 Ports are output only.
Each RJ45 Port outputs only one 100 Mbit Stream of one of the ECUs.

This setup (Four on One) is implemented three times in one 100BASET1_SPY. So, a total of 12 BroadR-Reach Ports and 3 Gigabit Ports are used for this.

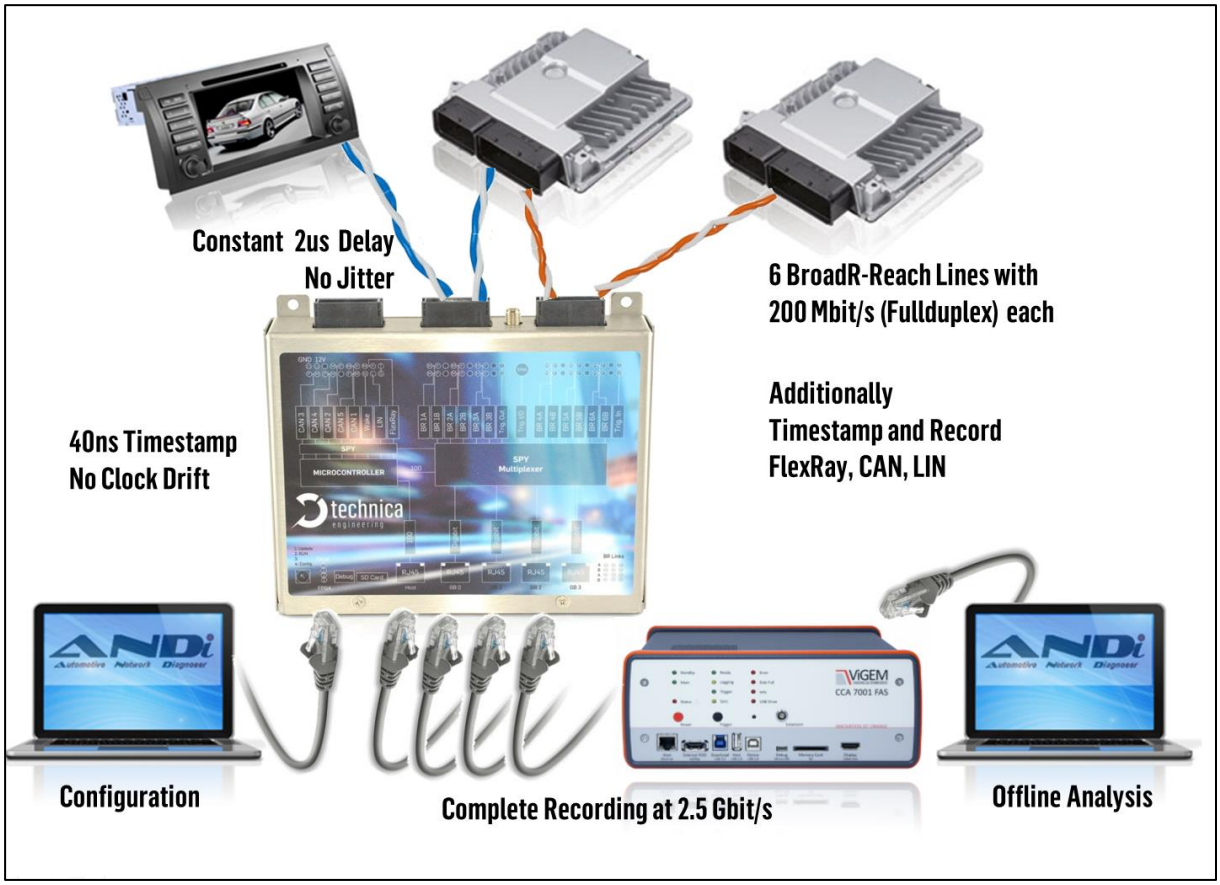

Figure 5-1: Use Case with ANDi

5.2 802.1AS Synchronization UseCase

If the **Enable Core 802.1AS** is activated in *Spy Multiplexer* settings label -please, see section 5.4.2-, the BRSPY device will be able to synchronize with any Master Device through Gigabit Port. In this case, the device will use the same TimeStamping as the Master Device, and this includes the maintenance of synchronized time during normal operation and following addition, removal, or failure of network components and network reconfiguration.

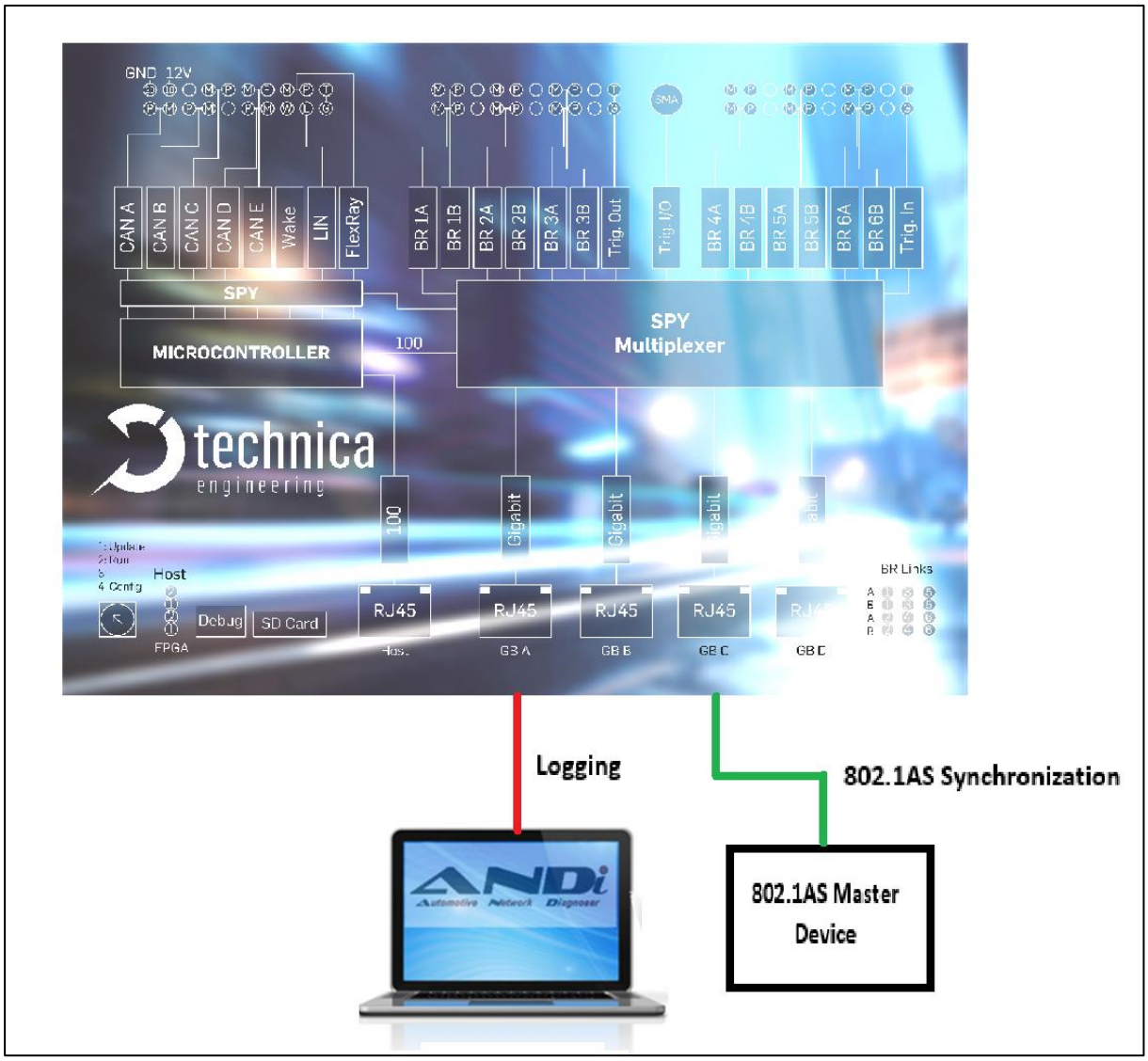

Figure 5-2: Use case with 802.1AS and ANDi

5.2.1 PTP of 802.1 AS Protocol

In an 802.1AS topology, the communication between a Master and a Slave Node is as you can see in the picture to the right.

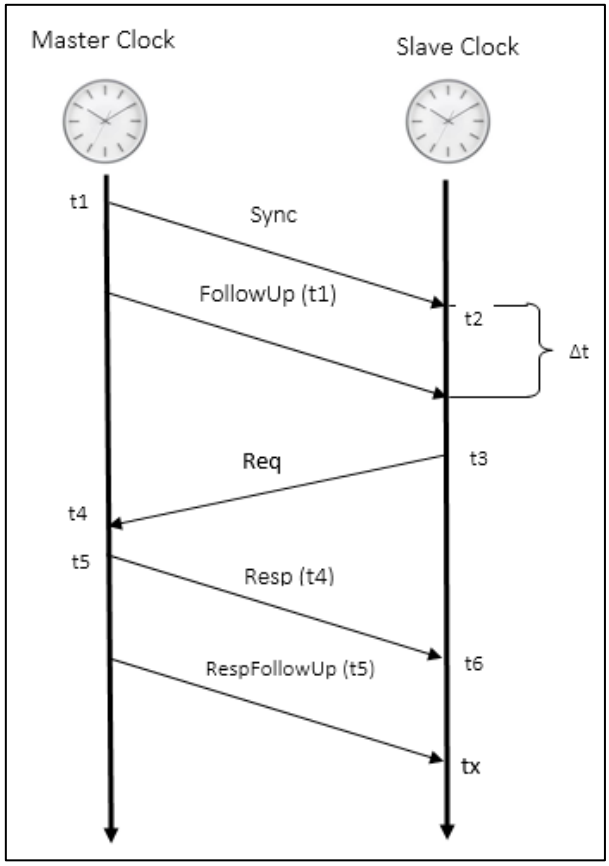

Figure 5-3: Timing PTP

For a generic time t_x, the Slave device can correct this time as follows:

$$tx'(ns) = tx + t1 + t2 + \Delta t - Path\ Delay$$

With t3, t4, t5 and t6, the slave device can calculate the Path Delay as follows:

$$PathDelay\ (ns) = \frac{(t6 - t3) - (t5 - t4)}{2}$$

5.2.2 802.1AS in 100BASE-T1 SPY

The following image shows a possible setup for this purpose, using 3 100BASE-T1 SPY_12_Port devices.

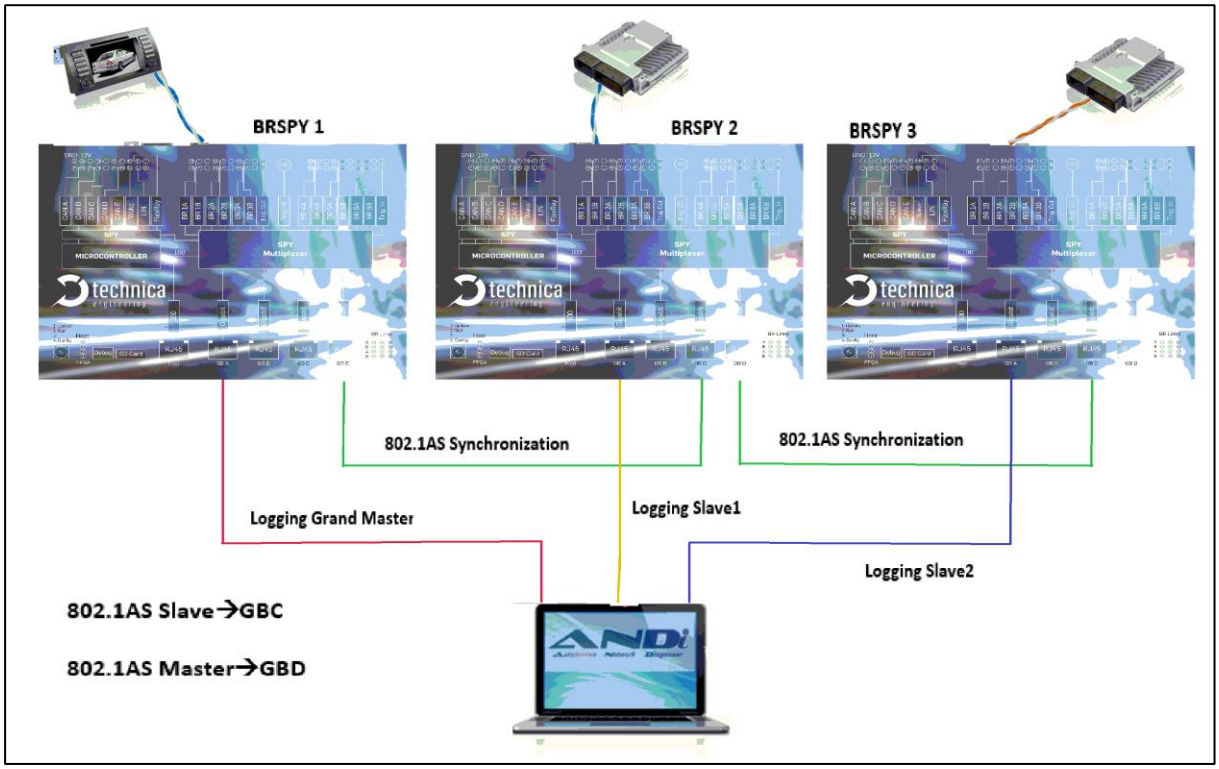

Figure 5-4: Setup with 3 100BASE-T1_SPY_12_Port devices

In this setup, the configuration of the devices in the Spy Multiplexer settings label will be as follows:

- BRSPY 1: Grand Master — 802.1AS Configuration → Master
- BRSPY 2 and BRSPY 3: Slave — 802.1AS Configuration → Slave

If the 100BaseT1 SPY device is configured as 802.1AS Master, the device will be the Grand Master of the network, forwarding its internal clock to the device connected to its Gigabit Port D, and using its internal clock as Timestamp. When the 100BaseT1 SPY device is configured as 802.1AS Slave, the device will forward through its Gigabit Port D the clock received from the Master device, and it will correct its internal clock to synchronize with the Master device and use this clock as Timestamp.

- BRSPY 1 will be Grand Master device, and it will send through its Gigabit Port D its internal clock to the other devices using Sync and Follow Up messages. This port will be connected to the Gigabit Port C from BRSPY 2, and in this case, it will send also Response and Response Follow Up messages. BRSPY 1 will use its internal clock as Timestamp.

- BRSPY 2 will act as Slave in Gigabit Port C, sending Request Messages to the Grand Master, and as Bridge in Gigabit Port D, acting in this case in a similar way that a Master, but sending its corrected clock to BRSPY 3. Both devices will use the corrected clock as Timestamp.
- BRSPY 3 will act as Slave in Gigabit Port C, sending Request Messages to the Bridge (BRSPY 2 Gigabit D).

If the Core 802.1AS is not activated in Spy Multiplexer settings label, all the devices will use their internal clocks, without synchronization between them.

Note: The Timestamp used by each device will have a resolution of 0.04 µs, following the described information in section 4. This means, the 100Base-T1_SPY Timestamp doesn't match with the 802.1AS Timestamp format.

6 HARDWARE VARIANTS

6.1 BroadR-Reach Analog Filter

All filter versions are compatible with each other.

The Broadcom BCM89811 PHY with integrated low pass filter is used.
For EMC and Bus termination the following filter is mounted on BroadR-Reach lines:

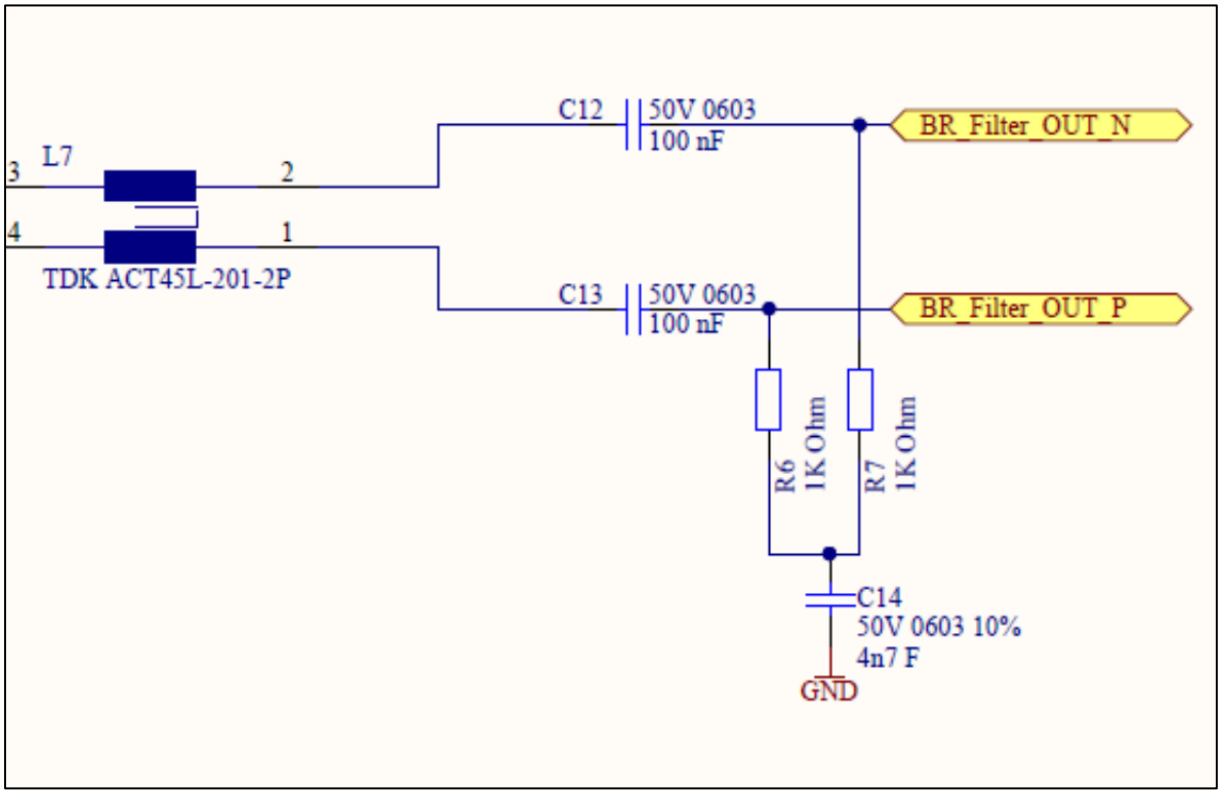

Figure 6-1: Broadcom BCM89811 PHY with integrated low pass filter

6.2 Debug connector

There is a debug connector on the front side of the case near the SD card slot. This small connector is only for customer service purpose.

Warning: Do not connect anything to this port.

6.3 Startup Time

TBD
Note: On the RJ-45 gigabit ports the Linkup time is about 3 to 4 seconds. This is because of IEEE Auto Negotiation which has to be done in gigabit mode.

7 APPLICATION FIRMARE UPDATE

The user can download the latest firmware and documentation for the 100BASET1_SPY here:
https://technica-engineering.de/en/produkt/100base-t1-spy_12-port/

Note: If the user updates the application the bootloader should also be updated to the latest version.

Warning: Not following these instructions may cause erroneous states of the device. The user will have to send it back to Technica Engineering for repair. Technica Engineering may charge support fees for this service.

Note: The user needs to have administration privileges on a Windows PC to be able to do the firmware update on the 100BASET1_SPY

The application firmware of the device may be updated by the following process:

1. Power up the device by a stable 12 Volt DC power supply. Do **not** switch off the power supply during the update process.

2. It is recommended to connect the Wake-up line (Pin 8 of the black MQS connector) to 12 Volt of the same power supply to make sure the ECU is awake during update.

3. Disconnect all other Ethernet, CAN, FlexRay, LIN and BroadR-Reach links from the 100BASET1_SPY.

4. **Disable the Firewall** of the Windows PC. Set the network device of the PC to the same subnet as the 100BASET1_SPY. (For example 192.168.0.100 and 255.255.0.0)

5. Check that the firmware package that the user received from Technica Engineering contains the following files:
   redtool.exe microcontroller.crc.srec redboot.srecspy.srec UpdateAll.bat

   The user will need to have java installed on the PC.

6. Check that the "Host" LED toggles slowly (so the device is running in application mode).

7. Check that the website at 192.168.0.49 can be accessed (or whatever the IP address of the 100BASET1_SPY is configured for).

8. Run UpdateAll.bat file in Administrator mode

Note: First, the device will be in bootloader mode. The Host LED1 is blinking fast when in this mode.

Note: during the update process the Host LED1 will stop to blink. This is a normal condition. Do not reset the device! The update process will **last about one minute**

When the update is finished the Host LED will toggle slowly again.

9. The user can re-activate Windows firewall after successful update.

```
.
.
.
-------------------------------------------------------
C:\_Altera_SPY2\Calypso_FW\100BASET1_SPY-Release-v1.1
Connect new device. Make sure firewall is disabled.
-------------------------------------------------------
Drücken Sie eine beliebige Taste . . .
Process started.....
=======================================================
Old Bootloader Version:
=======================================================
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Non-certified release, version 2.0 - built 09:57:49, Jul 28 2015
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Testing TFTP server
tftpServer ready. Port: 69
tftpServer: 127.0.0.1 requested file redboot-updater.srec
[**************************************]
TFTP transfer finished
TFTP server ok
Loading test file...
tftpServer: 192.168.0.49 requested file redboot-updater.srec
[**********************TFTP transfer finished
Test File loaded successfully
Updating application
Erasing flash...
Flash erased
Loading file...
tftpServer: 192.168.0.49 requested file redboot-updater.srec
[**************************************]
TFTP transfer finished
File loaded successfully
Run application...
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Testing TFTP server
tftpServer ready. Port: 69
tftpServer: 127.0.0.1 requested file redboot.srec
[**************************************]
TFTP transfer finished
TFTP server ok
Loading test file...
tftpServer: 192.168.0.49 requested file redboot.srec
[**********************TFTP transfer finished
Test File loaded successfully
Updating redboot
Erasing flash...
```

```
Flash erased
Loading file...
tftpServer: 192.168.0.49 requested file redboot.srec
[**************************************]
TFTP transfer finished
File loaded successfully
Run application...
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
NEW Bootloader Version:
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Non-certified release, version 2.0 - built 17:04:51, Aug 19 2015
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Testing TFTP server
tftpServer ready. Port: 69
tftpServer: 127.0.0.1 requested file microcontroller.crc.srec
[**************************************]
TFTP server ok
Loading test file...
TFTP transfer finished
tftpServer: 192.168.0.49 requested file microcontroller.crc.srec
[***TFTP transfer finished               ]
Test File loaded successfully
Updating application
Erasing flash...
Flash erased
Loading file...
tftpServer: 192.168.0.49 requested file microcontroller.crc.srec
[**************************************]
TFTP transfer finished
File loaded successfully
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Testing TFTP server
tftpServer ready. Port: 69
tftpServer: 127.0.0.1 requested file spy.srec
[**************************************]
TFTP server ok
Updating FPGA
Erasing flash...
TFTP transfer finished
Flash erased
Loading file...
tftpServer: 192.168.0.49 requested file spy.srec
[**************************************]
TFTP transfer finished
File loaded successfully
Connecting to 192.168.0.49:9000 (1).
Connected
Sending ^C
Run application at address 0x1006b40...
Drücken Sieeine beliebige Taste . . .
```

In the case that the IP Address of the device is changed, the user can restore the IP to the default one following the next steps:

1. Follow steps 1 to 7 described before.
2. Open a DOS-Box in Administrator mode and go to the local folder where the firmware ZIP files were extracted.

3. Execute the following commands:

   redtool.exe -t <IP Address of the device> -e

   Note: The device will be in bootloader mode. The Host LED1 is blinking fast when in this mode.

   redtool.exe -t <IP Address of the device> -r

   Note: The device will be in Application mode. The LEDs will work as usual again.

   redtool.exe -t <IP Address of the device> - a 192.168.0.49

8 ADDITIONAL INFORMATION

- The propagation delay of the 100BASET1_SPY is constant 1.4µs between two BroadR-Reach Ports in SPY mode.

- As the delay through the 100BASET1_SPY between two BroadR-Reach ports in only 1.4µs,100BASET1_SPY will not influence a AVB time synchronous network negatively.

- If the firmware update failed and the host is still in bootloader mode, please restart the device and try to update the application again as described in this manual.

- If any 100Base-T1 link is shown in red color on the Website, it can be a hardware or software problem. In this last case, the user needs only to restart the device. If the problem continues after restarting, is a hardware problem, and the user should contact us for more support.

- If the user cannot access to the device Website, please, check the Ethernet Adapter configuration, and follow the instructions as described in this manual, assigning the correct IP and subnet mask values.
- If there was an error during the firmware installation, and the FPGA has no software, the next message will be shown on the webpage of the device:

  Failed to flash the FPGA. Please try updating the board again!

  In this case, please wait a few seconds until the HOST LED 1 is blinking and there is link up on Host Ethernet Port, and then update again the firmware version.

- Some Ethernet Adapters must have the VLAN & Packet Priority option disabled. Please, change this configuration, going to Ethernet Adapter Properties/Advanced/Packet Priority & VLAN. If this option is enabled, just disabled. Otherwise, it should be enabled. Please, check also that there is not any IP Address configured on the Ethernet Adapter, and the Windows Firewall is disabled.
  Note: This last solution does not work with Intel Ethernet Adapters.

- The website is tested with Firefox and Internet Explorer. Firefox is preferred. Chrome is not supported.

- **Warning:** From firmware version 2.0.0, 100Base-T1_SPY has a new reedboot updater, not compatible with previous firmware. Please, don't try to update the device to a previous release if the 2.0.0 version or higher is installed in the

device. If the user does this, the Host and FPGA LEDs can stop working, the software update is no longer available, and the user must contact us for more support.

9 CHANGELOG

Version	Chapter	Description	Date
1.0.0	All	First release	
2.1.0	All	Second release with new design	16.11.2018
2.2	All	Correction bugs	05.07.2019

10 LIST OF FIGURES

11 CONTACT

If you have any questions regarding this product, please feel free to contact us:

Technica Engineering GmbH
Leopoldstr. 236
80807 München
Germany

Technical support:
support@technica-engineering.de

General information:
Info@technica-engineering.de

Most current user manuals and product information:
https://technica-engineering.de/