technica
engineering

MEDIAGATEWAY

USER MANUAL

March 2020

Manual-Version: 5.0   FW-Version: v4.4.0   HW-Version: v2.1a to v2.6

CONTENT

1 GENERAL INFORMATION

1.1 Functionality and Features of the MediaGateway

Figure 1-1: MediaGateway

The **Technica Engineering MediaGateway** allows users to connect and loop through up to 12 100BASE-T1-based devices on the physical layer and to establish virtual point-to-point connections, thus enabling filter and control of data streams (routing, mirroring, forwarding).
It can work as Converter between 100BASE-T1 and Standard Ethernet.
Extra functions as CAN-Gateway and FlexRay Logging are available.

Features:
- 12 Ports 100BASE-T1 Ethernet
- Ports Gbit Ethernet (10/100/1000) BASET Full duplex) for Logging data output and configuration
- 1 Port Gigabit Ethernet SFP module socket
- Automotive Tyco MQS Connector for 100BASE-T1 and power supply
- Easy configuration via webserver and via data telegram
- Import and export of configuration
- Wake up functionality
- CAN/LIN/FR interfaces (requires customer specific software)
- Power output for attached devices (VBAT max. 1,2 Ampere in total [Fused])

- ⟳ Possibility to reset to default settings by pushbutton
- ⟳ Robust steel case

General Information:

Power requirement:	7 to 16 Volt DC (nominal 12 Volt DC)
Power consumption:	7-12 Watt
Size:	195 x 143 x 33 mm
Weight:	0,77kg
International Protection:	IP 2 0
Operating temperature:	-40°Celsius to +80°Celsius

StartUp Time

The StartUp time is valid for HW-Variants 2.1a and higher, and Software 3.7 and higher. If there is information needed about older variants of the MediaGateway, please contact support@technica-engineering.de.

PowerUp and Processor Boot Time:	65	ms
Configuration Time depending on complexity	47-55	ms
100BASE-T1 LinkUp Time	20-130	ms

Note: The RJ-45 GB-Ports need about 3-4 seconds linkup time due to Autonegotiation.

LINKS:

The User can download the latest firmware and documentation for the MediaGateway here:

https://technica-engineering.de/produkt/media-gateway/

1.2 Warranty and Safety Information

Before operating the device, read this manual thoroughly and retain it for your reference.
The latest documentation for the MediaGateway can be downloaded here:
https://technica-engineering.de/produkt/media-gateway/

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.

Caution: The device can get hot.
Do not cover the device due to fire danger.
Do not place the device near to highly flammable materials due to fire danger.

If you wish to discard a 100BASE-T1 MediaConverter from Technica Engineering GmbH, please contact your dealer or supplier for further information.
This symbol is only valid in the European Union. If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal. Technica Engineering GmbH is registered as manufacturer of the brand "Technica Engineering" and the device type "Small devices of Information- and Telecommunications- technology for exclusive use in non-private Households". WEEE reg. No. DE 20776859

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:
                           BroadR-Reach Ethernet MediaGateway

Datum der Erklärung: 01.06.2016

Name des Unterzeichners: Joseba Rodriguez

Unterschrift:.......

Figure 1-2: Declaration of conformity

1.4 Scope of Delivery

The delivery includes:
- 1x MediaGateway
- 1x Cable-set
    - o 1x 1m Ethernet Cable
    - o 1x Black MQS Connector
    - o 3x Blue MQS Connectors
    - o 100BASE-T1 cabling
    - o MQS Crimps
    - o Power cabling
    - o 4mm Banana-plugs

Additional cable-sets can be ordered. Please write us at order@technica-engineering.de.

2 HARDWARE INTERFACES

2.1   Connectors

On the label on top of the device you can see an overview about all HW interfaces of the **MediaGateway**:
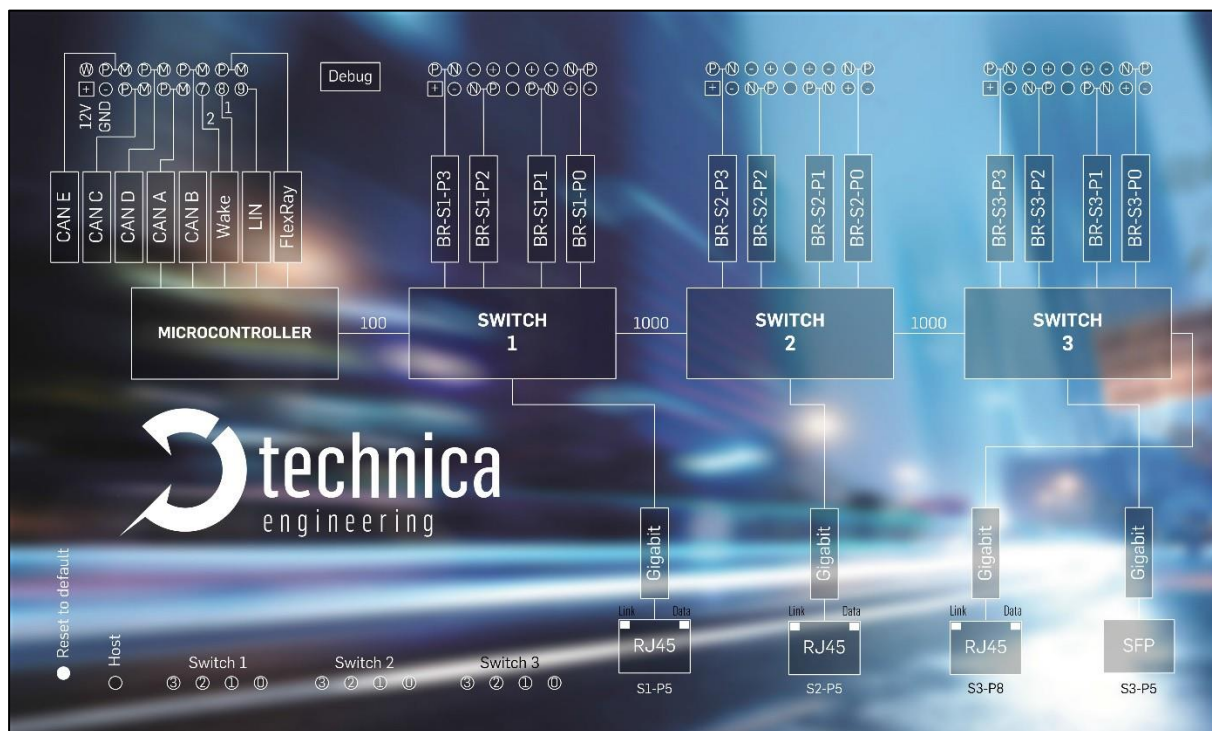

Figure 2-1: Label of MediaGateway with pinning information

2.1.1 Power Connector - Black MQS Connector

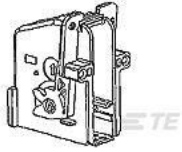The Tyco Electronics (TE) Micro Quad Lock System (MQS) is used.

Name	Picture	Part Number
Tyco, MQS Abdeckkappe 2x9 Pol, black Alternative		1-967416-1 1-1355350-1
Tyco, MQS Buchsengehäuse 2x9 Pol Alternative		965778-1 962108-2
Tyco crimp contact		928999-1

Table 2—1: Parts of black MQS connector

Note: You can use the official Tyco tool for these crimp contacts. A cheaper variant is the crimp tool for "PSK" contacts.

Pin	Function	Pin	Function
1	Battery +12 Volt Input	10	Wake up line 3 (Output only)
2	Power Ground	11	CAN E plus
3	CAN C plus	12	CAN E minus
4	CAN C minus	13	CAN D plus
5	CAN A plus	14	CAN D minus
6	CAN A minus	15	CAN B plus
7	Wake up line 2	16	CAN B minus
8	Wake up line 1	17	FlexRay plus
9	LIN Bus	18	FlexRay minus

Table 2-2: Pinning of black MQS connector

Note: CAN interfaces can only be used with CAN Gateway option and FlexRay Logging only with FlexRay option. For further Information please contact technicalsales@technica-engineering.de

The power supply for the device is supplied by Pin 1 (12Volt) and Pin 2 (Ground). Requirements for the MediaGateway itself: 12 Volts DC up to 1 Ampere (typical 600mA)

Please note, that the power supply for the 12 Volts camera power output is also supplied form Pins 1 and 2.

Warning: If you apply a voltage higher than 16 Volts, the device will be damaged!

A wake-up line can be connected on Pins 7 or 8. The wake-up line should have the same voltage level as the power supply (12 Volts). A high level on one of these pins wakes up the ECU from sleep mode and keeps it active. If the voltage on this pin drops below approx. 6 Volts for more than about 3 seconds, the ECU will enter sleep mode until voltage increases and it wakes again.

The **LIN interface** on Pin 9 can be used to communicate with the microcontroller by LIN bus. In the default software there is no data transmission specified. This interface may only be used in customer specific software.

The **FlexRay interface** on Pins 17 and 18 can be used to communicate with the microcontroller by the FlexRay bus. In the default software there is no data transmission specified. This interface may only be used in customer specific software.

2.1.2 Switch Connectors – Blue MQS Connectors

The Tyco Electronics (TE) Micro Quad Lock System (MQS) is used.

Pin	Function	Pin	Function
1	Camera +12 Volt nominal output	10	100BASE-T1 port 3, plus
2	Camera Ground output	11	100BASE-T1 port 3, minus
3	100BASE-T1 port 2, minus	12	Camera Ground output
4	100BASE-T1 port 2, plus	13	Camera +12 Volt nominal output
5	n.c.	14	n.c.
6	100BASE-T1 port 1, plus	15	Camera +12 Volt nominal output
7	100BASE-T1 port 1, minus	16	Camera Ground output
8	Camera +12 Volt nominal output	17	100BASE-T1 port 0, minus
9	Camera Ground output	18	100BASE-T1 port 0, plus

Figure 2-2: Pinning of blue MQS connectors

The pins marked with (P) or (N) are used for the 100BASE-T1 ports. Four ports are available per switch.

You have to connect the (P) pin to the (P) pin of the periphery device. You have to connect the (N) pin to the (N) pin of the periphery device.

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

The pins marked with (+) or (-) are 12 Volts power output pins. The actual voltage level of these pins depends on the supply voltage of the ECU. Be aware that the sum of all

12 power output pairs will deliver a maximum of 1.2 ampere. If more current is used the output will temporarily switch off.
The power output has to be switched on by website configuration (Control panel).

2.1.3   RJ-45 Ethernet connectors

There are three RJ-45 Standard Ethernet Connectors at the front side for Gigabit Ethernet. They are working with autonegotiation for 10/100/1000 Mbps.

2.1.4   SFP Slot

There is one SFP cage for a MiniGBIC module.

The following modules have been tested:
- Edimax Mini GBIC (SFP) LC, 1 Gigabit/s, 1000 Base-SX Module
- SFPEX S1GT-A Mini GBIC (SFP) 10/100/100 Mbps RJ-45 Module
- BEL SFP-1GBT-05 SFP 10/100/100 Mpbs RJ-45 Module

Note: Technica Engineering´s 100/1000BASE-T1 SFP Modules are compatible with the MediaGateway!

For further information please follow these links:

https://technica-engineering.de/en/produkt/100base-t1-sfp-module/
https://technica-engineering.de/en/produkt/1000base-t1-sfp-module/

2.1.5   Micro HDMI connector

This is an interface for programming and debugging (only for development.)

2.2   Other Interfaces

2.2.1   Status LEDs

The **MediaGateway** has several status LEDs at the front side of the case.

Figure 2-3: LEDs

The **"Host" LED** 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). You 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 (ap- prox. 0.25 sec).

Note: If the **HOST LED** is stuck, the microcontroller is overstrained. Please make sure that only necessary communication hits the microcontroller port (S1-P4) and try a power reset.

The 12 **port status LEDs** of all 100BASE-T1 Ports monitors the link status of the corresponding port. The LEDs are lit when there is a BroadR-Reach link detected. They begin to blink when there is data traffic on this link.

Note: There is a known issue: Whenever P/N of the bus swap, data transmission won't be possible, not even if the LED is lit in the 100BASE-T1 slave side.

The In-built **LEDs in RJ-45** 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.

2.2.2   Push Button (Reset to default)

The push button on the very left side at the front side of the case (hole) will reset all settings to factory default.

Press this button down for 5 to 6 seconds with a pointy stick or pen while the **HOST LED** is blinking normally.
After that:
- ⟳ IP Address are set to default (192.168.0.49)
- ⟳ Complete configurations are lost and set to default

Note: If the device is blocked and all LEDs are lit, device must be sent to Technica Engineering. In order to avoid controversues here please make sure that the HOST LED is blinking its normal operation mode and the power supply is stable before the reset.

3 CONFIGURATION OF DEVICE

3.1 Access to Webserver

You get access to the Webserver by connecting the device via a GB-port (RJ-45) to your PC.

1. Please go to the network adapter settings of your PC and adjust the IP in the same range of your **MediaGateway**. Default-IP address of the MediaGateway is 192.168.0.49, the subnet mask is 255.255.255.0.

2. Enter the IP address of the MediaGateway in your browser.

   Note: Firefox is the recommended browser.

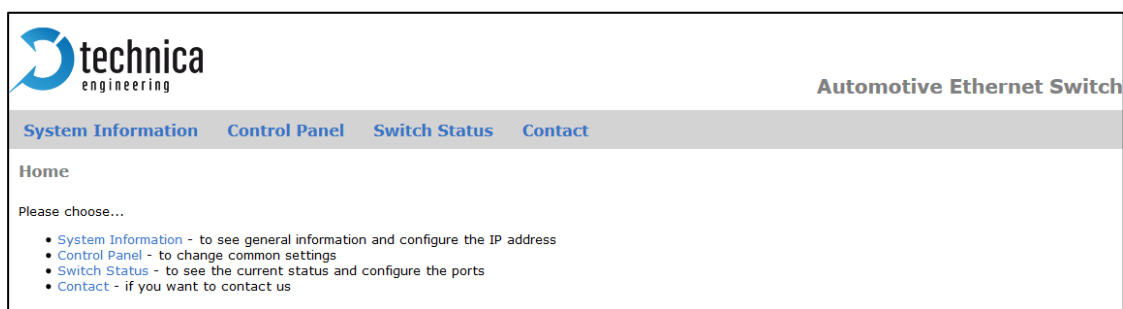3. The following website should appear:

Figure 3-1: Home Screen MediaGateway

Note: If there is a lot of broadcast traffic on the switch, the host microcontroller may be jammed. You cannot access the website in this case. Please use VLAN configuration to forward only relevant messages to the microcontroller. Sometimes a power reset works, too.

Please select one of the tabs for further configuration.
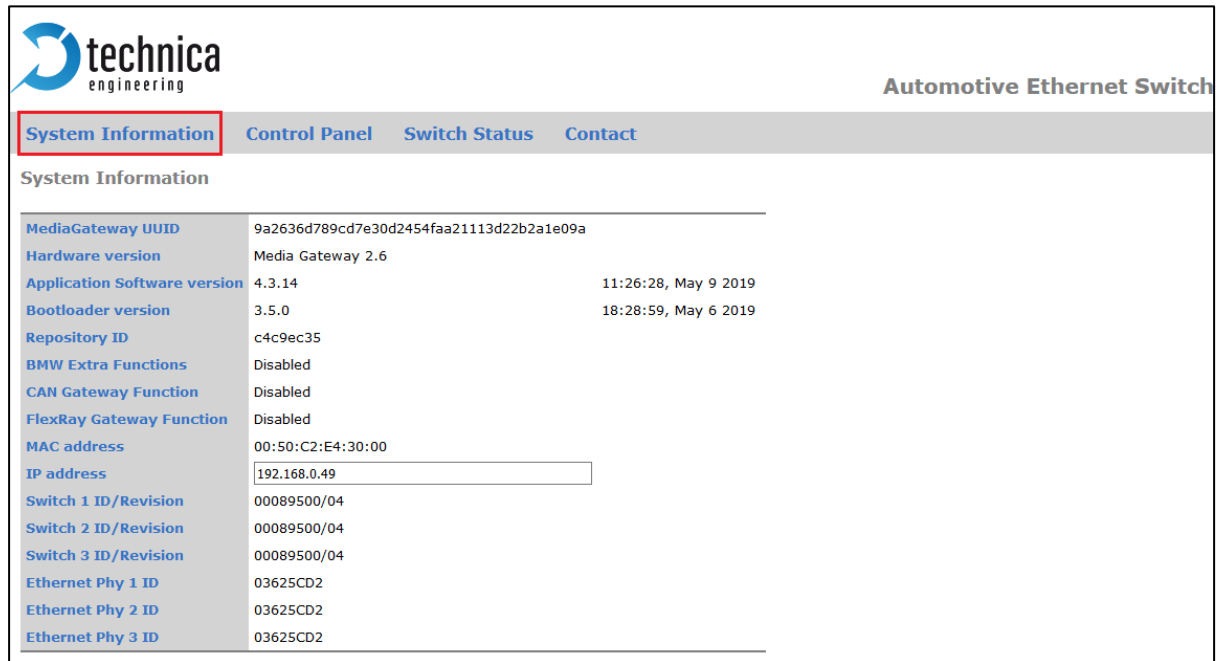
3.2 Save changes

If you changed anything in the configuration the following hint appears every time:

Figure 3-2: Save Configuration

You don't have to save every time when this hint appears. You can make all wished changes and save the configuration at the end. Please check the box "restart after saving" and then press the "Save configuration" button.

After the restart, all changes are applied.

3.3 System Information tab

Figure 3-3: System Information tab

On the tab "System Information", some status information about the device is displayed. You can check the version number of the application firmware and the bootloader or the unique MAC address of the device. The version number registers of the switch and PHY chips are displayed for information only.

MediaGateway UUID: Since version 4.1.12 the UUID is shown. This UUID is need for activation of extra features.

MAC address: This MAC address should be the same as on the label on the bottom of the device.

IP address: You can change the IP address of the host microcontroller (Webserver) here. If you want to use multiple devices in one network, you must configure a unique IP address for each device here.

Note: If you forgot the IP address of your device you can reset it to default as described in CHAPTER 2.2.2
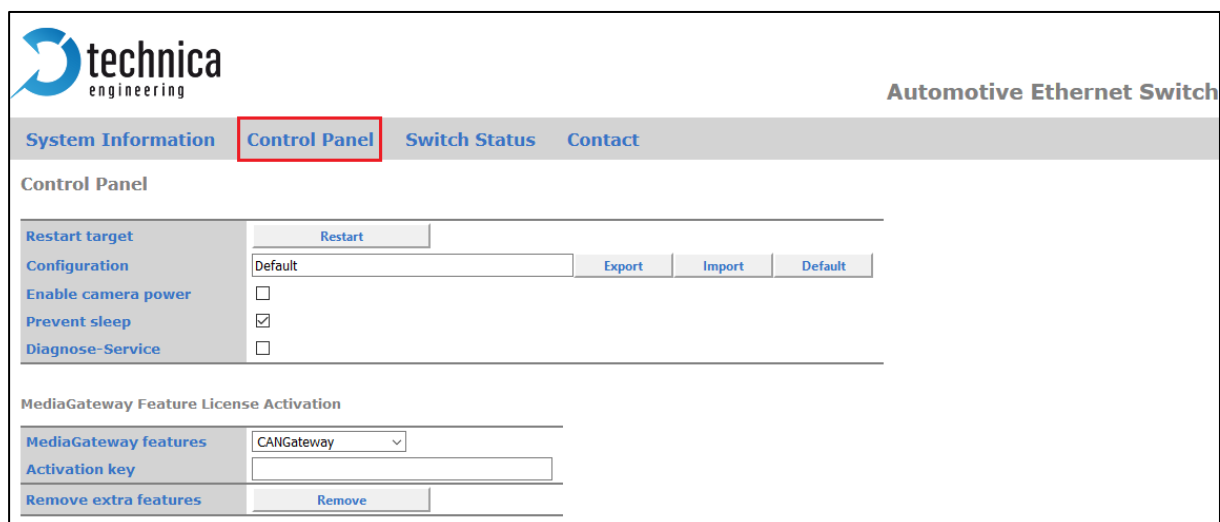
3.4 Control Panel tab

3.4.1 Control panel

Figure 3-4: Control Panel tab

Restart target: Software reset. Configuration will NOT be lost.

Configuration: It shows the current configuration name.
Export: Save the stored configuration from MediaGateway into user's PC.
Import: User can import or export the configuration settings of the device to a file (*.cfg) on a computer connected to the RJ45 Port. A restart is needed to apply the new configuration.
Default: You can reset the configuration settings to default. All values will be set to default **except the IP address**. It will be not modified.

Enable camera power: The camera power output pins are disabled by default. To activate them, this checkbox should be checked.

Prevent sleep: If you do not want to use a Wakeup line, you can enable the "Prevent sleep" checkbox (default). This will keep the device running without entering the sleep mode. If this option is disabled, the device will go to sleep if no activity is recognized according to observed ports. (Please see the configuration of each port in CHAPTER 3.6)

Diagnose service: If you enable this functionality, the MediaGateway will send periodically status information about its state. For example, transmitted and dropped frame counters, link quality, etc. For more details please see CHAPTER 6

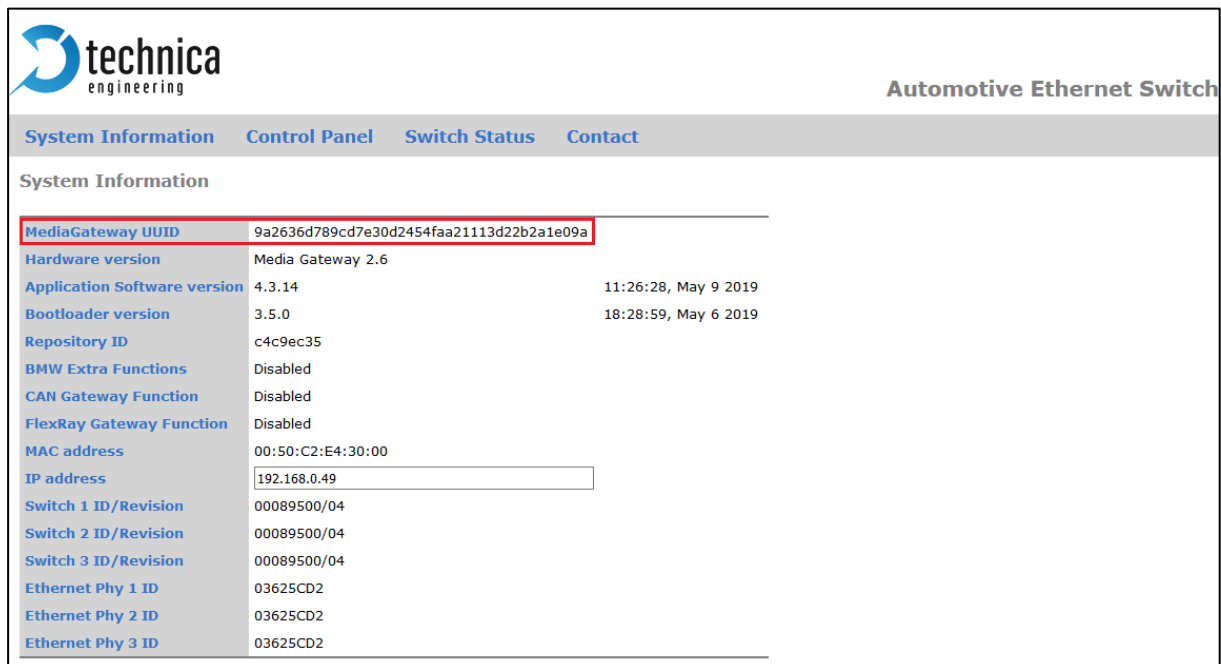## 3.4.2 MediaGateway Feature Activation

MediaGateway features and Activation key:
- CAN Gateway
- FlexRay Gateway
- BMW Extra Functions (not available)

For activation of the extra features (CAN Gateway, FlexRay Gateway) an activation key is needed. Please contact order@technica-engineering.de if you want to order an activation key. Or contact technicalsales@technica-engineering.de for more information about the conditions of these features.

For the activation key please write an Email to support@technica-engineering.de with following information:
- Order number
- UUID of the MediaGateway
- Ordered Feature

Figure 3-5: UUID of MediaGateway

Technica Engineering will provide an activation code for the feature. The received activation code must be entered in the Control Panel.

The next picture shows how to unlock CAN Gateway feature after receiving the activation code:

1. Select the feature: e.g. CAN Gateway
2. Insert the code
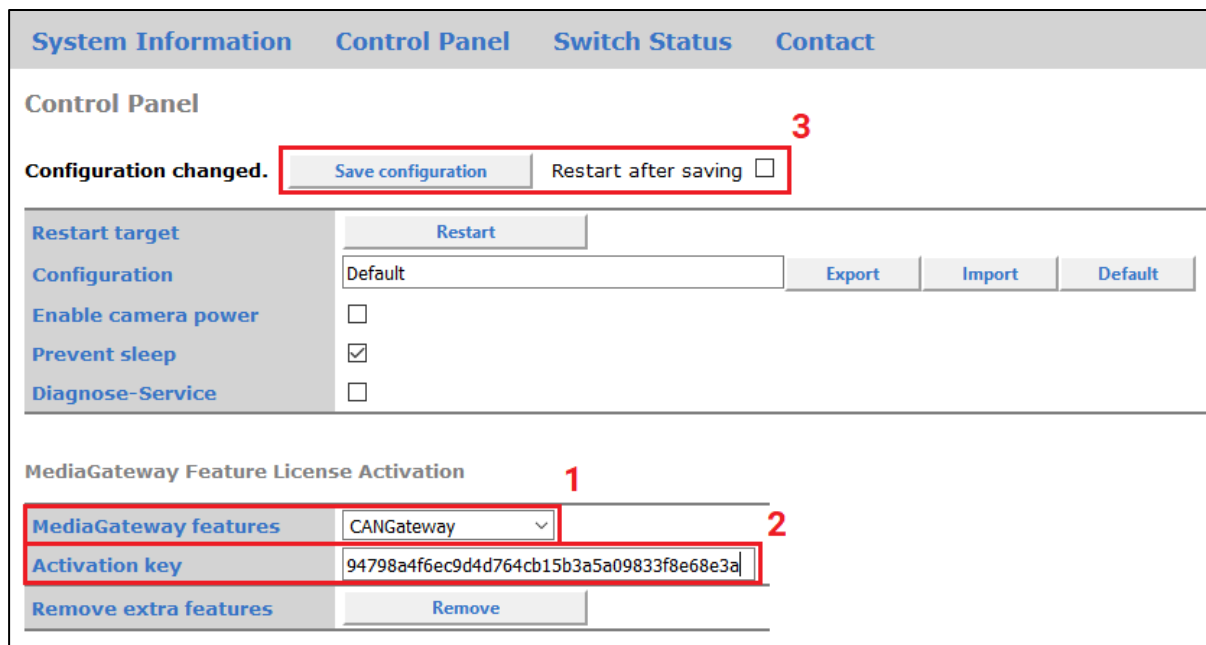3. Save configuration and restart the device.

Figure 3-6: How to unlock feature

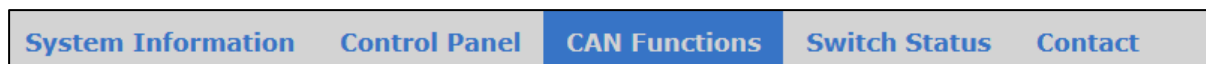Now there is an extra tabulator for the extra feature available:

Figure 3-7: CAN Gateway tabulator

Remove extra features: With this function all extra features will be removed from this MediaGateway. If this is done, reactivation is possible with the Activation key again.
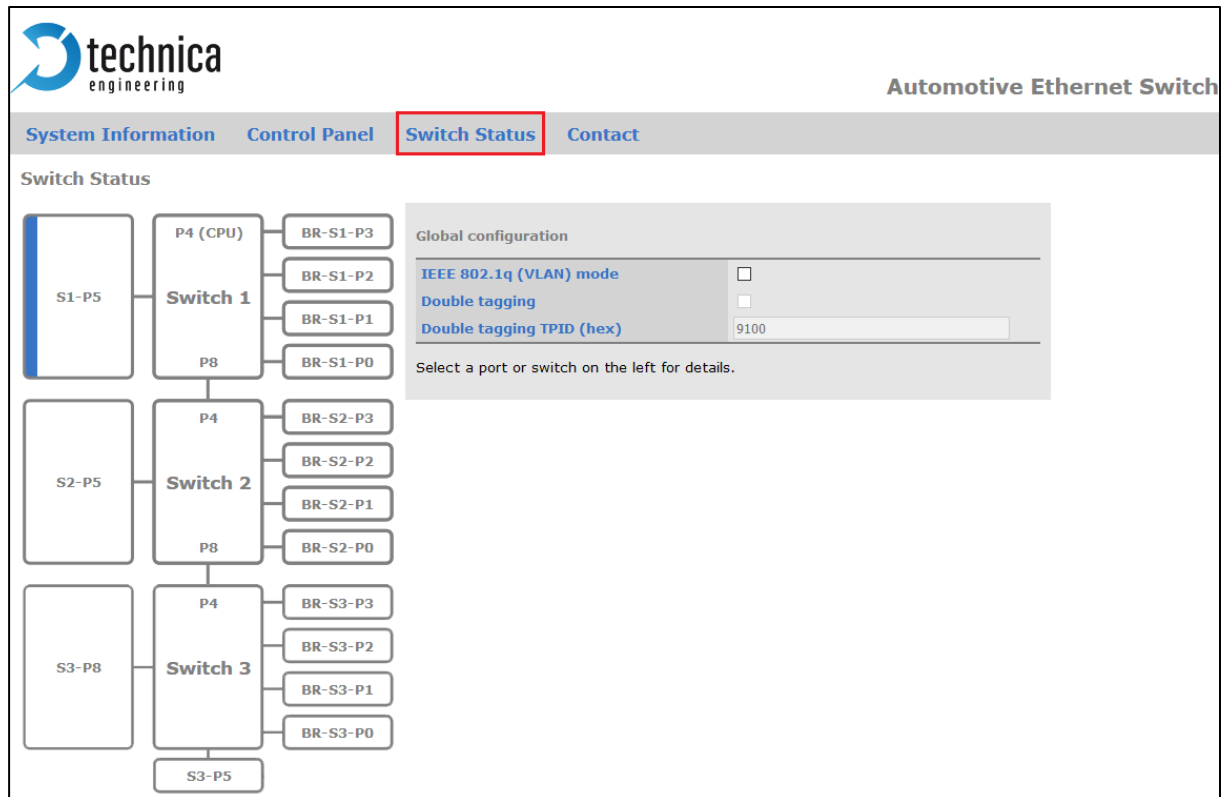
3.5   Switch Status tab

Figure 3-8: Switch Status tab

The main configuration of the MediaGateway is done in the "Switch Status"tab.
Here you can configure details about each port and get some status information
about the ports and switch states.

On the left side of the page you can see an overview of all available ports. A blue bar
at the side of a port label indicates an active link (On the Cascade SFP port there is no
linkup indication).

3.5.1   Global Configuration

In global configuration, user can change global settings affecting all three switches
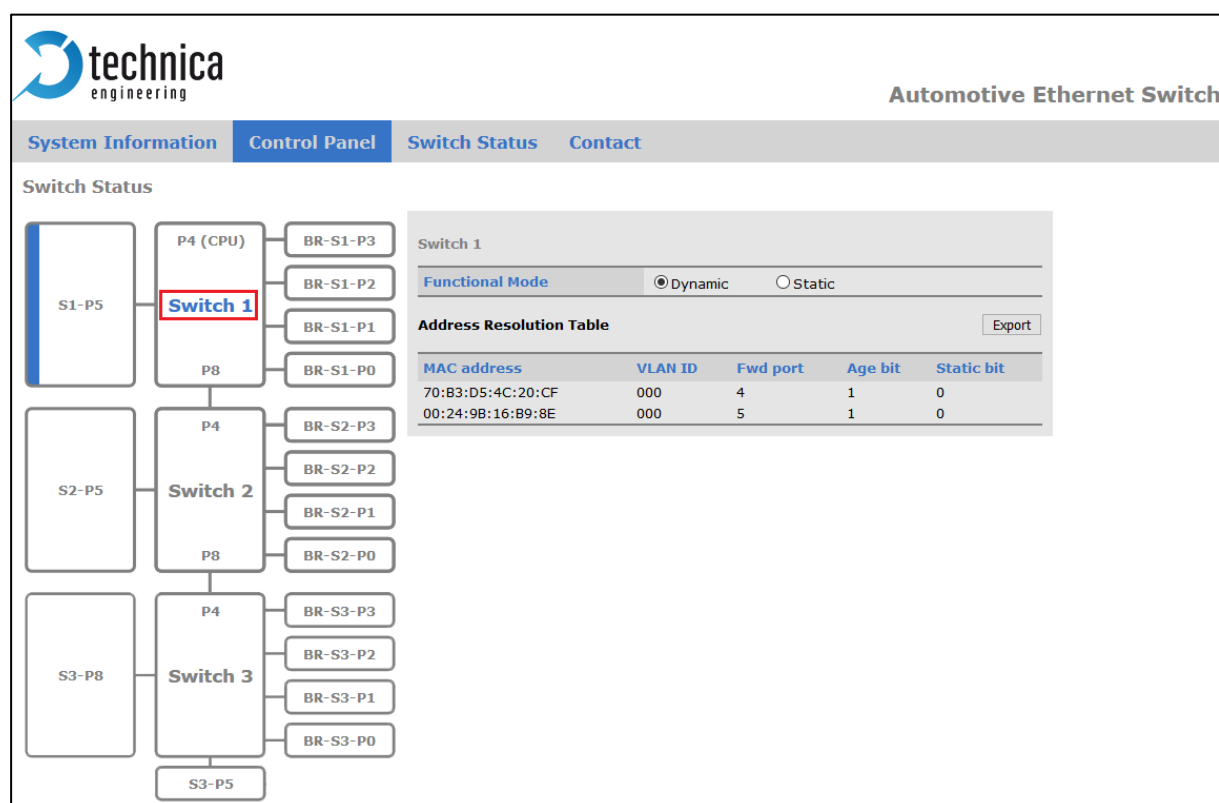inside MediaGateway.

IEEE 802.1q (VLAN) mode: Activates port based Single VLAN.

Double Tagging: If IEEE 802.1q (VLAN) mode is activated, it is possible to work with
double tagging. It is only possible to activate it if single tagging is already activated.

Double Tagging TPID: On Board Switches use the old non-standard 802.1QinQ 0x9100 ether type (TPID) for double tagged frames. New 802.1QinQ standard uses TPID 0x88A8. The TPID can be changed in this field. It is only available if double tagging is activated. Only these two ether types are not working.

3.5.2   ARL Table Status

When you click on one of the switches (indication by blue letters) the entries of the **Address Resolution Table** of selected switch will be displayed.

Figure 3-9: Current ARL Table of Switch 1

Functional Mode: It must be chosen for each switch separately. Standard mode is Dynamic.
Dynamic: the switch is learning the ARL table by itself
Static: the ARL table can be set and all entries must be defined by the user. Even the micro of the MediaGateway itself and the PC for configuration.

The Address Resolution Table shows the following information:
MAC address, VLAN ID, Fwd port, Age Bit, Static Bit

The example of FIGURE 3-9 shows two ARL Entries in Switch 1:
MAC Address 70:B3:D5:4C:20:CF is present on port 4 using VLAN ID 0x000.
MAC Address 00:24:9B:16:B9:8E is present on port 5 using VLAN ID 0x000.

Note: If IEEE 802.1q (VLAN) mode (Global configuration) is disabled, VLAN ID will be 0x000.

3.5.2.1 Dynamic ARL Table

By default, dynamic ARL mode is active on all three internal switches. It means that the information collected from received unicast packets are learned or stored for the future purpose of forwarding frames addressed to the receiving port.

For a received frame, it learns received MAC source address, VLAN ID (if not present VLAN ID = 0x000) and it creates an entry. This entry is dynamic, so it will be active for 300 seconds. After 300 seconds, if no further frames matching this entry are received, the entry will be aged (Age_bit = 0) and removed from the forwarding table. New learning will be necessary.

Field	Description
MAC Address	Received Source MAC Address
VLAN ID	VLAN ID associated with the MAC Address
Fwd port	Port associated with the MAC address
Age bit	1 = Entry has been learned or accessed since last aging process 0 = Entry has not been accessed since last aging process
Static bit	Entry has not been learned and cannot expire

Table 3-1: Description of ARL Tabel Entry

3.5.2.2   Static ARL Table

In ARL Static Table mode the switch does not automatically learn MAC addresses or port associations. These MAC addresses are not aged out by the automatic internal aging process.

To add new ARL table entries the user must change the Functional mode to Static followed by selecting Edit Table option. The steps are described below.

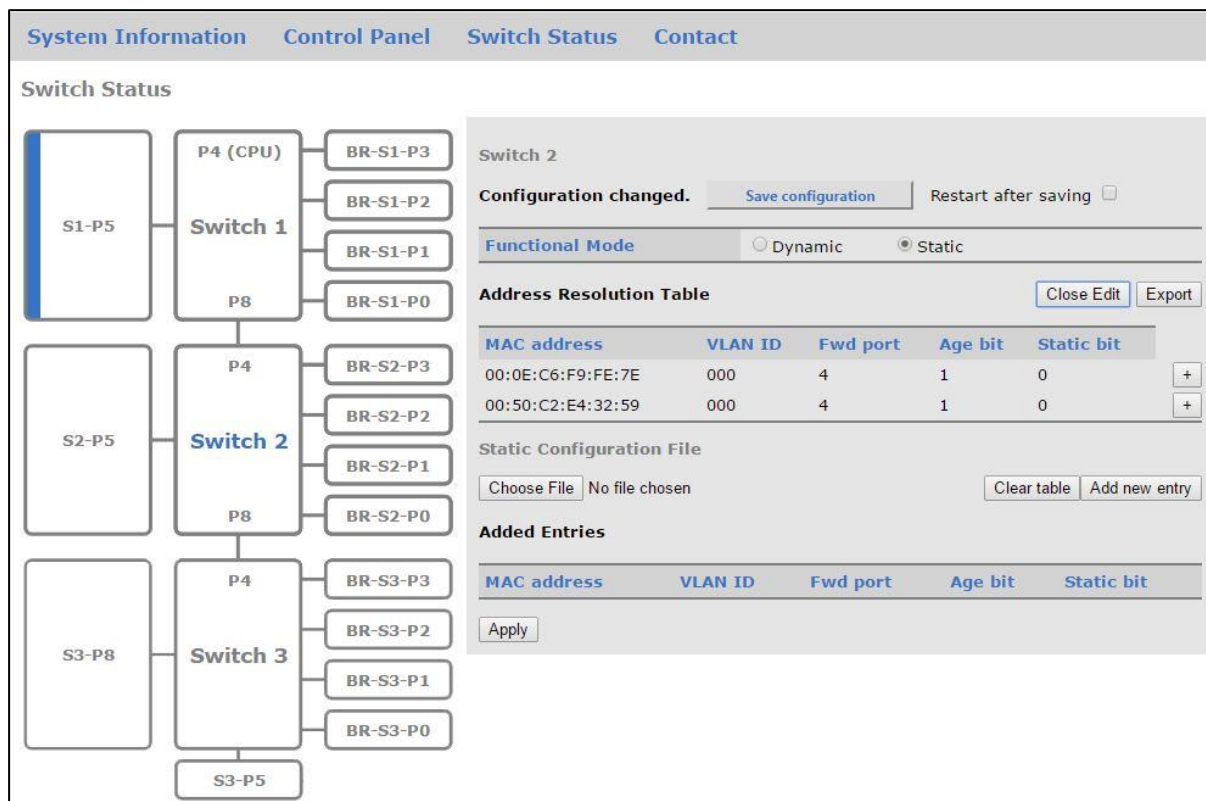*Figure 3-10: Steps for editing ARL table*

Note: When you open Edit table, all current entries are displayed

Note: If you want to edit the ARL table. You have to start from beginning as if there were no entries. That means, if you want to add an entry to current entries, don't forget to add even the current entries by pressing "+". Please see FIGURE 3-11

Figure 3-11: How to add current entries

After selecting Edit Table the following configuration mask will appear.

Figure 3-12: Configuration overview for static ARL table

Close Edit: this button closes the mask again.

Export: the current configuration of the ARL table is exported to a *.json-file.

Choose File: the user can import a ARL-table-configuration file of type *.json. After the import the changes must be applied by the button "Apply" and then must be saved by the button "Save configuration".

A valid configuration *.json file looks like as follows:

```
{
  "arlEntry":{
    "unicast":[
      {
      "arlMAC": "B8:70:F4:C4:E5:E8",
      "vId": "0",
      "port": "4",
      "age":"0",
      "staticBit":"1"
      },
      {
      "arlMAC": "B8:70:F4:C4:E5:E9",
      "vId": "0",
      "port": "5",
      "age":"0",
      "staticBit":"1"
      }
    ]
    ,
    "multicast":[
      {
      "arlMAC": "B9:70:F4:C4:E5:EA",
      "vId": "0",
      "port": ["1","0","2","3","4"],
      "age":"0",
      "staticBit":"1"
      },
      {
      "arlMAC": "B1:70:F4:C4:E5:EB",
      "vId": "0",
      "port": ["8"],
      "age":"0",
      "staticBit":"1"
      }
    ]
  }
}
```

Figure 3-13: ARL table configuration file format

Clear table: All Entries are removed from ARL table. After that, please check the box "restart after saving" and press the button "save Configuration"

Note: In the current firmware, the saving operation does not working properly sometimes. After pressing the save button, the shown tabulator jumps to System Information tab and there is no restart of the MediaGateway. Please go to the Control Panel-tab and do here the saving again. This way the MediaGateway should restart and all changes will be saved.

Add new entry: Here the user can add an entry manually.

- ⟳ Adding a unicast:
  Frames containing a unicast destination address should have only a **single** port as Fwd port.
  Note: The **last bit** of **first byte** of a **uni**cast MAC address shall be 0. For example: FE:FF:FF:FF:FF

- ⟳ Adding a multicast:
  Frames containing a multicast as destination address can have more than one port as Fwd port. For example:

MAC address	VLAN ID	Fwd port	Age bit	Static bit
F3:0E:C6:F9:FE:7E	000	1,2,8	0	1

Figure 3-14: Example of multicast MAC address entry with multiple Fwd ports

Note: The **last bit** of **first byte** of a **multi**cast MAC address shall be 1. For example: F9:FF:FF:FF:FF

Apply: By this button, the changes in the ARL table are transferred to the MediaGateway. Then please hook "restart after saving" and press the button "save Configuration"

Note: In the current firmware, the saving operation does not working properly sometimes. After pressing the save button, the shown tabulator jumps to System Information tab and there is no restart of the MediaGateway. Please go to the Control Panel-tab and do here the saving again. This way the MediaGateway should restart and all changes will be saved.

3.5.3   Ports overview

The MediaGateway has different kinds of ports, a total of 21 configurable ports.

- ⟳ Internal ports with 1 GB/s: P4 and P8 between all switches.
- ⟳ The port for the microcontroller: it is connected by a 100MBit/s link to S1-P4 (P4 CPU).
- ⟳ Standard Ethernet RJ-45 ports: S1-P5, S2-P5, S3-P8 with 10/100/1000Mbit/s
- ⟳ One SFP slot: For different kinds of SFP Modules up to 1000Mbit/s.
- ⟳ 100BASE-T1 ports: P0 to P3 ports on all switches

To change the configuration of each port, click directly to the port. The selected port is indicated by a blue text.

For detailed port information, please go to CHAPTER 3.6

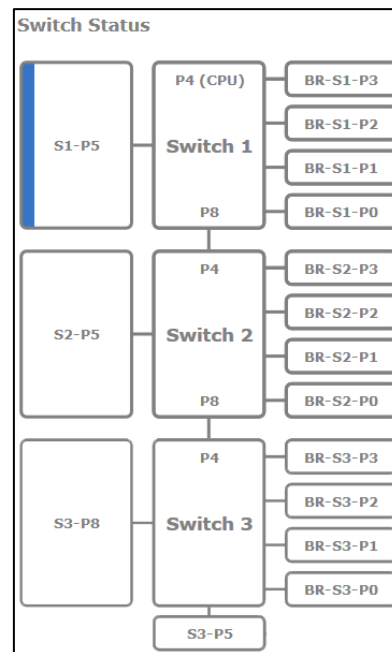*Figure 3-15: Port Overview*

3.6   Port Information (dependent on Global configuration mode)

3.6.1   Ports Information while No VLAN tagging is active

IEEE 802.1q (VLAN) mode is not hooked (see CHAPTER 3.5.1)
In this mode, basic configuration details can be adjusted, but the MediaGateway works as standard switch.
Grey fields are not configurable and have standard values or no values.

3.6.1.1 Ethernet Port RJ-45

Figure 3-16: Details of the Ethernet Port RJ-45

Port name: Here you can change the Port Name

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.

☑ This port is monitored: If on this port is incoming traffic, the MediaGateway doesn't go asleep.

☐ This port is not monitored: The MediaGateway can go asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored.

Note: this is only valid for one switch! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4 and then on S1-P5.

Speed: different speeds are available. By "Autonegotiation all Capable" autonegotiation is done. By the other settings, the speed is set, but master/slave is still autonegotiated.

Detected Speed: Here the detected speed is displayed, which is autonegotiated between MediaGateway and connected device on this port.

Drop ingress packets with…:
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:
Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Note: This drop feature is only available if mirroring on this port is activated
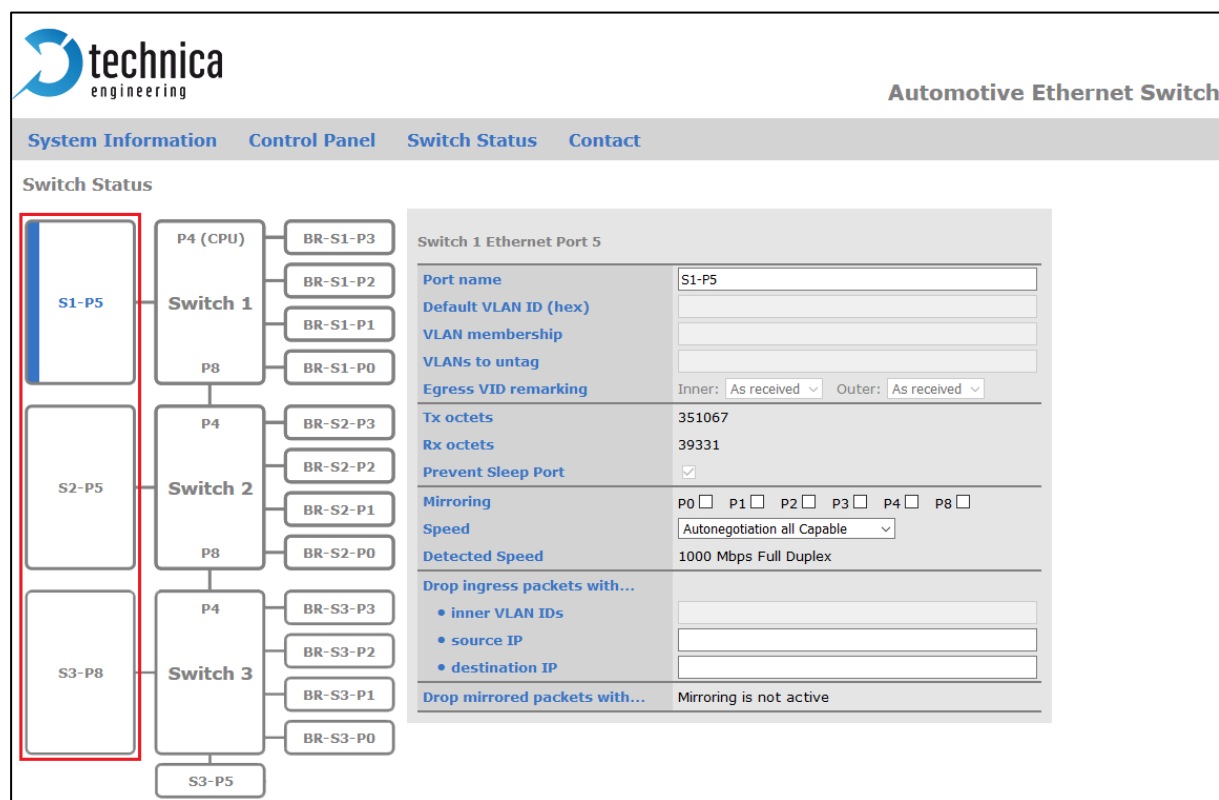
3.6.1.2   SFP module port

Figure 3-17: SFP Module Port

Port name: Here you can change the Port Name

Tx octets: decimal value of sent octets on this port.

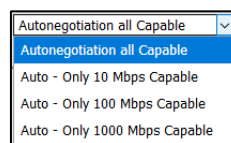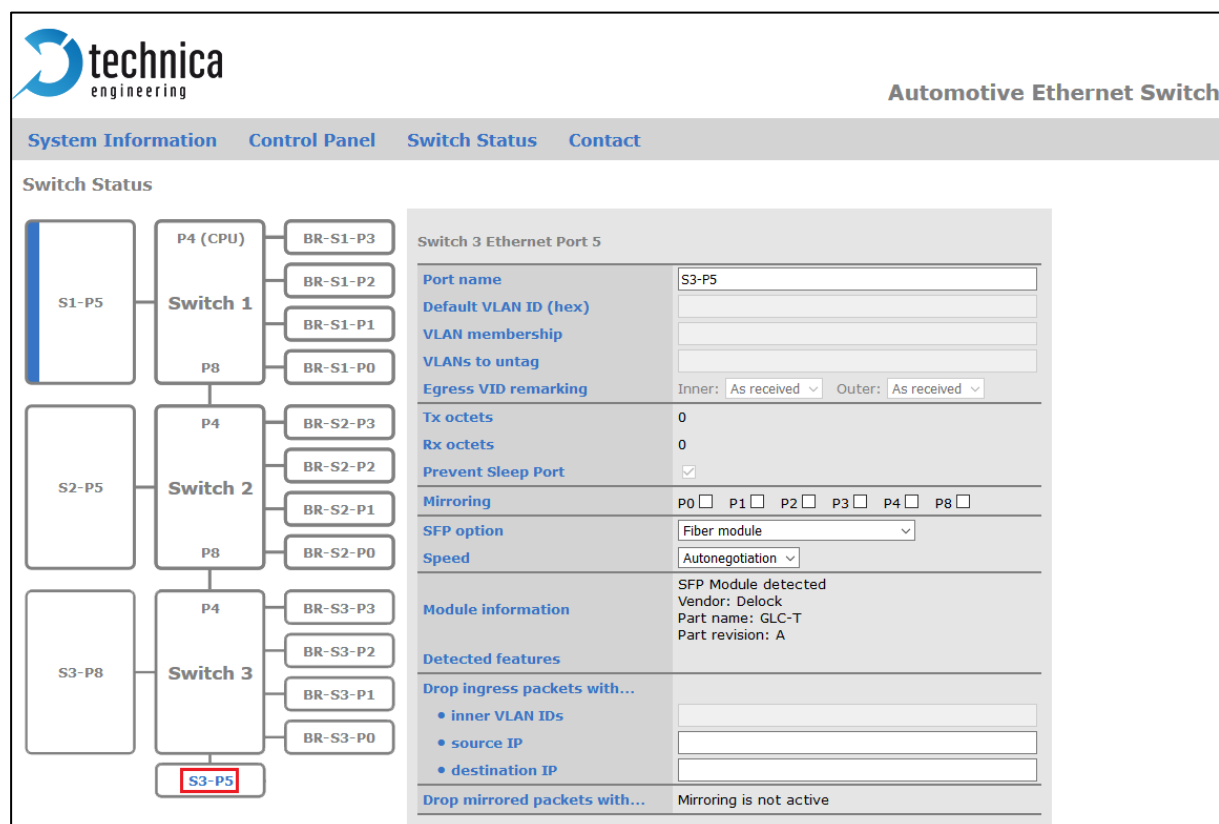Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
- ☑ This port is monitored: If on this port is incoming traffic, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored.

Note: this is only valid for one switch! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4 and then on S1-P5.

SFP option: In this option, the correct SFP Module has to be chosen in case a SFP Module is plugged in.

- ⟳ **Fiber module**: please select this option for fiber optical SFP-modules.
- ⟳ **RJ45 module**: please select this option for copper modules.
- ⟳ **Base-T1 / BroadR-Reach® module**: please select this option for a BASE-T1 modules from Technica-Engineering GmbH

Speed: If autonegotiation is not available, please select the speed of the SFP module 100BASE-T1 for 100Mbps and 1000BASE-T1 for 1000Mbps

BASE-T1 / BroadR-Reach® mode: please configure as slave if the connected device is master and the other way around. This is only visible, if a BASE-T1 SFP Module is used.

Module information: Based on selected SFP Module and detected hardware, different information about the SFP Module is displayed here.

Detected features: Based on selected SFP Module and detected hardware, different information about the features of the SFP Module is displayed here.

Drop ingress packets with…:
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:
Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Note: This drop feature is only available if mirroring on this port is activated

3.6.1.3 S1-P4 (CPU) and internal ports (P4 and P8)

Figure 3-18: CPU port and internal ports

Port name: Here you can change the Port Name

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
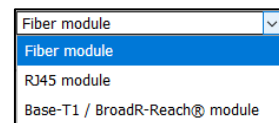- ☑ This port is monitored: If on this port is incoming traffic, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: Here you can choose the incoming traffic from the ports, which you want to be mirrored to this port. It is for each switch only for one port available.

Note: Mirroring is only valid for **one switch**! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4 and then on S1-P5.
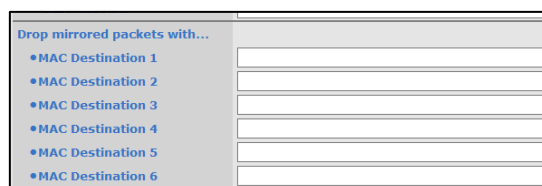
Drop ingress packets with…:

Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.

Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.
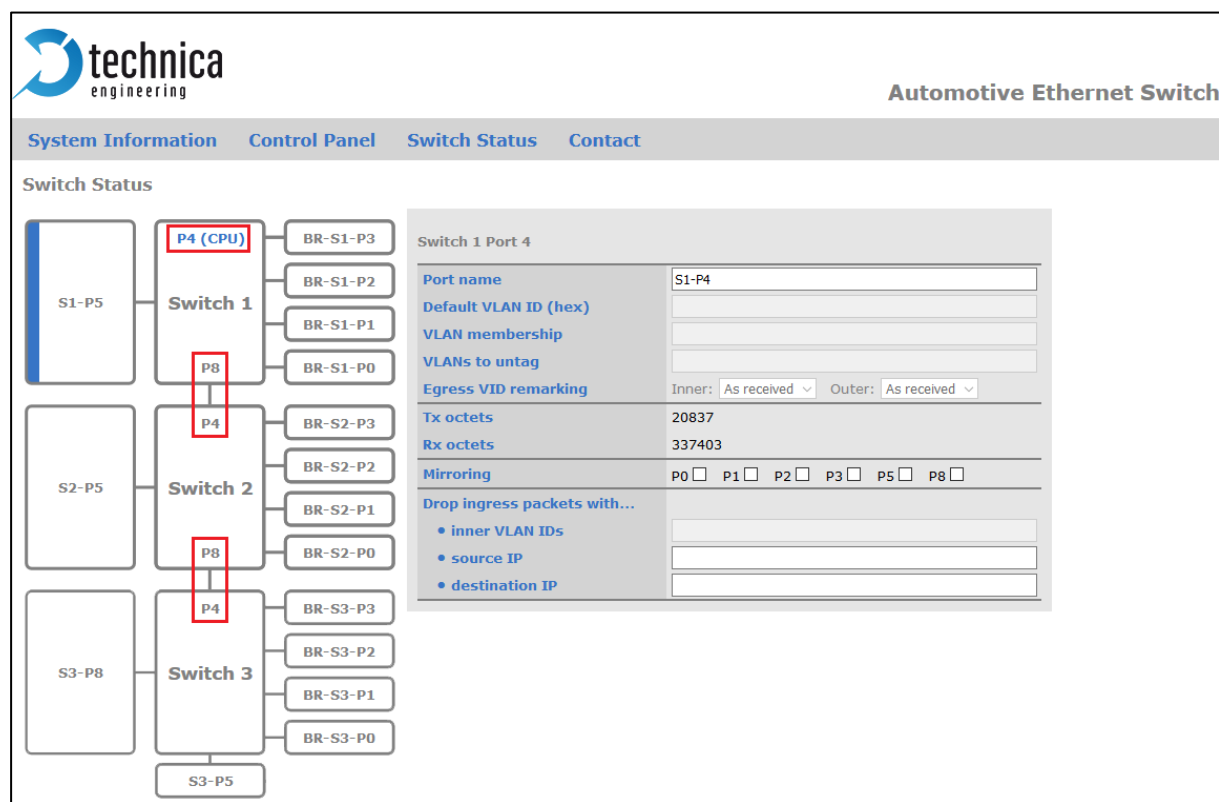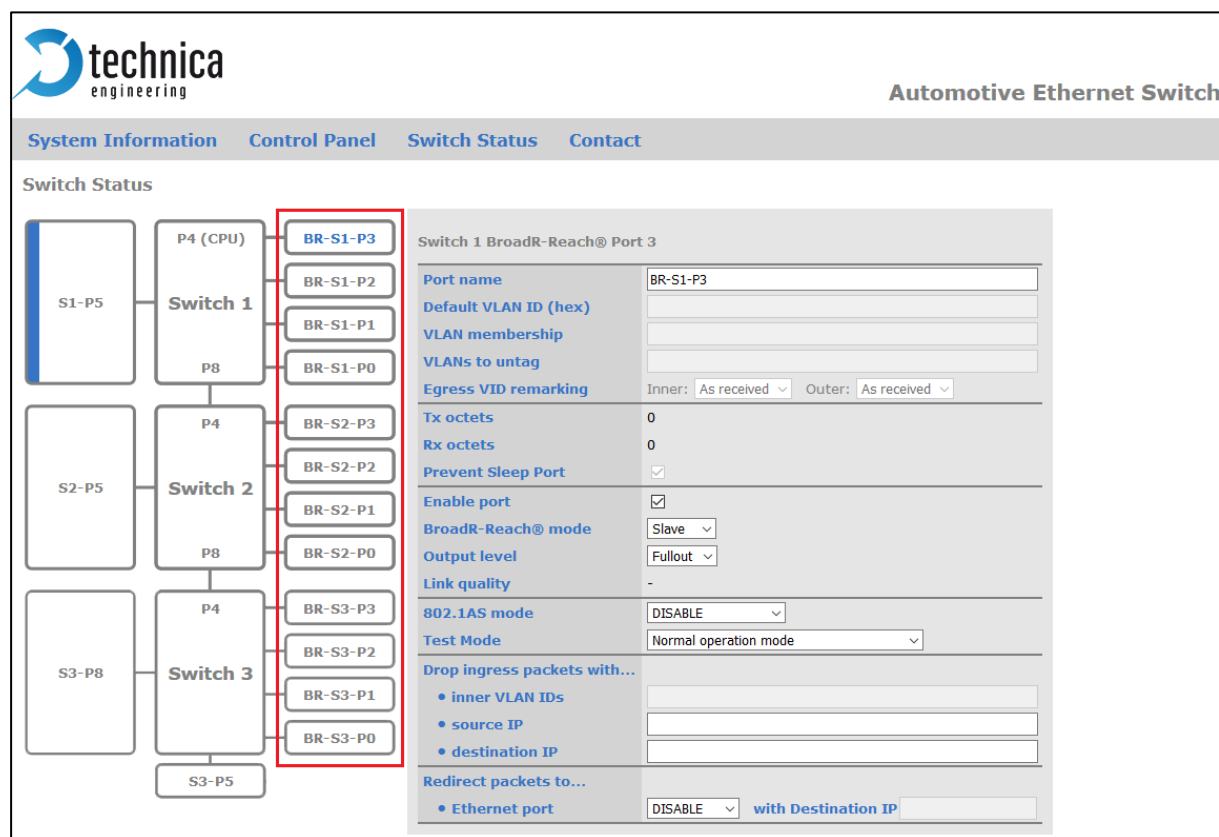
Drop mirrored packets with…:

Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Note: This drop feature is only available if mirroring on this port is activated

3.6.1.4   100BASE-T1 Ports

Figure 3-19: 100BASE-T1 Ports

Port name: Here you can change the Port Name

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
- ☑ This port is monitored: If on this port is incoming traffic, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Enable port:
- ☑ port is active.
- ☐ this port is not active: Incoming data is not forwarded and no outgoing traffic possible.

    Note: If there is a device connected on this port, link up is shown by the LED even if this port is not enabled.

BroadR-Reach® mode: For the MediaGateway there is no autonegotiation on 100BASE-T1 Ports available.
- ↺ Slave: the connected device is a master and MediaGateway-port itself is a slave
- ↺ Master: the connected device is a slave and MediaGateway's port itself is a master

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

Note: Both devices of one 100BASE-T1 link must use the same level, otherwise the link is not stable. FullOut is recommended.

Link quality: The "link quality" is an indicator about the signal integrity of the 100BASE-T1 link on this port. 1 = Poor, 5 = Excellent. For more information about link quality and its measurement, please contact Broadcom directly.

802.1AS mode:
Note: It is possible to activate but it is not working. It is only working when double tagging is set in Global Configuration.
For further information, please see Chapter 5 about 802.1AS and Chapter 3.6.3 for double VLAN tagging.

Test Mode: For 100BASE-T1 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.

Important: In the case of BroadR-Reach master, it is mandatory to restart the switch to recover link.

Note: For compliance testing an oscilloscope with special test software is necessary.

Drop ingress packets with…:
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Redirect packets to…: By defining an Ethernet port (or the SFP-slot) you can redirect packets with a specific destination IP address to this port, independent from any other configuration. It means, that the packet is not sent to the port it was originally supposed to be sent. This function is only available for IP layer.

3.6.2   Port Information while Single VLAN tagging is active

If IEEE 802.1q (VLAN) mode is hooked (see CHAPTER 3.5.1) but not double tagging, port based single VLAN is activated.
In this mode, the routing through the MediaGateway is defined by the configuration of each port.
Grey fields are not configurable and have standard values or no values.

3.6.2.1   Ethernet Port RJ-45

Figure 3-20: Details of the Ethernet Port RJ-45

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is single tagged with this value, if **not already** tagged. It is not overwriting VLAN-IDs.

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic is allowed to leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs.

VLANs to untag: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** (allowed) traffic is sent with no VLAN-tag anymore.

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.

☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.

☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored.

Note: this is only valid for one switch! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4 and then on S1-P5.

Speed: different speeds are available. By "Autonegotiation all Capable" autonegotiation is done. By the other settings, the speed is set, but master/slave is still autonegotiated.

Detected Speed: The possible speed between the MediaGateway and other devices is detected in this port.

Drop ingress packets with…:
Inner VLAN IDs: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. It is a filter for incoming traffic. Data with configured VLAN-ID will be dropped and not forwarded, when incoming on this port.
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:
Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded.

Note: This drop feature is only available if mirroring on this port is activated.

3.6.2.2 SFP module port
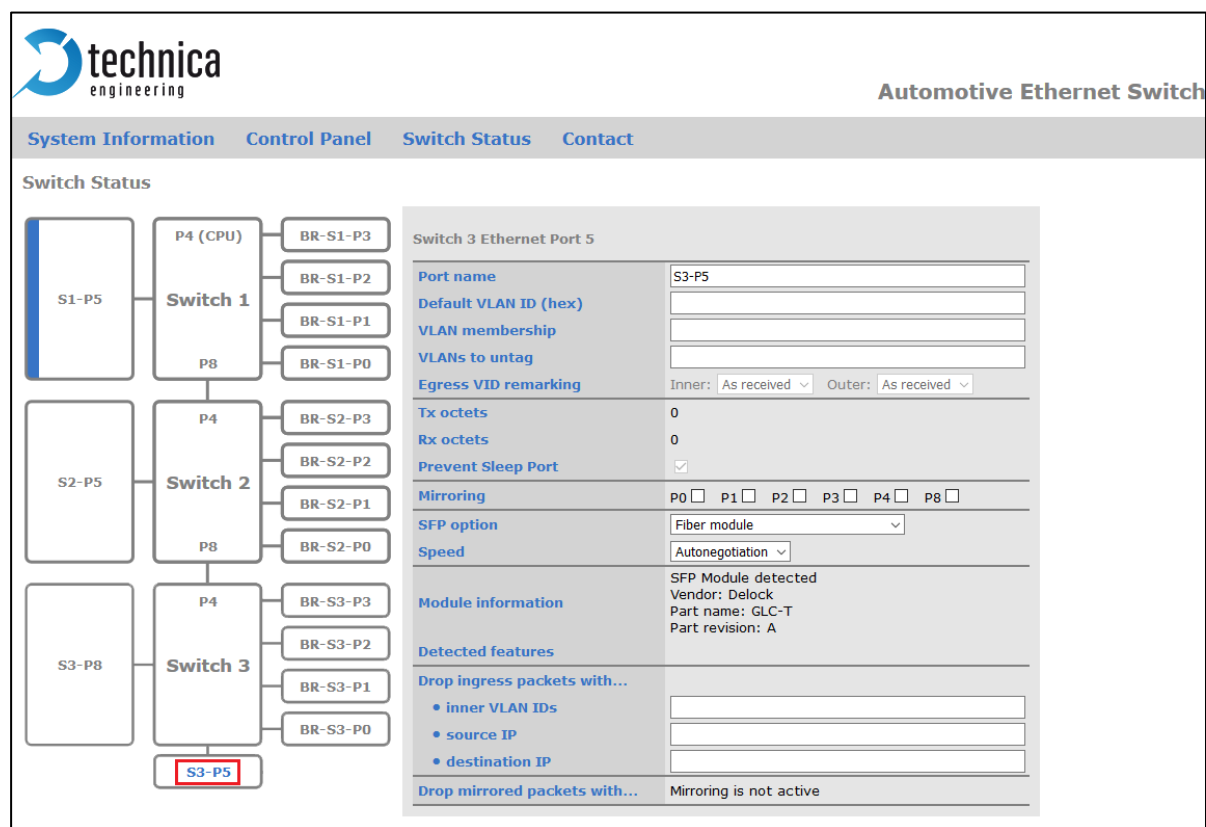
Figure 3-21: SFP Module Port

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is single tagged with this value, if **not already** tagged. It is not overwriting VLAN-IDs.

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic is allowed to leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs.

VLANs to untag: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** (allowed) traffic is sent with no VLAN-tag anymore.

Tx octets: decimal value of sent octets on this port.

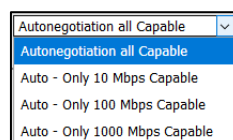Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.

- ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can go asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored

SFP option: Here must be chosen the correct SFP module if any is plugged in.

- ↻ **Fiber module**: please select this option for fiber optical SFP-modules.
- ↻ **RJ45 module**: please select this option for copper modules.
- ↻ **Base-T1 / BroadR-Reach® module**: please select this option for a BASE-T1 modules from Technica-Engineering GmbH

Speed: If no autonegotiation is not available, please select the speed of the SFP module 100BASE-T1 for 100Mbps and 1000BASE-T1 for 1000Mbps

BASE-T1 / BroadR-Reach® mode: please configure as slave if the connected device is master and the other way around. This is only visible, if a BASE-T1 SFP Module is used.

Module information: Based on selected SFP Module and detected hardware, different information about the SFP Module is displayed here.

Detected features: Based on selected SFP Module and detected hardware, different information about the features of the SFP Module is displayed here.
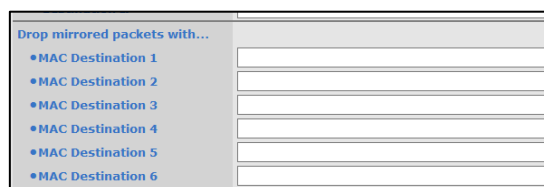
Drop ingress packets with…:

Inner VLAN IDs: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. It is a filter for incoming traffic. Data with configured VLAN-ID will be dropped and not forwarded, when incoming on this port.

Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.

Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:

Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Note: This drop feature is only available if mirroring on this port is activated

3.6.2.3   S1-P4 (CPU) and internal ports (P4 and P8)

Figure 3-22: CPU port and internal ports

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is single tagged with this value, if **not already** tagged. It is not overwriting VLAN-IDs.

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic is allowed to leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs.

VLANs to untag: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** (allowed) traffic is sent with no VLAN-tag anymore.

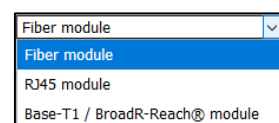**Tx octets**: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
- ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored

Note: this is only valid for one switch! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4 and then on S1-P5.

Drop ingress packets with…:
Inner VLAN IDs: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. It is a filter for incoming traffic. Data with configured VLAN-ID will be dropped and not forwarded, when incoming on this port.
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:
Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded.

Drop mirrored packets with…	
• MAC Destination 1	
• MAC Destination 2	
• MAC Destination 3	
• MAC Destination 4	
• MAC Destination 5	
• MAC Destination 6	

Note: This drop feature is only available if mirroring on this port is activated.
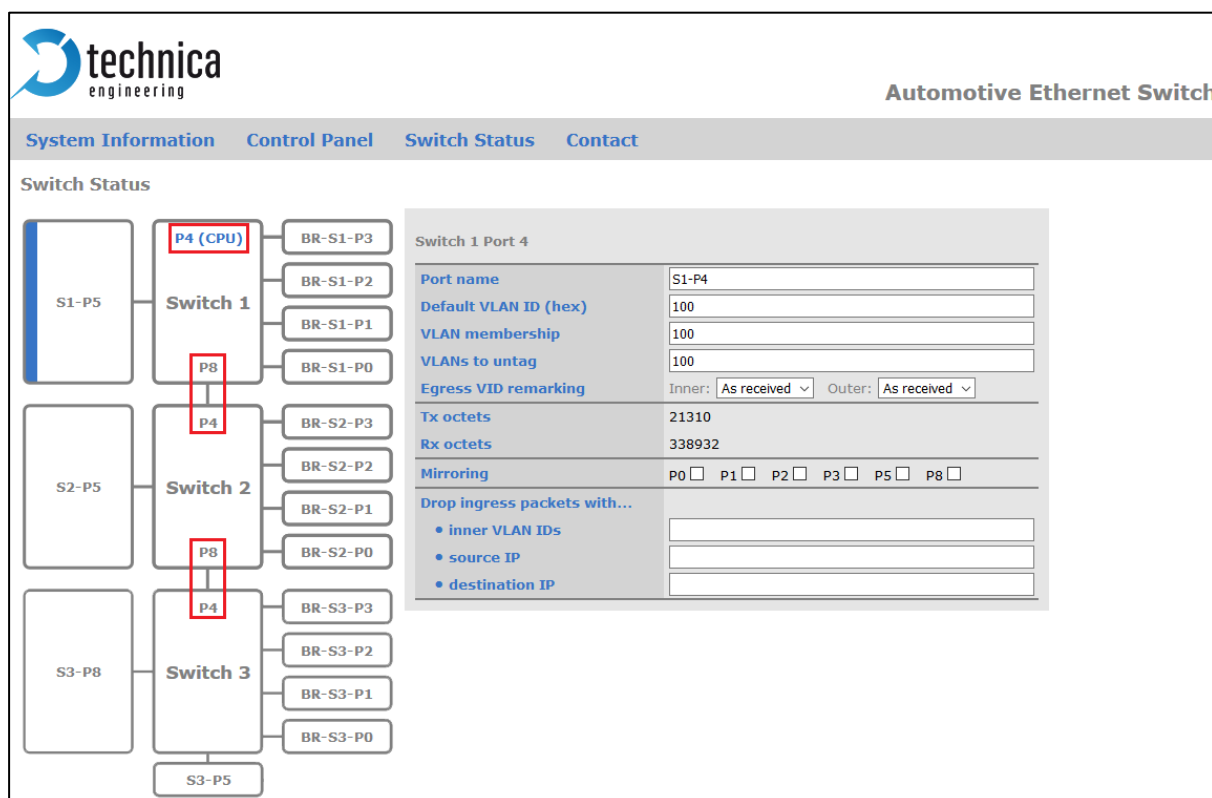
3.6.2.4 100BASE-T1 Ports

Figure 3-23: 100BASE-T1 Ports

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is single tagged with this value, if **not already** tagged. It is not overwriting VLAN-IDs.

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic is allowed to leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs.

VLANs to untag: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** (allowed) traffic is sent with no VLAN-tag anymore.

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.

- ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Enable port:

- ☑ port is active.
- ☐ this port is not active: Incoming data is not forwarded. And no outgoing traffic possible.

   Note: If there is a device connected to this port, link up can be shown by the LED even if this port is not enabled.

BroadR-Reach® mode: For the MediaGateway there is no autonegotiation on 100BASE-T1 Ports available.

- ↻ Slave: the connected device is a master and MediaGateway itself is a slave
- ↻ Master: the connected device is a slave and MediaGateway itself is a master

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

Note: Both devices of one 100BASE-T1 link must use the same level, otherwise the link is not stable. FullOut is recommended.

Link quality: The "link quality" is an indicator about the signal integrity of the 100BASE-T1 link on this port. 1 = Poor , 5 = Excellent. For more information about link quality and its measurement, please contact Broadcom directly.

802.1AS mode:
Note: It is possible to activate but it is only working when double tagging is set in Global Configuration.
For further information, please see CHAPTER 5 about 802.1AS and CHAPTER 3.6.3 for double VLAN-tagging.

Test Mode: For 100BASE-T1 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.

Important: In case to of BroadR-Reach Master, it is mandatory to restart the switch to recover link.

Note: For compliance testing an oscilloscope with special test software is necessary.

Drop ingress packets with…:
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
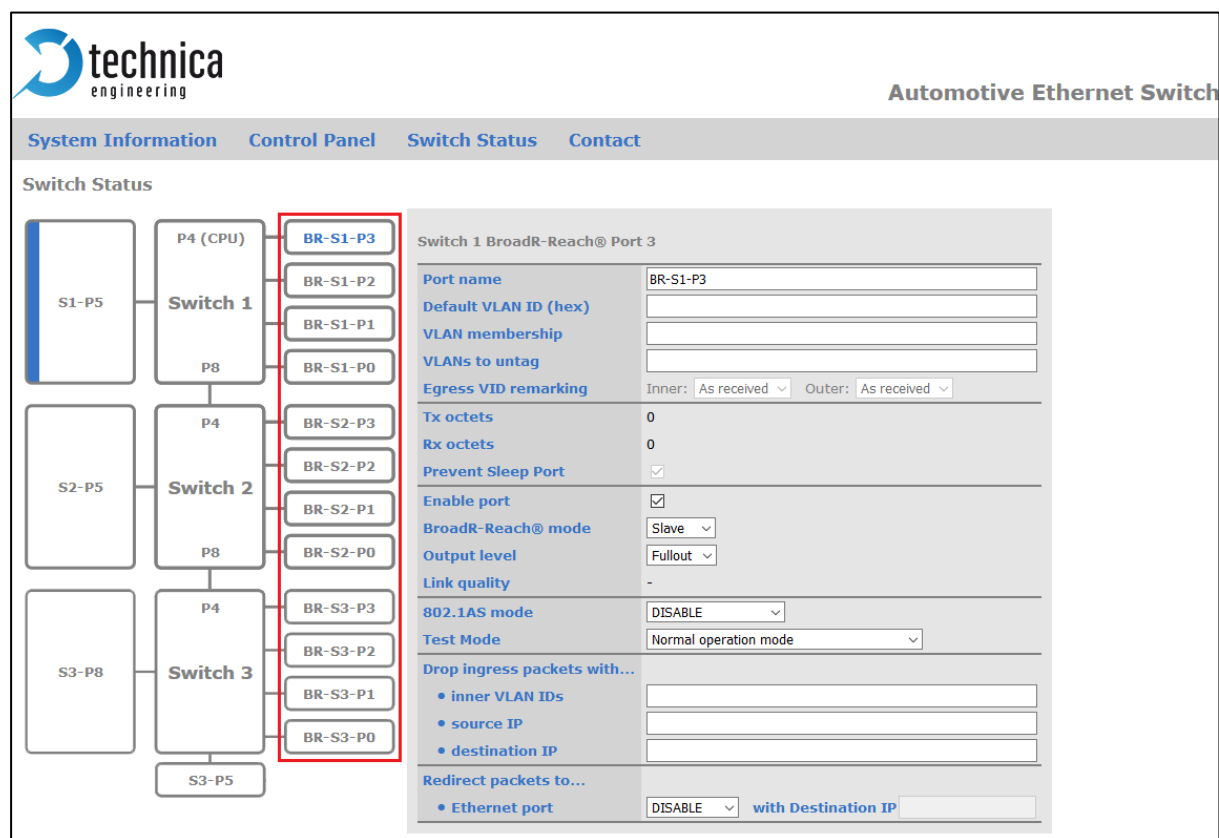Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Redirect packets to…: By defining an Ethernet port (or the SFP-slot) you can redirect packets with a specific destination IP address to this port, independent from any other configuration. It means that the packet is not sent to the port it was originally supposed to be sent. This function is only available for IP layer.

3.6.3　Port Information while Double VLAN tagging is active

IEEE 802.1q (VLAN) mode is hooked (see CHAPTER 3.5.1) and double tagging is hooked, too. In this mode, the routing through the MediaGateway is defined by the configuration of each port.
Grey fields are not configurable and have standard values or no values.

Note: This is the recommended use case of the MediaGateway. Networks in vehicles are often already single-tagged. In this use case you can prove the flexibility of the MediaGateway, being independent from single-tagged networks.

3.6.3.1 Ethernet Port RJ-45

Figure 3-24: Details of the Ethernet Port RJ-45

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is tagged with this value, if **NOT already** tagged! It is NOT overwriting VLAN-IDs. This rule is valid for **innerVLAN** and **outerVLAN**!

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined here separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic can leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs. **Only outerVLAN**s are checked!

Egress VID remarking: this must be defined for innerVLAN and outerVLAN separately. This adjustment is valid **only** for (allowed) **outgoing** traffic. Three different options are available:
- As received: a frame came in to the (current) switch on another port. This frame must leave on this port "as received" =>
    - leave with VLAN if received with VLAN on another port
    - leave without VLAN if received without VLAN on another port
- Remove: a frame leaves the **switch** on this port without the VLAN
- Normalized: a frame leaves the **switch** on this port with the VLAN

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
- ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored

Note: this is only valid for one switch! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4, then on S1-P5.

Speed: different speeds are available. By "Autonegotiation all Capable" autonegotiation is done. By the other settings, the speed is set, but master/slave is still autonegotiated.

Detected Speed: The possible speed between the MediaGateway and other devices is detected in this port.

Drop ingress packets with…:
Inner VLAN IDs: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. It is a filter for incoming traffic. Data with configured innerVLAN-ID will be dropped and not forwarded, when incoming on this port.
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:

Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Note: This feature is only available if mirroring on this port is activated

3.6.3.2 SFP module port

Figure 3-25: SFP Module Port

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is tagged with this value, if **NOT already** tagged. It is NOT overwriting VLAN-IDs. This rule is valid for **innerVLAN and outerVLAN**!

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined here separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic can leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs. **Only outerVLAN**s are checked!

Egress VID remarking: this must be defined for innerVLAN and outerVLAN separately. This adjustment is valid **only** for (allowed) **outgoing** traffic. Three different options are available:

- ↻ **As received**: a frame came in to the (current) switch on another port. This frame must leave on this port "as received" =>
  - o leave with VLAN if received with VLAN on another port
  - o leave without VLAN if received without VLAN on another port
- ↻ **Remove**: a frame leaves the **switch** on this port without the VLAN
- ↻ **Normalized**: a frame leaves the **switch** on this port with the VLAN

Tx octets: decimal value of sent octets on this port.

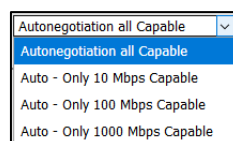**Rx octets**: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.

- ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored

SFP option: The correct SFP Module option has to be chosen, as long as there is any SFP Module plugged in.

Fiber module	⌄
Fiber module	
RJ45 module	
Base-T1 / BroadR-Reach® module	

- ↻ **Fiber module**: please select this option for fiber optical SFP-modules.
- ↻ **RJ45 module**: please select this option for copper modules.
- ↻ **Base-T1 / BroadR-Reach® module**: please select this option for a BASE-T1 modules from Technica-Engineering GmbH
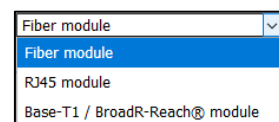
Base-T1 / BroadR-Reach® module: please select this option for a BASE-T1 modules

Speed: If autonegotiation is not available, please select the speed of the SFP module 100BASE-T1 for 100Mbit/s and 1000BASE-T1 for 1000Mbit/s

BASE-T1 / BroadR-Reach® mode: please configure as slave if the connected device is master and the other way around. This is only visible, if a BASE-T1 SFP Module is used.

Module information: Based on selected SFP Module and detected hardware, different information about the SFP Module is displayed here.

Detected features: Based on selected SFP Module and detected hardware, different information about the features of the SFP Module is displayed here.

Drop ingress packets with…:

Inner VLAN IDs: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. It is a filter for incoming traffic. Data with configured innerVLAN-ID will be dropped and not forwarded, when incoming on this port.

Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.

Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:

Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Drop mirrored packets with…	
● MAC Destination 1	
● MAC Destination 2	
● MAC Destination 3	
● MAC Destination 4	
● MAC Destination 5	
● MAC Destination 6	

Note: This drop feature is only available if mirroring on this port is activated

3.6.3.3   S1-P4 (CPU) and internal ports (P4 and P8)

Figure 3-26: CPU port and internal ports

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is tagged with this value, if **NOT already** tagged. It is NOT overwriting VLAN-IDs. This rule is valid for **innerVLAN and outerVLAN**!

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined here separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic can leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs. **Only outerVLAN**s are checked!

Egress VID remarking: this must be defined for innerVLAN and outerVLAN separately. This adjustment is valid **only** for (allowed) **outgoing** traffic. Three different options are available:
- As received: a frame came in to the (current) switch on another port. This frame must leave on this port "as received" =>
    - leave with VLAN if received with VLAN on another port
    - leave without VLAN if received without VLAN on another port
- Remove: a frame leaves the **switch** on this port without the VLAN

⟳ Normalized: a frame leaves the **switch** on this port with the VLAN

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
- ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
- ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Mirroring: On each switch only on port can be a mirroring port. Please select the ports to be mirrored.

Note: This is only valid for one switch! For example, if you want to mirror incoming traffic on S3-P3 to S1-P5, it is necessary to mirror the traffic on S3-P4, then S2-P4 and then on S1-P5.

Drop ingress packets with…:
Inner VLAN IDs: as many as wished values between 0x1 and 0xFFF can be defined separated by "," [E.g.: 100, 101, EDF, …]. It is a filter for incoming traffic. Data with configured innerVLAN-ID will be dropped and not forwarded, when incoming on this port.
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Drop mirrored packets with…:
Each field allows one MAC address. In total six MAC addresses can be configured. It is a filter for outgoing traffic. Data with configured MAC address as destination MAC address will be dropped and forwarded

Drop mirrored packets with…	
•MAC Destination 1	
•MAC Destination 2	
•MAC Destination 3	
•MAC Destination 4	
•MAC Destination 5	
•MAC Destination 6	

Note: This drop feature is only available if mirroring on this port is activated
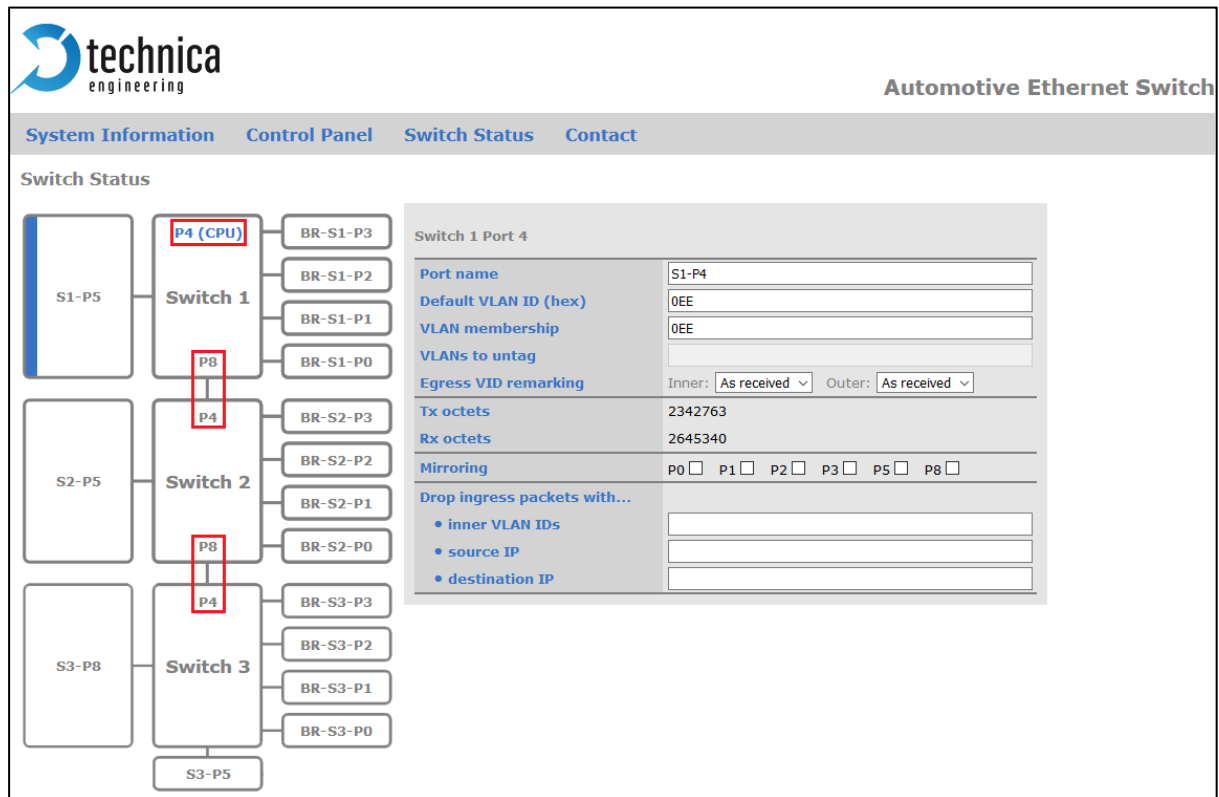
3.6.3.4 100BASE-T1 Ports
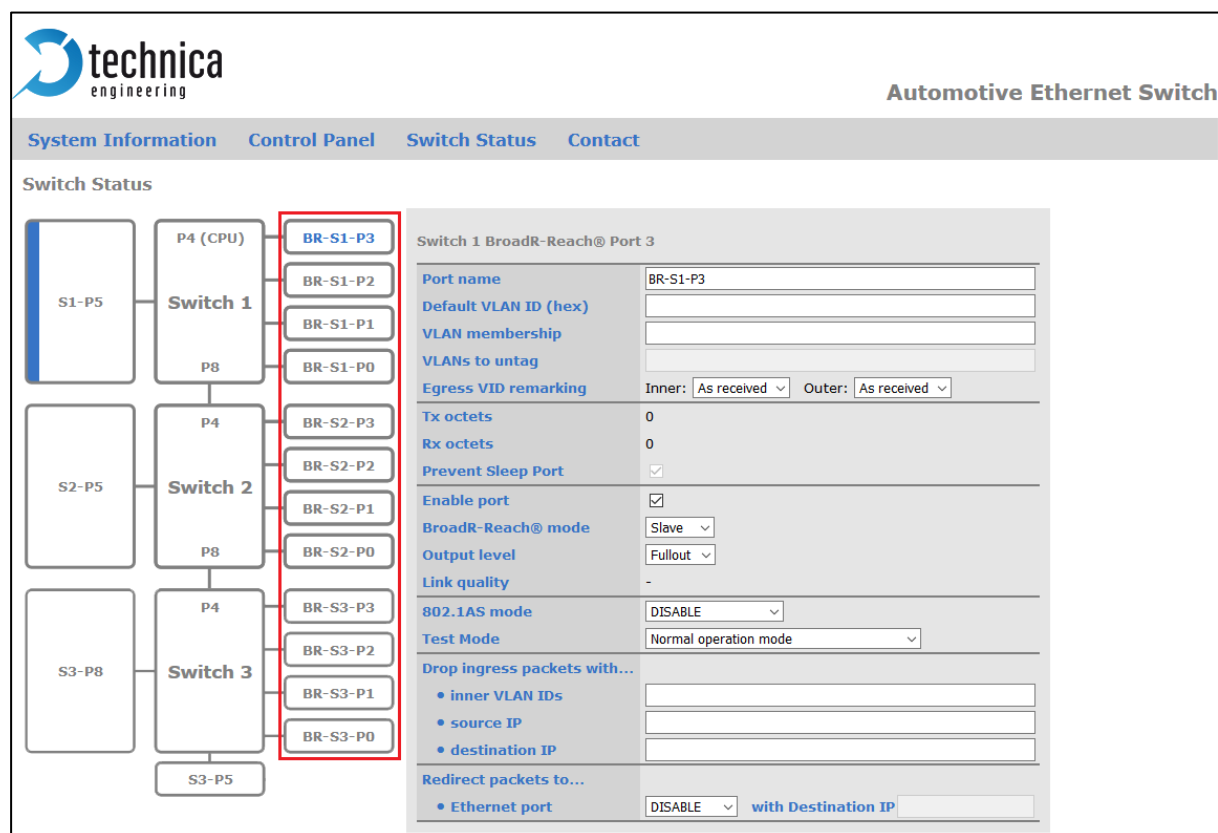
Figure 3-27: 100BASE-T1 Ports

Port name: Here you can change the Port Name

Default VLAN ID (hex): please define one hexadecimal value between 0x1 and 0xFFF. **Incoming** traffic is tagged with this value, if **NOT already** tagged! It is NOT overwriting VLAN-IDs. This rule is valid for **innerVLAN** and **outerVLAN**!

VLAN membership: as many as wished values between 0x1 and 0xFFF can be defined here separated by "," [E.g.: 100, 101, EDF, …]. **Outgoing** traffic can leave the switch on this port, if the data is tagged with one of the defined VLAN-IDs. **Only outerVLAN**s are checked!

Egress VID remarking: this must be defined for innerVLAN and outerVLAN separately. This adjustment is valid **only** for (allowed) **outgoing** traffic. Three different options are available:
- ↻ **As received**: a frame came in to the (current) switch on another port. This frame must leave on this port "as received" =>
  - ○ leave with VLAN if received with VLAN on another port
  - ○ leave without VLAN if received without VLAN on another port
- ↻ **Remove**: a frame leaves the **switch** on this port without the VLAN

⊃ Normalized: a frame leaves the **switch** on this port with the VLAN

Tx octets: decimal value of sent octets on this port.

Rx octets: decimal value of received octets on this port.

Prevent Sleep Port: This option is available if the function "Prevent sleep" on "Control panel" tab is deactivated.
  - ☑ This port is monitored: If there is incoming traffic on this port, the MediaGateway doesn't fall asleep.
  - ☐ This port is not monitored: The MediaGateway can fall asleep, even if there is incoming traffic on this port.

Enable port:
  - ☑ port is active.
  - ☐ this port is not active: Incoming data is not forwarded and no outgoing traffic possible.

    Note: If there is a device connected on this port, link up can be shown by the LED even if this port is not enabled.

BroadR-Reach® mode: For the MediaGateway there is no autonegotiation on 100BASE-T1 Ports available.
  ⊃ Slave: the connected device is a master and MediaGateway itself is a Slave
  ⊃ Master: the connected device is a Slave and MediaGateway itself is a Master

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

Note: Both devices of one 100BASE-T1 link must use the same level, otherwise the link is not stable. FullOut is recommended.

Link quality: The "link quality" is an indicator about the signal integrity of the 100BASE-T1 link on this port. 1 = Poor , 5 = Excellent. For more information about link quality and its measurement, please contact Broadcom directly.

802.1AS mode:
For each port following values can be set:
  ⊃ DISABLED: Port will not take part of any 802.1AS traffic
  ⊃ BRIDGEX_MASTER: Port will take part of 802.1AS network as PTP-Bridge-Master.
  ⊃ BRIDGEX_SLAVE: Only one Slave per BridgeX is allowed. MediaGateway will take part of 802.1AS network as PTP-BridgeX-Slave
  ⊃ MASTER_802.1AS: Port will work as 802.1AS Master Clock. Only one MasterClock per switch is possible.

For further information, please see CHAPTER 5.4

Test Mode: For 100BASE-T1 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: If a test mode has been selected there is no communication possible for this port.

Important: In case of BroadR-Reach Master test, it is mandatory to restart the switch to recover link.

Note: For compliance testing an oscilloscope with special test software is necessary.

Drop ingress packets with…:
Source IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as source IP address will be dropped and not forwarded, when incoming on this port.
Destination IP: one IP address can be configured here. It is a filter for incoming traffic. Data with configured IP address as destination IP address will be dropped and not forwarded.

Redirect packets to…: By defining an Ethernet port (or the SFP-slot) you can redirect packets with a specific destination IP address to this port, independent from any other configuration. It means that the packet is not sent to the port it was originally supposed to be sent. This function is only available for IP layer.

3.6.4   Important VLAN tagging rules

default VLAN ID:
- If tagging is activated, every frame which enters a switch on a specific port, is tagged by the VLAN ID which is configured in field default VLAN ID on this specific port.
- The MediaGateway does never overwrite any VLAN tags. It means a frame already tagged before entering a switch of the MediaGateway's switch doesn't change its VLAN tag.
- Both rules are valid for both VLAN tags and in both VLAN tagging modes (single/double).

VLAN membership
- This field is only checking **outgoing** traffic!
- In double-tagging mode:
  Only the **outer**VLAN tag is checked and compared to the VLAN ID list configured in this field for the specific port.

- In single-tagging mode:
  The (inner)VLAN tag is checked and compared to the VLAN ID list configured in this field for the specific port.
- If a port is membership of a specific VLAN ID, frames tagged with this VLAN ID (single Tagging) or only outerVLAN ID (double tagging) can leave the switch on this specific port.

egress VID remarking: (only double-tagging mode)
- This function affects only outgoing traffic
- remove means removing the inner/outer VLAN tag
- normalized is sending the frames with inner/outer VLAN tag
- as received is sending the frames as the frames came into the current switch. For example:
  Both egress VID remarking are set to as received
  The frame comes into switch 1 on port 3 (S1-P3) and has no outerVLAN-Tag but already an innerVLAN tag and should leave the Switch on port 8 (S1-P8). In this case the following will happen:
  - The frame gets the default VLAN id from port S1-P3 but only the outerVLAN-tag, the innerVLAN tag is already there.
  - VLAN-membership of S1-P8 has the same VLAN ID configured as the default VLAN-ID on S1-P3. => Frame will leave here the Switch 1
  - The frame will be sent from Switch 1 to Switch 2 with innerVLAN tag, because the frame had already the innerVLAN tag while entering the Switch 1
  - The frame will be sent from Switch 1 to Switch 2 without outerVLAN tag, because the frame had no outerVLAN tag while entering the Switch 1

Note: Please be aware, that the internal ports P4/P8 between the switches must be handled the same as all other ports. That means: if you want to send data from one switch to the other, you have to be aware about the egress VID remarking, especially for the outerVLAN tag if you need this tag in the next switch!
⇨ If frames leave on S1-P8 the switch, VLAN tags will be removed or not, dependent from the configuration of the egress VID remarking. They enter on S2-P4 the next switch and will be tagged following the tagging rules for incoming traffic
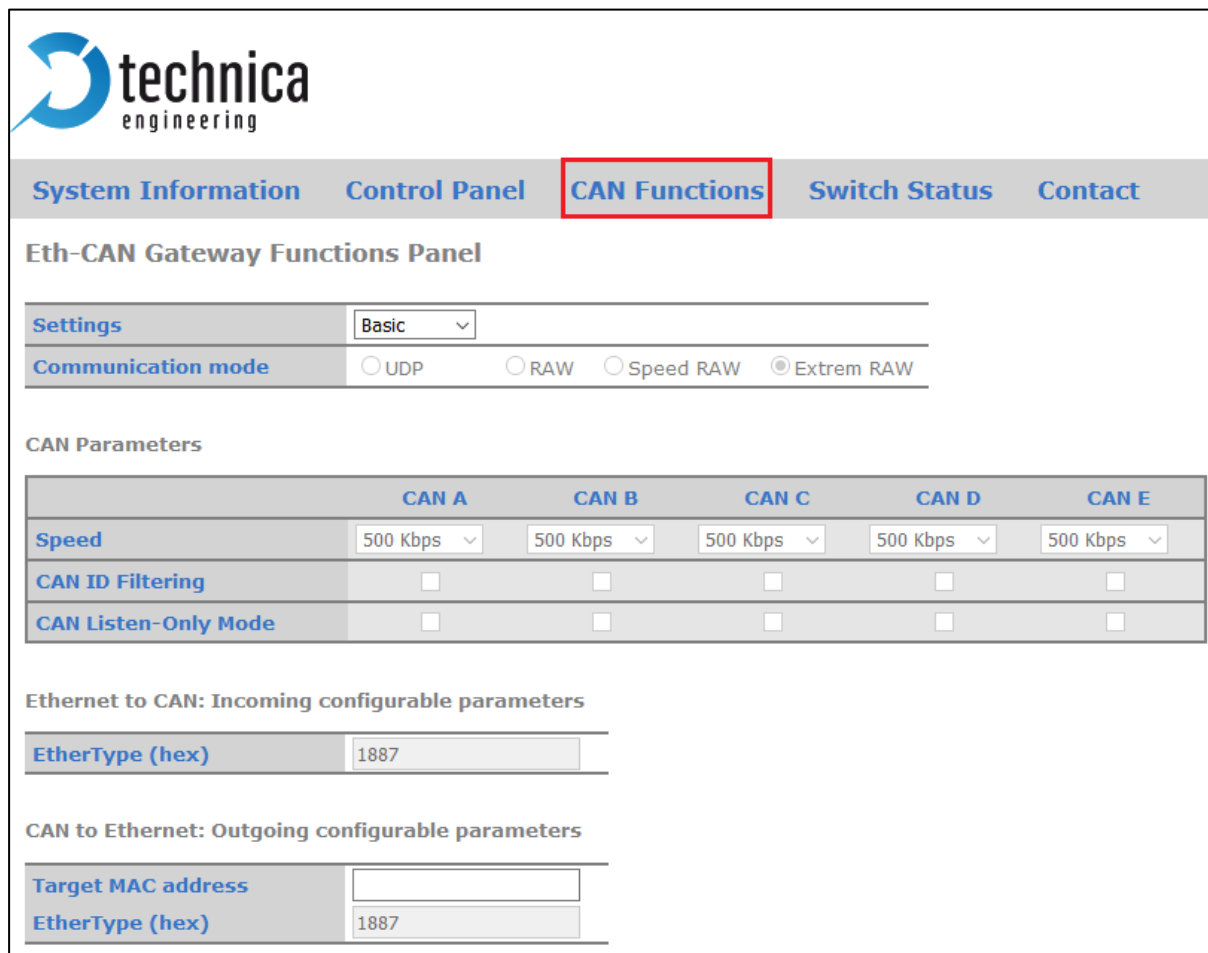
3.7 CAN Gateway

Note: The CAN Gateway is in the Microcontroller (CPU). The Switch 1 has to be configured in a way that the microcontroller has still a connection to your PC.

Note: The CAN Gateway is not able to work with CAN-FD.

The Ethernet CAN gateway can be configured using the webserver. Its properties can be set on the CAN Functions Tab. The following picture shows this tab.

Figure 3-28: CAN Gateway Tab

Settings:
Here you can select the main settings of the CAN Gateway.
- Basic
- Advanced.

Communication Mode:
Only in Advanced Settings a Communication mode can be selected.
Extreme Raw is the highest performant mode. UDP is less performant. UDP makes more sense for low communication load due to easy configuration.
Communication mode in basic settings is not selectable. Please change into advanced settings for changing the communication mode. After choosing the communication mode please change back to the Basic settings.
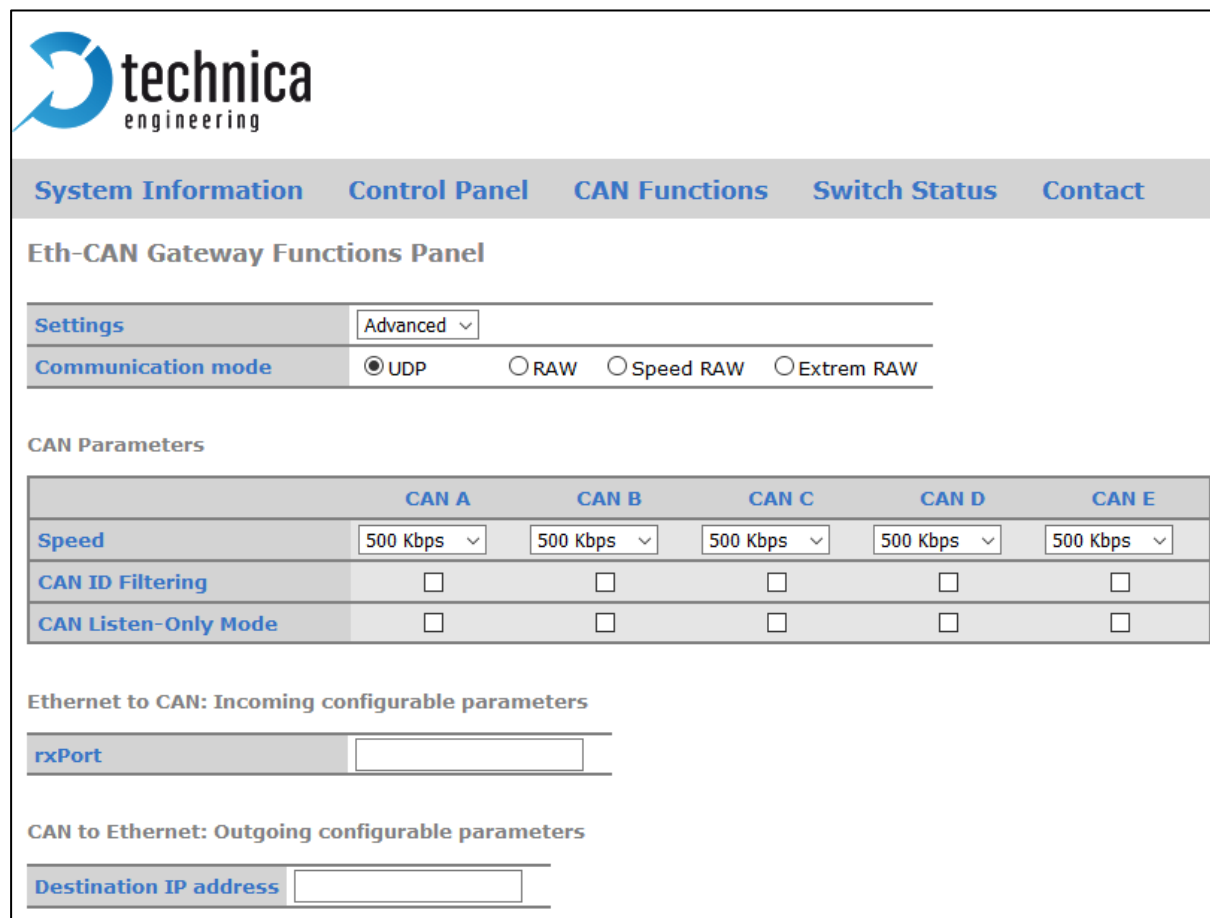
3.7.1 Communication mode: UDP

Using this mode, the CAN Gateway can be configured by setting target IP Address and the port of the UDP packets. Non-valid entries will not be accepted and will be replaced by default values. If the target IP address or the rxPort have set the default value the CAN Gateway will be disabled.
Here you can see an overview about the configuration board for the UDP mode.

Figure 3-29: Overview CAN Gateway settings in UDP-mode

CAN Parameters:
(only in advanced mode available)

Speed: For each CAN channel the correct speed must be selected (CAN-FD is not available.)
Following kilo baud per second are available:
- 125Kbps
- 500Kbps
- 1000Kbps

CAN ID Filtering: Please select the CAN channels by checking the box. Then you can adjust CAN ID Filtering.

For each selected CAN channel there appears a line where the CAN IDs must be put in. Values are in hexadecimal and are separated by a comma.

CAN Parameters					
	CAN A	CAN B	CAN C	CAN D	CAN E
Speed	500 Kbps ∨	125 Kbps ∨	1000 Kbps ∨	1000 Kbps ∨	500 Kbps ∨
CAN ID Filtering	☑	☑	☐	☑	☐
CAN Listen-Only Mode	☐	☐	☐	☐	☐
CAN IDs for CAN A	123,200,EDF				
CAN IDs for CAN B	123,ACF				
CAN IDs for CAN D	300				

Figure 3-30: CAN Parameters

CAN Listen-Only Mode: By checking the box, Listen-Only mode is active for the selected CAN channel. Listen-Only means no acknowledge is done for CAN messages on this bus by the MediaGateway. In deactivated Listen-Only Mode, the MediaGateway acknowledges every message on the CAN channel. This is necessary if there is no other communication partner for the CAN messages.

Ethernet to CAN: Incoming configurable parameters:

rxPort: The MediaGateway will wait for UDP-CAN packets on selected UPD port. Please select a non-reserved port number.

CAN to Ethernet: Outgoing configurable parameters:

Destination IP address: Here the target IP address for the UDP packets can be entered in dot-decimal notation. The default IP address is 255.255.255.255.
Received CAN messages will be sent to Destination IP and the destination port set on rxPort.
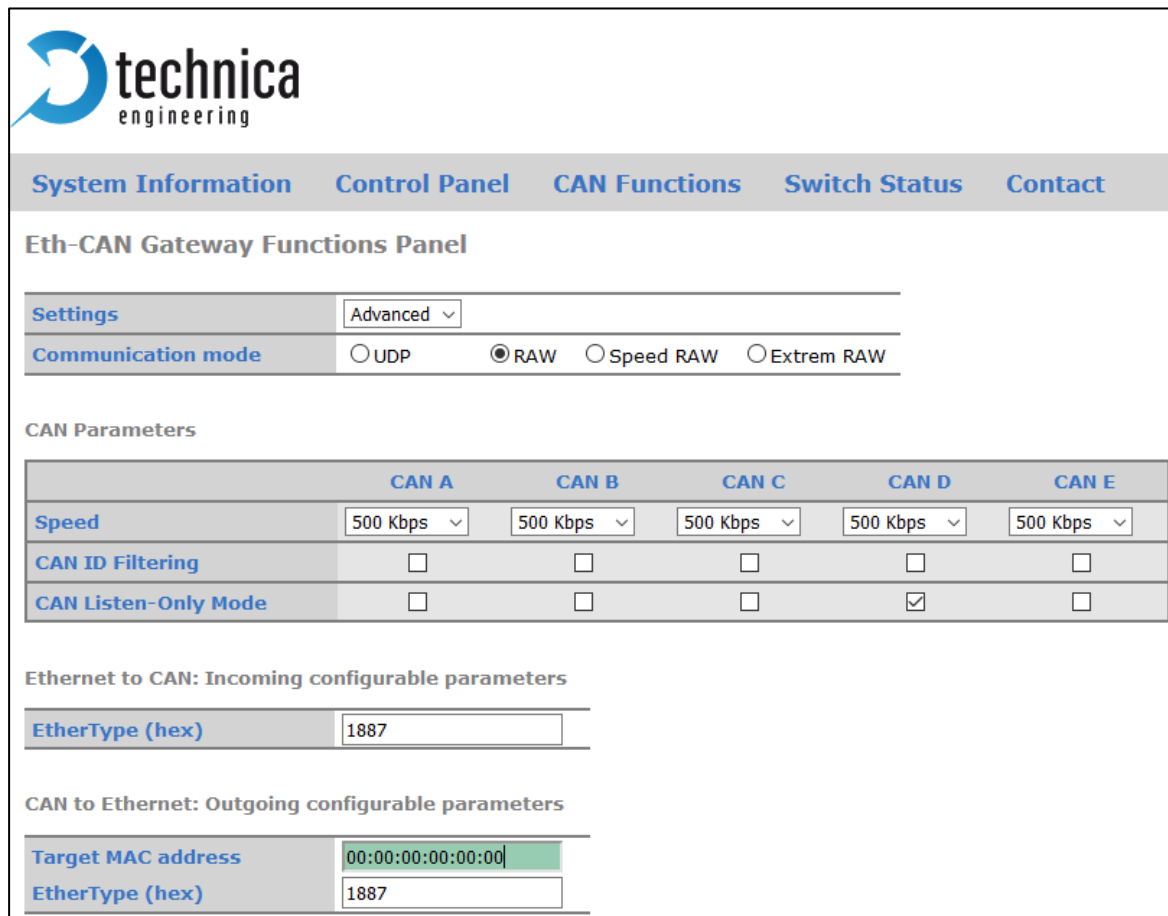
Ethernet to CAN: Incoming configurable parameters	
rxPort	1024

CAN to Ethernet: Outgoing configurable parameters	
Destination IP address	192.168.0.10

Figure 3-31: CAN-Eth-Gateway configurable parameters

3.7.2 Communication mode: Raw

Using this mode, the CAN Gateway can be configured by setting target MAC Address and the EtherType of the RAW packets. Non-valid entries will not be accepted and will be replaced by default values. If the target MAC address or the EtherType has the default value set, the Ethernet CAN Gateway will be disabled.
Here you can see an overview about the configuration board for the RAW mode.

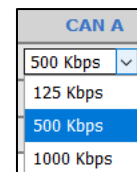*Figure 3-32: Overview CAN Gateway settings in RAW mode*

CAN Parameters:
(only in advanced mode available)

Speed: For each CAN channel the correct speed must be selected (CAN-FD is not available.)
Following kilo baud per second are available:
- 125Kbps
- 500Kbps
- 1000Kbps

CAN ID Filtering: Please select the CAN channels by checking the box. Then you can adjust CAN ID Filtering.

For each selected CAN channel there appears a line where the CAN IDs must be put in. Values are in hexadecimal and are separated by a comma.

CAN Parameters

	CAN A	CAN B	CAN C	CAN D	CAN E
Speed	500 Kbps ⌄	125 Kbps ⌄	1000 Kbps ⌄	1000 Kbps ⌄	500 Kbps ⌄
CAN ID Filtering	☑	☑	☐	☑	☐
CAN Listen-Only Mode	☐	☐	☐	☐	☐
CAN IDs for CAN A	123,200,EDF				
CAN IDs for CAN B	123,ACF				
CAN IDs for CAN D	300				

Figure 3-33: CAN Parameters

CAN Listen-Only Mode: By checking the box, Listen-Only mode is active for the selected CAN channel. Listen-Only means no acknowledge is done for CAN messages on this bus by the MediaGateway. In deactivated Listen-Only Mode, the MediaGateway acknowledges every message on the CAN channel. This is necessary if there is no other communication partner for the CAN messages.

Ethernet to CAN: Incoming configurable parameters:

EtherType (hex): The EtherType is a two bytes hexadecimal number. The EtherType field can accept any value between 0 and FFFF.

CAN to Ethernet: Outgoing configurable parameters:

Target MAC address: Target MAC address must respect the usual format (a sequence of six hexadecimal numbers having two bytes size each, separated by a colon) xx:xx:xx:xx:xx:xx. Note that entering Broadcast MAC address FF:FF:FF:FF:FF:FF as Target MAC address will cause sending time stamps frames to be disabled

EtherType (hex): The EtherType is a two bytes hexadecimal number. The EtherType field can accept any value between 0 and FFFF.

Figure 3-34: CAN-Eth-Gateway configurable parameters

3.7.3 Communication mode: Speed RAW

Using this mode, the CAN Gateway can be configured by setting target MAC Address and the EtherType of the RAW packets. Non-valid entries will not be accepted and will be replaced by default values. If the target MAC address or the EtherType has the default value set, the Ethernet CAN Gateway will be disabled.
Here you can see an overview about the configuration board for the Speed RAW mode.

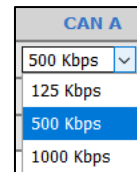Figure 3-35: Overview CAN Gateway settings in Speed RAW mode

CAN Parameters:
(only in advanced mode available)

Speed: For each CAN channel the correct speed must be selected (CAN-FD is not available.)
Following kilo baud per second are available:
- ↺ 125Kbps
- ↺ 500Kbps
- ↺ 1000Kbps

CAN ID Filtering: Please select the CAN channels by checking the box. Then you can adjust CAN ID Filtering.
For each selected CAN channel there appears a line where the CAN IDs must be put in. Values are in hexadecimal and are separated by a comma.

CAN Parameters	CAN A	CAN B	CAN C	CAN D	CAN E
Speed	500 Kbps	125 Kbps	1000 Kbps	1000 Kbps	500 Kbps
CAN ID Filtering	☑	☑	☐	☑	☐
CAN Listen-Only Mode	☐	☐	☐	☐	☐
CAN IDs for CAN A	123,200,EDF				
CAN IDs for CAN B	123,ACF				
CAN IDs for CAN D	300				

Figure 3-36: CAN Parameters

CAN Listen-Only Mode: By checking the box, Listen-Only mode is active for the selected CAN channel. Listen-Only means no acknowledge is done for CAN messages on this bus by the MediaGateway. In deactivated Listen-Only Mode, the MediaGateway acknowledges every message on the CAN channel. This is necessary if there is no other communication partner for the CAN messages.

Ethernet to CAN: Incoming configurable parameters:

EtherType (hex): The EtherType is fixed to value 0x1886. No change possible.

CAN to Ethernet: Outgoing configurable parameters:

Target MAC address: Target MAC address must respect the usual format (a sequence of six hexadecimal numbers having two bytes size each, separated by a colon) xx:xx:xx:xx:xx:xx. Note that entering Broadcast MAC address FF:FF:FF:FF:FF:FF as Target MAC address will cause sending time stamps frames to be disabled

EtherType (hex): The EtherType is a two bytes hexadecimal number. The EtherType field can accept any value between 0 and FFFF.
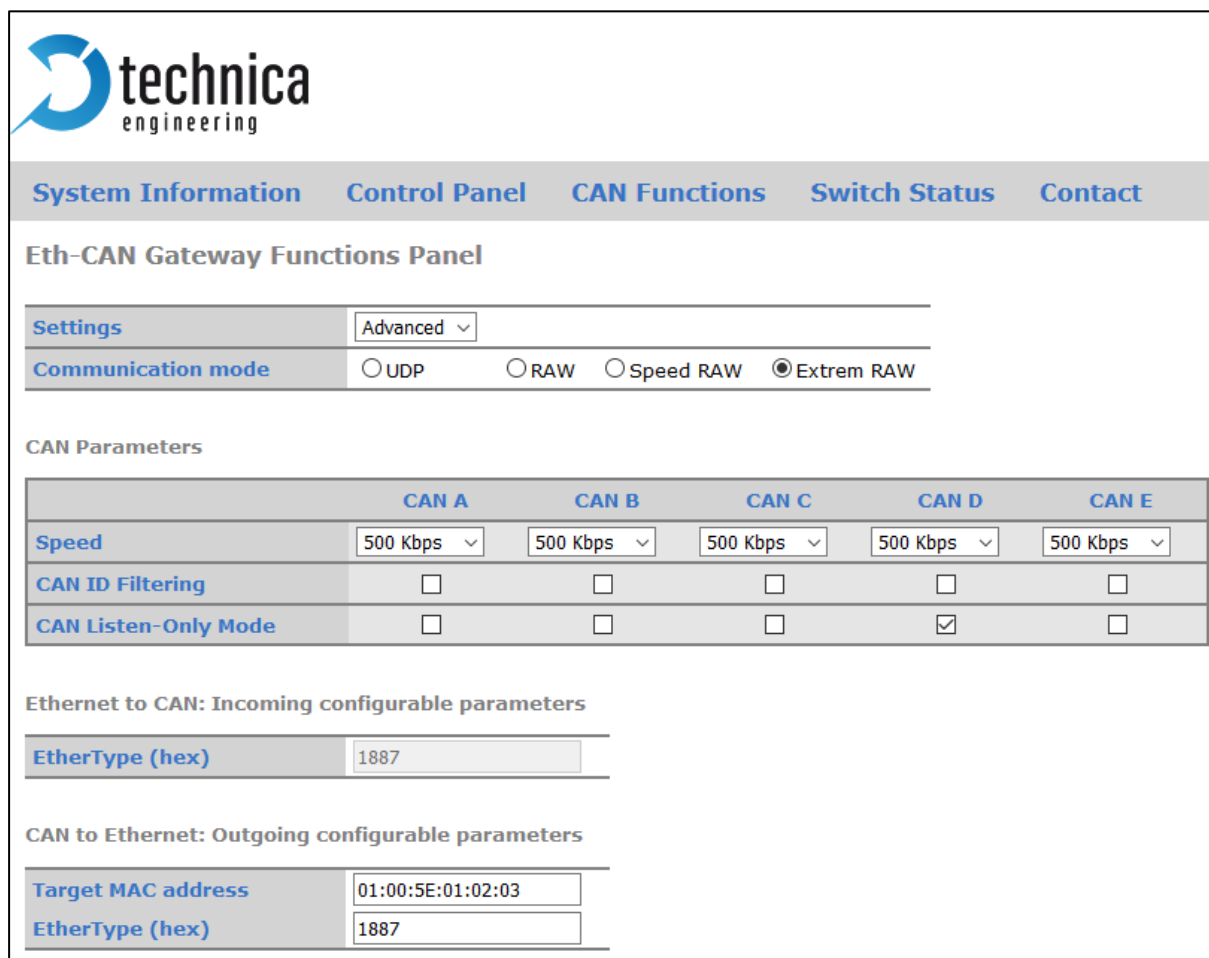
Ethernet to CAN: Incoming configurable parameters	
EtherType (hex)	1886

CAN to Ethernet: Outgoing configurable parameters	
Target MAC address	01:00:5E:01:02:03
EtherType (hex)	1886

Figure 3-37: CAN-Eth-Gateway configurable parameters

3.7.4   Communication mode: Extreme RAW

Using this mode, the CAN Gateway can be configured by setting target MAC Address and the EtherType of the RAW packets. Non-valid entries will not be accepted and will be replaced by default values. If the target MAC address or the EtherType has the default value set, the Ethernet CAN Gateway will be disabled.
Here you can see an overview about the configuration board for the Extreme RAW mode.

Figure 3-38: Overview CAN Gateway settings in Extreme RAW mode

CAN Parameters:
(only in advanced mode available)

Speed: For each CAN channel the correct speed must be selected (CAN-FD is not available.)
Following kilo baud per second are available:

- 125Kbps
- 500Kbps
- 1000Kbps

CAN ID Filtering: Please select the CAN channels by checking the box. Then you can adjust CAN ID Filtering.
For each selected CAN channel there appears a line where the CAN IDs must be put in. Values are in hexadecimal and are separated by a comma.

Figure 3-39: CAN Parameters

CAN Listen-Only Mode: By checking the box, Listen-Only mode is active for the selected CAN channel. Listen-Only means no acknowledge is done for CAN messages on this bus by the MediaGateway. In deactivated Listen-Only Mode, the MediaGateway acknowledges every message on the CAN channel. This is necessary if there is no other communication partner for the CAN messages.

Ethernet to CAN: Incoming configurable parameters:

EtherType (hex): The EtherType is fixed to value 0x1887. No change possible.

CAN to Ethernet: Outgoing configurable parameters:

Target MAC address: Target MAC address must respect the usual format (a sequence of six hexadecimal numbers having two bytes size each, separated by a colon) xx: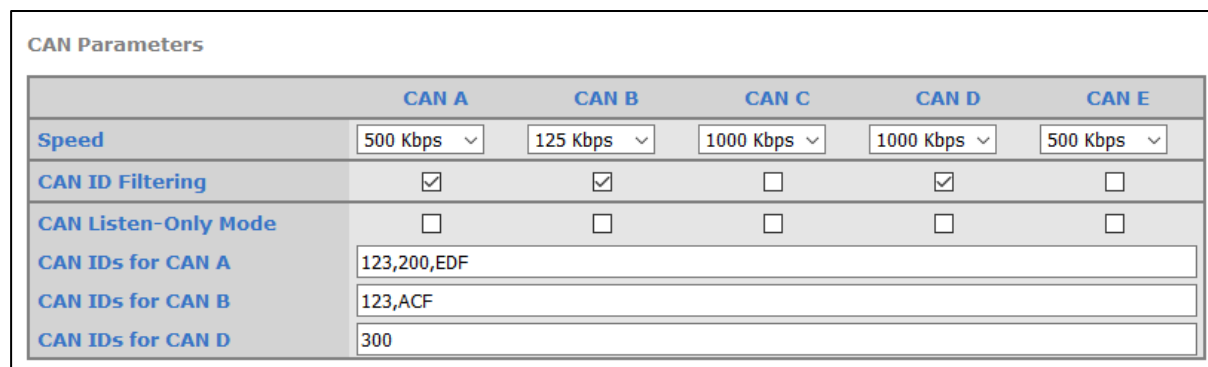xx:xx:xx:xx:xx. Note that entering Broadcast MAC address FF:FF:FF:FF:FF:FF as Target MAC address will cause sending time stamps frames to be disabled

EtherType (hex): The EtherType is a two bytes hexadecimal number. The EtherType field can accept any value between 0 and FFFF.

Figure 3-40: CAN-Eth-Gateway configurable parameters

3.7.5 Difference between all RAW modes

- ⟳ Speed RAW is faster than RAW. Incoming Ethernet RAW frames are fixed to EtherType: 0x1886
- ⟳ Extreme RAW is the fastest mode. It is only accepting RAW Frames with EtherType 0x1887

3.7.6 Structure of a CAN⇔Ethernet packet

3.7.6.1 Structure of UDP-Packet

Ethernet Header (14 Bytes)	IP Header (20 Bytes) Destination IP Address (4 Bytes)	UDP Header (8 Bytes) UDP Destination Port (2 Bytes)	Payload (CAN packet) (17 Bytes)

Table 3-2: Structure of UDP packet

The blue text modules are configurable by the user on CAN Function Tab

3.7.6.2 Structure of RAW-Packet

Destination MAC address (6 Bytes)	Source MAC address (6 Bytes)	EtherType (2 Bytes)	Payload (CAN packet) (17 Bytes)

Table 3-3: Structure of UDP packet

The blue text modules are configurable by the user on CAN Function Tab

3.7.6.3 Structure of Payload from the UDP or RAW ethernet frame

The CAN packet is the payload of the UDP frame or RAW ethernet frame. The following tables show the structure of this payload:

8 Byte							
1	2	3	4	5	6	7	8
Version	CAN Channel	ID				ID type	Frame type
DLC	D0	D1	D2	D3	D4	D5	D6
D7							

Table 3-4: Payload of CAN/Ethernet Packet

Field Name	Data Type	Description
Version	UINT8	Version of the CAN/Ethernet Packet type. It is always 1 for this type of CAN/Ethernet packet.
CAN channel	UINT8	1: CAN A 2: CAN B 3: CAN C 4: CAN D 5: CAN E
ID	UINT32	CAN ID for standard or extended frame format
ID type	UINT8	0 for 11bit standard ID 1 for 29bit extended ID
Frame type	UINT8	0 for CAN data frame 1 for CAN remote transmission request
DLC	UINT8	Payload length of the CAN packet
D0 to D7	up to UINT64	Payload

Table 3-5: Detailed Information about Payload of CAN/Ethernet Packet

4 Configuration Examples

Note: Best practise is using double tagging, because a lot of systems have already single tagged communication. For the routing through the MediaGateway a further level is needed, and this is done by the double tag.

Note: It makes sense to configure the configuration port first. The connection between a PC and the MediaGateway for access to the webserver on the microcontroller is the same as any other connection through the MediaGateway. => S1-P4 to PC-port must be configured.

4.1 Logging communication between two DUTs

The picture shows a standard use case for logging the communication between 2 devices (e.g. ECUs). The line between DUT_1 and DUT_2 must be cut in two pieces and reconnected by the MediaGateway. The RJ-45 port in the middle is for logging the communication between these two DUTs and the very left RJ-45 Port is for configuration of the MediaGateway.

It is recommended to use double tagging, especially if the logged network is already working with singleVLAN tags.
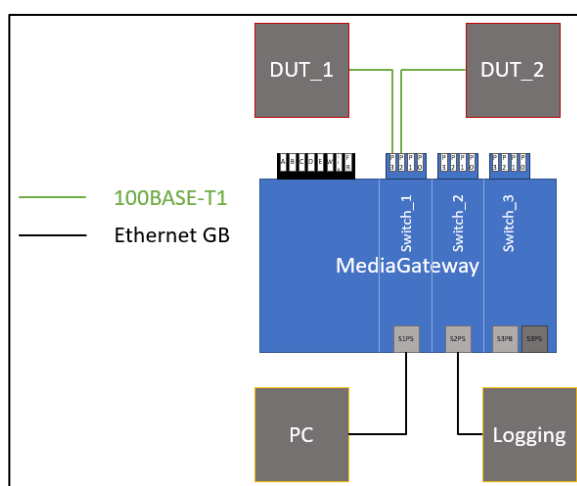
Figure 4-1: Example for logging 2 DUTs

Steps to configure your MediaGateway:

- Take a MediaGateway in default configuration. For resetting the MediaGateway, please see CHAPTER 2.2.2

- Connect all devices as shown in the picture, for configuration at least the PC is necessary.

- Don'tforget the power supply for the MediaGateway and don't forget to configure your network adapter (See CHAPTER 3.1)

- Open a web browser and type 192.168.0.49

- click Switch Status tab

- activate IEEE 802.1q (VLAN) mode and double tagging

IEEE 802.1q (VLAN) mode	☑
Double tagging	☑
Double tagging TPID (hex)	9100

↻ go to the port (S1-) P4 (CPU)

↻ set default VLAN ID to e.g. 0xEE
now every frame incoming to Switch_1 on S1-P4 is tagged with VLAN ID (if not already tagged). => The Microcontroller is not part of Switch_1, so the frames coming from the Microcontroller are tagged with this VLAN ID (innerVLANs and outerVLANs).

Port name	S1-P4
Default VLAN ID (hex)	0EE
VLAN membership	
VLANs to untag	
Egress VID remarking	Inner: As received ∨ Outer: As received ∨

↻ Go to the port S1-P5

↻ set VLAN membership to the same as the default VLAN ID from Port P4 (CPU)
now frames incoming on S1-P4 can leave on this port the Switch_1

Port name	S1-P5
Default VLAN ID (hex)	
VLAN membership	0EE
VLANs to untag	
Egress VID remarking	Inner: As received ∨ Outer: As received ∨

↻ do the same for the other direction with e.g. 0xDD as VLAN-ID:

Port name	S1-P5
Default VLAN ID (hex)	0DD
VLAN membership	0EE
VLANs to untag	
Egress VID remarking	Inner: As received ∨ Outer: As received ∨

And

Port name	S1-P4
Default VLAN ID (hex)	0EE
VLAN membership	0DD
VLANs to untag	
Egress VID remarking	Inner: As received ∨ Outer: As received ∨

↻ do a save

Save configuration	Restart after saving ☑

↻ if you have still access the S1-P5 is as configuration-port defined

⟳ Now do the same for the connection between DUT_1 and DUT_2

Port name	BR-S1-P3
Default VLAN ID (hex)	013
VLAN membership	012
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Remove

And

Port name	BR-S1-P2
Default VLAN ID (hex)	012
VLAN membership	013
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Remove

⟳ Please check for both ports the BroadR-Reach® mode (Master/Slave). According to your DUT_1, S1-P3 has to be the opposite and according to DUT_2, S1-P2 has to be the opposite, too.

BroadR-Reach® mode	Slave	or	BroadR-Reach® mode	Master

⟳ The connection between DUT_1 and DUT_2 is established and both DUTs should be able to talk to each other (if you do a save with restart now)

⟳ To get the data logged on port S2-P5, mirroring on S1-P8 must be activated and also on S2-P5.

Port name	S1-P8
Default VLAN ID (hex)	
VLAN membership	
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Normalized
Tx octets	9112
Rx octets	0
Mirroring	P0☐ P1☐ P2☑ P3☑ P4☐ P5☐

And

Port name	S2-P5
Default VLAN ID (hex)	
VLAN membership	
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Normalized
Tx octets	0
Rx octets	0
Prevent Sleep Port	☑
Mirroring	P0☐ P1☐ P2☐ P3☐ P4☑ P8☐

⟳ The Egress VID remarking for outer VLANs is normalized. It means thatyou can find the configured VLAN tags on logged data for easy filtering of the data by ports.
A VLAN membership is not necessary because of the mirroring.
InnerVLAN IDs are not touched by this configuration. It doesn't matter if the original data has singleVLAN tags or not (egress VID remarking is "As received")

⟳ Do a save

Save configuration	Restart after saving ☑

4.2 Get access by third communication partner

Now we try to get access by a third communication partner on the "Inject"-Port (S3-P8) to the DUT_2.
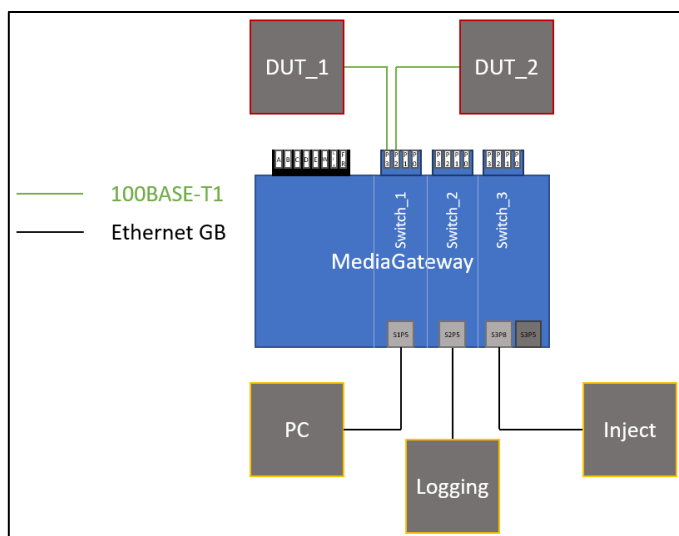
Figure 4-2: Example for inject

Steps to configure your MediaGateway:

○ Take your MediaGateway and configure it like the example before ([4.1](#)).

○ Go to port S3-P8

○ Set default VLAN ID e.g. 0x38 and set the VLAN membership to the default VLAN ID of the connected port, in this case 0x12. As your Inject-device probably will not work with outerVLAN tags, set Egress VID remarking for outerVLANs to remove

Port name	S3-P8
Default VLAN ID (hex)	038
VLAN membership	012
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Remove

○ Port S3-P4 and S2-P4 must forward the data from S3-P8 to Port S1-P2. They should not touch the already configured outerVLAN Tag. => set VLAN membership to 0x38 and set Egress VID remarking for outerVLAN tags to Normalized.

Port name	S3-P4
Default VLAN ID (hex)	
VLAN membership	038
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Normalized

And

Port name	S2-P4
Default VLAN ID (hex)	
VLAN membership	38
VLANs to untag	
Egress VID remarking	Inner: As received Outer: Normalized

↻ The same other way around: S1-P8 and S2-P8 must forward the data from S1-P2 to S3-P8 without touching the outerVLAN tag => set VLAN membership to 0x12 and set Egress VID remarking for outerVLAN tags to Normalized.

Port name	S1-P8
Default VLAN ID (hex)	
VLAN membership	12
VLANs to untag	
Egress VID remarking	Inner: As received ⌄ Outer: Normalized ⌄

And

Port name	S2-P8
Default VLAN ID (hex)	
VLAN membership	12
VLANs to untag	
Egress VID remarking	Inner: As received ⌄ Outer: Normalized ⌄

↻ Do a save

Save configuration	Restart after saving ☑

↻ Now you have access on the "Inject"-Port by any other device to the DUT_2 in our example.

5 PTP AND 802.1AS in the MediaGateway

This chapter explains the current support of the MediaGateway for 802.1AS protocol.

802.1AS is a protocol used between two or more devices to synchronize all of them through an Ethernet communication. This synchronization allows two or more devices (one master and one or multiple slaves) to transmit/receive time-critical information as audio or video through a physical link and assures that all the devices will handle the same time reference to encode/decode correctly the information.

This special software allows to maintain the synchronization between the 802.1AS connected devices, receiving, modifying and creating new corrected packets for the 802.1AS protocol, correcting so the possible delays generated for the routing through the Switch and the propagation delays of the cables.

5.1 Protocol

The software allows MediaGateway to be converted in a time-aware system bridge, which implements the transport of time-synchronization information and also the mechanism for the measurement of the propagation delay.

5.2 Transport of time-synchronization information

For the reference case where this communication is established only between two devices, „Time-aware system i-1" configured as 802.1as master and „Time-aware system i+1" configured as slave, the ports of the MediaGateway („Time-aware system I") implement additionally then, in addition, the respective opposite sides of the communication, one slave port and one master port, as shown in the next image.
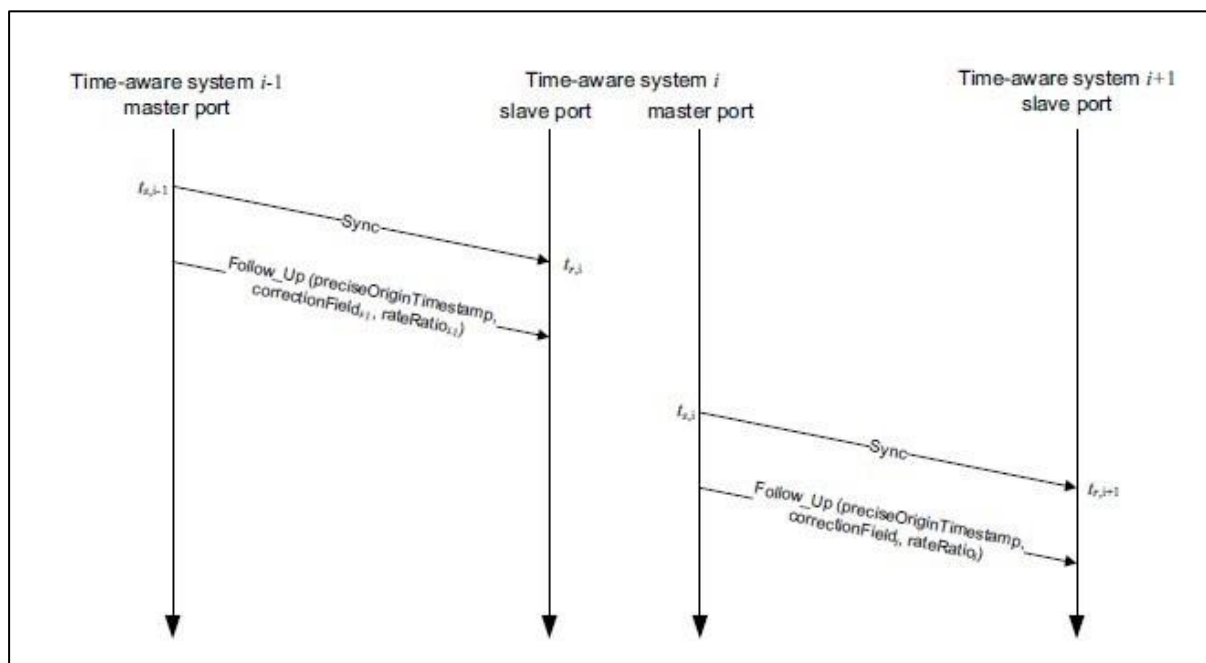
Figure 5-1: Sync and Follow_Up messages

The Time synchronization information contained on the Sync and Follow Up messages sent by the „Time-aware system i-1" is redirected and only received by the MediaGateway processor.

These packets are decoded, and the relevant information extracted. The extracted information is used later to generate, together with the information extracted from the propagation delay algorithm, the new corrected Sync and Follow Up messages that will be sent to the „Time-aware system i+1". In the new generated packets, a field called "correction field" will be changed and this parameter will be used on reception side to adjust the reference time of the system considering the delay of the switch and the delay in the path „Time-aware system i-1" to „Time-aware system i".

5.3 Propagation delay measurement

For the correction adjust of the time reference transmitted by the Sync and Follow Up Packets, the delay between the initiator of the protocol „Time-aware system i-1" and the first slave port of the MediaGateway „Time-aware system i", should be measured.
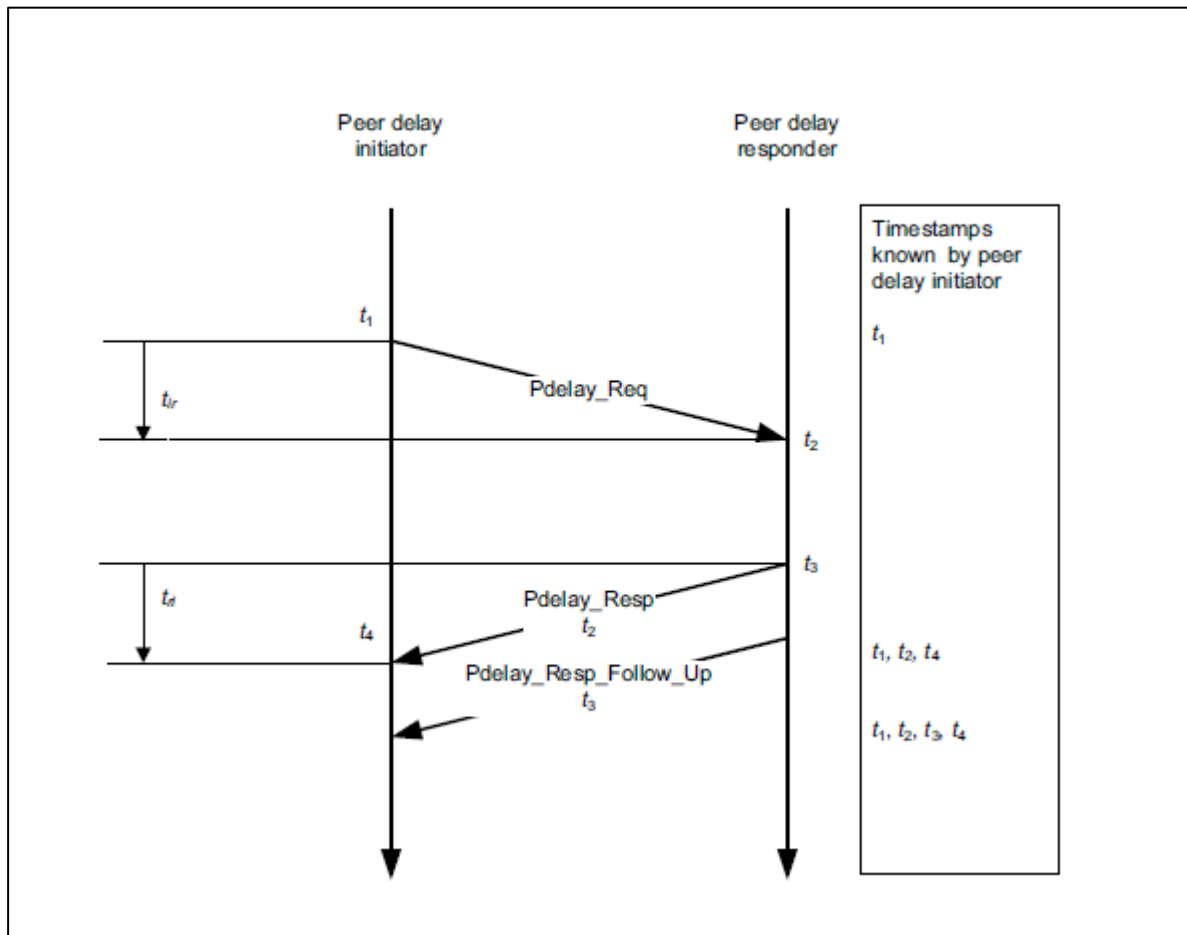
$$D = \frac{t_{ir} + t_{ri}}{2} = \frac{(t_4 - t_1) - (t_3 - t_2)}{2}$$

Figure 5-2: p_delay messages and formula

The measures of the propagation delay are performed by each attached link of an 802.1AS communication, which means that each side of the link will generate and response to these packets, called
- ⟳ Pdelay_Request
- ⟳ Pdelay_Response
- ⟳ Pdelay_Response_Follow_Up.

5.4 802.1AS in the MediaGateway

The MediaGateway allows the user to configure six different bridges through the webpage. Each of them offers two possibilities: BridgeX_Master or BridgeX_Slave. Each Broad-R Reach port can set as:

- Disabled: Port will not take part of any 802.1AS traffic.
- BridgeX_Slave: Only one per BridgeX. It will receive 801.2AS traffic from an external master.
- BridgeX_Master: Port will send 802.1AS traffic coming from its BridgeX_Slave.
- Master_802.1AS: Port will work as 802.1AS Master Clock.

Warning: Redirection of 802.1AS packets to processor are not following normal use of VLANs. Please read the limitations.

5.5 Limitations in MediaGateway using 802.1AS

Given the need of working constantly with a high precision timestamping's, and given the huge number of packets pro 802.1AS OABR port that should be received and transmitted by MediaGateway's microcontroller, there are some limitations that the user has to know in advance.

- The implementation allows only the use of the 802.1AS in the 12 x OABR Ports of the MediaGateway. Due to technical reasons, the use of the 802.1AS protocol is not possible in Ethernet ports.
- For a correct synchronization, all ports that form one Bridge (2 to 4 ports) should be connected to the **same Broadcom Ethernet Switch**.
- A Bridge should be formed by at least one port configured as Bridge_Slave (Connected with 802.1AS Master) and up to 3 Ports configured as Bridge_Master (Connected with 802.1AS Slave). It means the next possibilities pro Bridge are allowed: 1BS:1BM, 1BS:2BM and 1BS:3BM.
- For the use of the 802.1AS Bridge functionality of the MediaGateway, its configuration should use double VLAN tagging with unidirectional VLAN IDs
- Every port must have a unique default VLAN ID. Two ports are not allowed to have the same default VLAN ID. This must be considered for the whole MediaGateway.
- 802.1AS should never be used with traffic injection.
  This means: no injection of a third device into an 802.1AS Bridge
- Announcement packages from best master clock (BMC) algorithm are not corrected or forwarded (they should not be present in automotive networks as there is only one master clock).

6 Diagnostic Frames

There are two diagnostic frames implemented in the MediaGateway. To see them, please activate Diagnose-Service (CHAPTER 3.4.1) and mirror the Port S1-P4 (CPU). Both frames are based on SOME/IP. For specific information about SOME/IP please see SOME/IP PROTOCOL SPECIFICATION AUTOSAR FO.
The frames are innerVLAN tagged with VID 0x070 for easy filtering. Both Frames have the Service ID 0x0124. One has the Method ID 0x8001 (Board Info, Configuration), the other one has the Method ID 0x8002 (Port Information).
Please ask Support@technica-engineering.de for a Wireshark dissector.

Note: The dissector is only available for Firmware version 4.4.0 of the MediaGateway

6.1 Board Configuration Frame (0x8001)

The bytes description of the following table refers only to the payload of this SOME/IP packet. The frame contains the information of 21 ports (12 BR ports, 3 Ethernet Ports, 5 internal Ports, and 1 SFP Port). The same information for each port is available. The related bytes for each port are indicated in the payload by the variable "nr_port" (0 to 20).

Figure 6-1: Board Configuration Frame

Description of the 21 ports and the assigned value for "nr_port":

Port Number [nr_port]	Real Port
0	S1-P0 (100BASE-T1-port)
1	S1-P1 (100BASE-T1-port)
2	S1-P2 (100BASE-T1-port)
3	S1-P3 (100BASE-T1-port)
4	S2-P0 (100BASE-T1-port)
5	S2-P1 (100BASE-T1-port)
6	S2-P2 (100BASE-T1-port)
7	S2-P3 (100BASE-T1-port)
8	S3-P0 (100BASE-T1-port)
9	S3-P1 (100BASE-T1-port)
10	S3-P2 (100BASE-T1-port)
11	S3-P3 (100BASE-T1-port)
12	S1-P5 (RJ-45- port)
13	S2-P5 (RJ-45-port)
14	S3-P5 (SFP Cage-port)
15	S1-P4 (internal GB-port)
16	S1-P8 (internal GB-port)
17	S2-P8 (internal GB-port)
18	S2-P8 (internal GB-port)
19	S3-P8 (internal GB-port)
20	S3-P8 (RJ-45)

Table 6-1: assigned value for "Nr_ports"

Description of payload of the Board Configuration frame, starting with byte "0" at the beginning of the payload of SOME/IP frame:

[bytes]	Values
0 to 1	HW Version
2 to 21	UUID
22 to 24	Firmware version
25 to 27	Enabled function (gateways)
28	MS Restart Status
(Nr_port x 21) + 29	Port Number
(Nr_port x 21) + 30	Port Name
(Nr_port x 21) + 31 to (Nr_port x 21) + 32	Defined Default VLAN ID
(Nr_port x 21) + 33	Inner VID Remarking
(Nr_port x 21) + 34	Outer VID Remarking

(Nr_port x 21) + 35	Mirroring Information
(Nr_port x 21) + 36	Enable port
(Nr_port x 21) + 37	Prevent sleep
(Nr_port x 21) + 38	BroadR-Reach® mode
(Nr_port x 21) + 39	Output Level
(Nr_port x 21) + 40	IEEE 802.1AS mode
(Nr_port x 21) + 41	Test mode
(Nr_port x 21) + 42	Speed
(Nr_port x 21) + 43 to (Nr_port x 21) + 46	Drop Source IP
(Nr_port x 21) + 47 to (Nr_port x 21) + 50	Drop Destination IP
470 and following	VLAN Table Size and configured VLAN-memberships and VLANs to untag

Table 6-2: Specific information of bytes

6.2 Port Information Frame (0x8002)

Figure 6-2: Board Information Frame
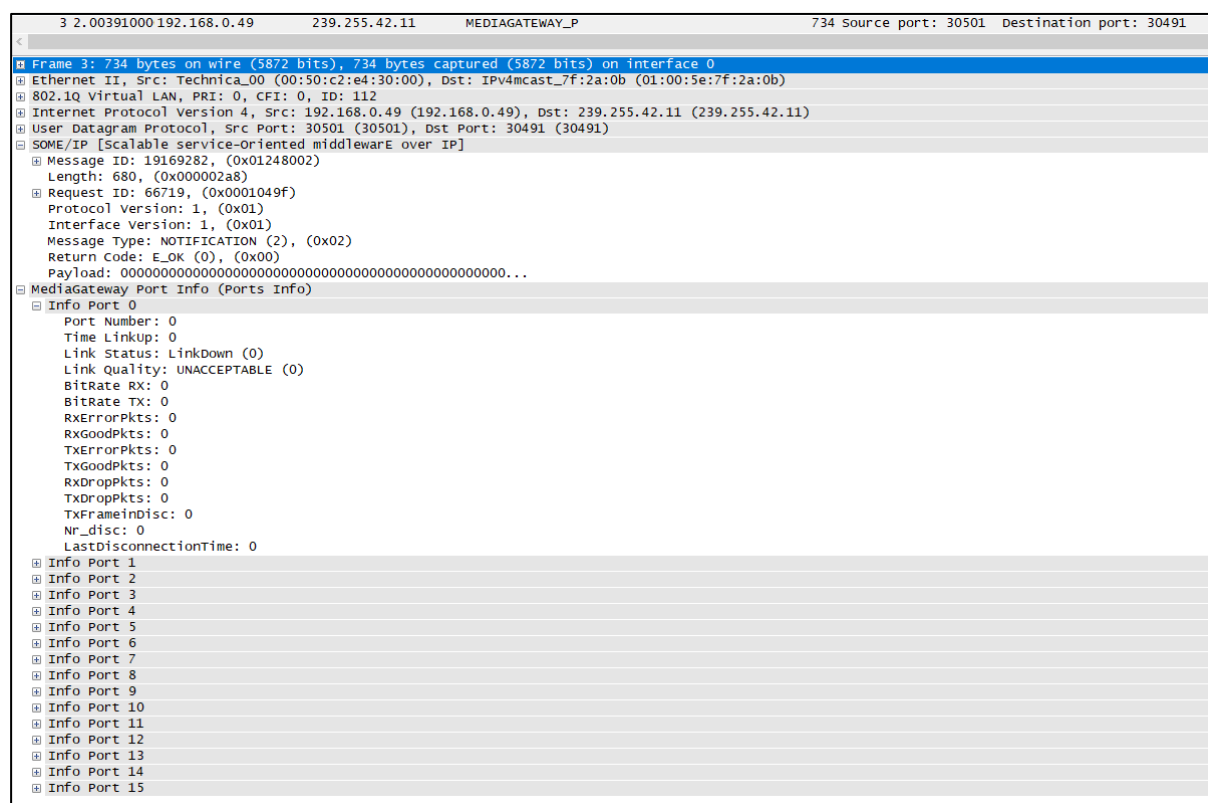
This frame contains the information of 15 ports (12 BR ports and the 3 Ethernet Ports). The same information for each port is available. The related bytes for each port are indicated in the payload by the variable "Nr_Port" (0 to 14).
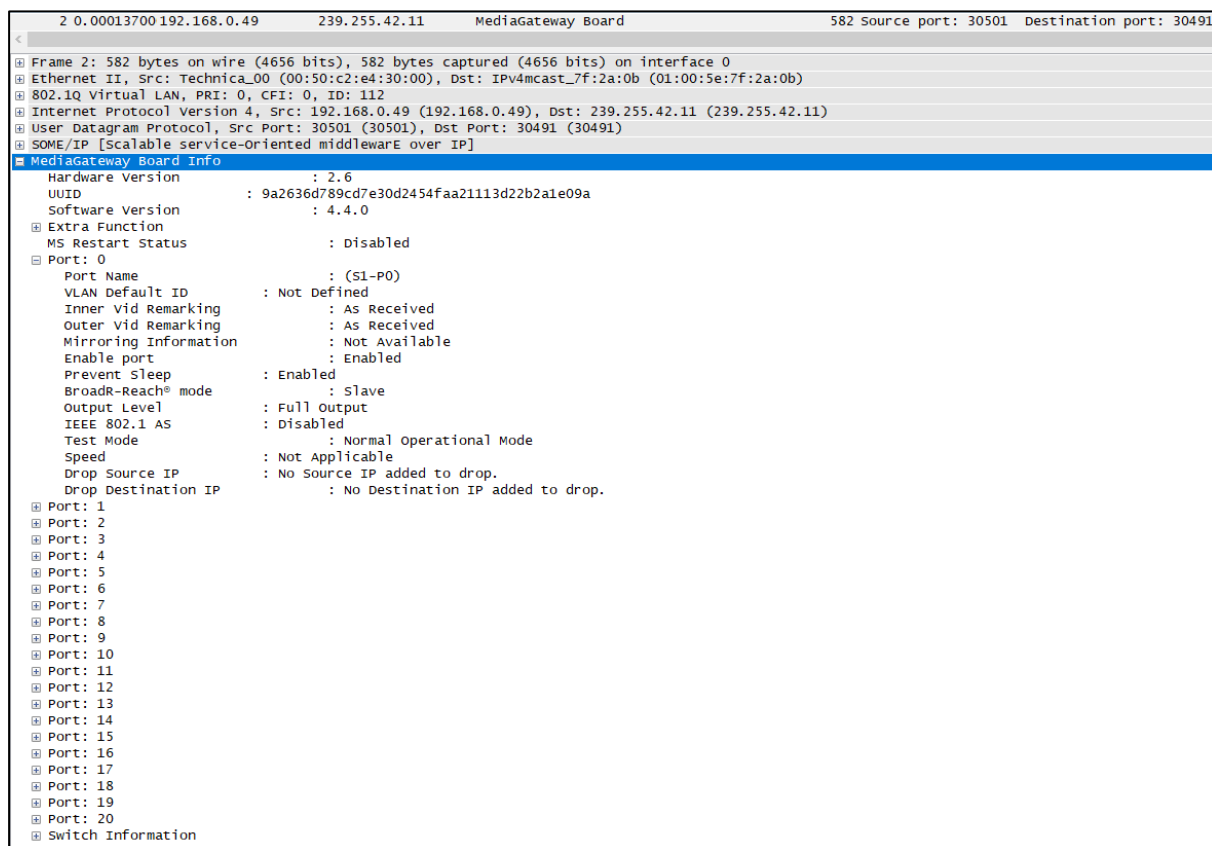
Description of payload of the Board Configuration frame, starting with byte "0" at the beginning of the payload of SOME/IP frame:

[bytes]	Values
(Nr_port x 42) + 0	Port Number
(Nr_port x 42) + 1 to (Nr_port x 42) + 2	Time for Link Up
(Nr_port x 42) + 3	Link Status
(Nr_port x 42) + 4	Link Quality
(Nr_port x 42) + 5 to (Nr_port x 42) + 6	BitrateRx [Mbit/s]
(Nr_port x 42) + 7 (Nr_port x 42) + 8	BitrateTx [Mbit/s]
(Nr_port x 42) + 9 to (Nr_port x 42) + 12	RxErrorPkts
(Nr_port x 42) + 13 to (Nr_port x 42) + 16	RxGoodPkts
(Nr_port x 42) + 17 to (Nr_port x 42) + 20	TxErrorPkts
(Nr_port x 42) + 21 to (Nr_port x 42) + 24	TxGoodPkts
(Nr_port x 42) + 25 to (Nr_port x 42) + 28	RxDropPkts
(Nr_port x 42) + 29 to (Nr_port x 42) + 32	TxDropPkts
(Nr_port x 22) + 33 to (Nr_port x 22) + 36	TxFrameinDisc
(Nr_port x 22) + 37 to (Nr_port x 22) + 38	Nr_disconnections
(Nr_port x 22) + 39 to (Nr_port x 22) + 40	Last disconnection time in [ms]
(Nr_port x 42) + 41	Separator Byte

Table 6-3: Specific information of bytes

7 MediaGateway Remote Control

Firmware v4.1.23 or every newer version allows to configure and change some values of the MediaGateway through SOME/IP messages. For specific information about SOME/IP please see SOME/IP PROTOCOL SPECIFICATION AUTOSAR FO.
These messages have to be sent to the MediaGateway with the destination IP of MediaGateway and UDP port 30491

Currently, the following methods are implemented:

- restart device
- import configuration
- export configuration
- dynamic configuration
- check status
- set Wake Up Line status
- get Wake Up Line status
- Port Enable
- port master/slave
- reset to default

The SOME/IP packet contains 16 bytes of header. The byte description of following table refers only to the SOME/IP header (16 bytes after UDP layer) and payload.

4 Byte			
1	2	3	4
Service ID		Method ID	
Length			
Request ID			
Protocol Version	Interface Version	Message Type	Return Code
Payload			

Table 7-1: SOME/IP Header

Field Name	Data Type	Description
Service ID	UINT16	0x0124
Method ID	UINT16	Dependent from used method
Length	UINT32	0x8 + size of payload
Request ID	UINT32	0x00000000
Protocol Version	UINT8	0x01
Interface version	UINT8	0x01
Message Type	UINT8	0x00
Return Code	UINT8	0x00
Payload	Variable size	Dependent from used method

Table 7-2: Detailed Information in SOME/IP Header

The blue text modules are different for each method for remote control of the MediaGateway. All other values are always the same.

7.1 Reset Device

This method performs a complete device reset. The configuration after a device restart is loaded from flash.

Request with:
- ⟳ Method ID: 0x0001
- ⟳ Length: 0x8
- ⟳ Payload: no payload

Response:
This method returns a SOME/IP message with return code 0x00 (OK) before restart.

7.2 Import Configuration

This method has the same behaviour as the Import button from webpage of the MediaGateway. This method stores a configuration into the flash. The new configuration is the payload.

Note: New settings will be applied when next device restart is performed.

Request with:
- ⟳ Method ID: 0x0002
- ⟳ Length: 0x8 + count of bytes of payload
- ⟳ Payload: configuration file as HEX stream

Response:
This method returns a SOME/IP message with return code 0x00 (OK).

7.3 Export Configuration

This method has the same behaviour as the Export button from webpage of the MediaGateway. The response message from MediaGateway contains the *.cfg file in its payload as HEX stream.

Request with:
- Method ID: 0x0003
- Length: 0x8
- Payload: no payload

Response:
This method returns a SOME/IP message with return code 0x00 (OK) and the payload contains the configuration as HEX stream.

7.4 Dynamic Configuration

This method is useful for automation of tests where different configurations are needed. This method loads a configuration and applies it with "fast restart". No complete reset is needed.
While Dynamic Configuration is applied and running, Host LED will blink faster as in normal operation. This Dynamic Configuration will run until device is restarted restart or a new dynamic configuration is loaded.

Request with:
- Method ID: 0x0004
- Length: 0x8 + count of bytes of payload
- Payload: configuration file as HEX stream

Response:
This method returns a SOME/IP message with return code 0x00 (OK).

7.5 Check Status

This method will respond with the current status of the device.
Current status can be:
- Normal Mode: When current configuration is loaded from flash.
- Dynamic Mode: When current configuration is loaded dynamically. In dynamic mode, Host LED blinks a little bit faster.

Request with:
- Method ID: 0x0005
- Length: 0x8

◌ Payload: no payload

Response:
This method returns a SOME/IP message with return code 0x00 (OK). The response payload will contain only one byte with following information:
- ◌ 0x01: for Normal Operation
- ◌ 0x02: for Dynamic Operation

7.6 Set WakeUp Line Status

This method provides the user the possibility of driving the wakeup line to high or low level. Two wake up lines are available in the MediaGateway.

Request with:
- ◌ Method ID: 0x0006
- ◌ Length: 0xA
- ◌ Payload: 2 bytes with wakeup line information

2 Byte	
1	2
Line selection	New line status

Field Name	Data Type	Description
Line selection	UINT8	0x01 for WakeUp line 1 0x02 for WakeUp line 2
New line Status	UINT8	0x00 for new status LOW 0x01 for new status HIGH

Response:
This method returns a SOME/IP message with return code 0x00 (OK) if passed values are correct. Otherwise it will return Code 0x01 (NOT_OK).

7.7 Get WakeUp Line Status

This method returns the state of the selected wake up line.

Request with:
- ◌ Method ID: 0x0007
- ◌ Length: 0x8
- ◌ Payload: no payload

Response:

This method returns a SOME/IP message with return code 0x00 (OK) and the payload contains the current status of both WakeUp Lines

2 Byte	
1	2
Status Line 1	Status Line 2

Field Name	Data Type	Description
Status Line 1	UINT8	0x00 for WakeUp Line 1 is LOW 0x01 for WakeUp Line 1 is HIGH
Status Line 2	UINT8	0x00 for WakeUp Line 2 is LOW 0x01 for WakeUp Line 2 is HIGH

7.8 Set Port Enabled/Disabled (only 100BASE-T1-Ports)

Via this method the user can enable or disable 100BASE-T1 ports, similarly to the Enable port function on the webserver for the 100BASE-T1 ports.

Request with:
- Method ID: 0x0008
- Length: 0xA
- Payload: 2 bytes contain the information, which port is enabled/disabled

2 Byte	
1	2
100BASE-T1 Port selection	Enable/disable

Field Name	Data Type	Description
100BASE-T1 Port selection	UINT8	0x00: S1-P0
		0x01: S1-P1
		0x02: S1-P2
		0x03: S1-P3
		0x04: S2-P0
		0x05: S2-P1
		0x06: S2-P2
		0x07: S2-P3
		0x08: S3-P0
		0x09: S3-P1
		0x0A: S3-P2
		0x0B: S3-P3
Enable/disable	UINT8	0x00 for disable
		0x01 for enable

Response:
This method returns a SOME/IP message with return code 0x00 (OK).

7.9 Set Port to Master/Slave (only 100BASE-T1-Ports)

Via this method the user can set 100BASE-T1 ports to master or slave,similarly to the BroadR-Reach® mode function on the webserver for the 100BASE-T1 ports.

Request with:
- ⟳ Method ID: 0x0009
- ⟳ Length: 0xA
- ⟳ Payload: 2 bytes contain the information, which port is set to master/slave.

2 Byte	
1	2
100BASE-T1 Port selection	BroadR-Reach® mode

Field Name	Data Type	Description
100BASE-T1 Port selection	UINT8	0x00: S1-P0 0x01: S1-P1 0x02: S1-P2 0x03: S1-P3 0x04: S2-P0 0x05: S2-P1 0x06: S2-P2 0x07: S2-P3 0x08: S3-P0 0x09: S3-P1 0x0A: S3-P2 0x0B: S3-P3
BroadR-Reach® mode	UINT8	0x00 for Slave 0x01 for Master

Response:
This method returns a SOME/IP message with return code 0x00 (OK).

7.10 Reset to default

This method performs a reset of the configuration to default values and device restarts, similarly to the Default button on Control Panel tab on the webserver of the MediaGateway.

Request with:
- ⟳ Method ID: 0x0010
- ⟳ Length: 0x8
- ⟳ Payload: no payload

Response:
This method returns a SOME/IP message with return code 0x00 (OK) before restart.

7.11 Get System Information

This method returns information about the MediaGateway and its active licenses. It is the same information, that is shown on System Information tab on the Webserver of the MediaGateway.

Request with:
- ⟳ Method ID: 0x0011
- ⟳ Length: 0x8
- ⟳ Payload: no payload

Response:

This method returns a SOME/IP message with return code 0x00 (OK) and the following payload:

8 Byte							
1	2	3	4	5	6	7	8
HW version high	HW version low	SW version			BMW extra functions	CAN Gateway	FlexRay

Field Name	Data Type	Description
HW version high	UINT8	e.g. 0x02 for HWv2.6
HW version low	UINT8	e.g. 0x06 for HW v2.6
SW version	UINT24	e.g. 0x040400 for SW v4.4.0
BMW extra function	UINT8	0x00 disabled 0x01 enabled/unlocked
CAN Gateway	UINT8	0x00 disabled 0x01 enabled/unlocked
FlexRay	UINT8	0x00 disabled 0x01 enabled/unlocked

8 APPLICATION AND FIRMWARE UPDATE

You can download the latest firmware and documentation for the **MediaGateway** here:
https://technica-engineering.de/produkt/media-gateway/

8.1 Preconditions and important information

Warnings:
- Please do not downgrade the bootloader or application to a former version.
- Please follow this update instruction to avoid erroneous states of the device. Technica Engineering may charge support fees for repair service.
- Only upgrade to the latest firmware, bootloader and application
- Firewall must be deactivated, or **Port 69 and Port 9000** must be opened
- You need a stable 12 volts DC power supply. Do **not** switch off the power supply during the update process!

Notes:
- Make sure you have installed the latest Java 8 version (e.g. Java 8 update 191).
- Make sure your network-adapter is configured in the correct IP address range
- If an error occurs during the update, please do a power reset and try again.

8.2 Update

1. Power up the device
2. Reset the MediaGateway to default settings: IP must be 192.168.0.49
3. Make sure the network adapter from your PC is configured in the same IP range (e.g. 192.168.0.60)
4. Connect the network-adapter with a RJ-45 cable directly to the Port S1-P5 and make sure there is a link by checking the LEDs blinking. Do not connect a switch in between.
5. Start "update_all.bat" from the same folder as the firmware files are stored.
6. Wait until "Press any key..."appears in cmd-window.
7. Press any key
8. Do a power reset
9. Check the Host-LED if it is blinking in normal mode.
10. YES => check webserver by browser
    NO => redo from point 5.

=> Finished

9 TROUBLESHOOTING AND FAQ

9.1 All 100BASE-T1 LEDs are lit permanently

If all 12 LEDs for the 100BASE-T1 ports are on permanently without any link, the software of the microcontroller is broken. In this case, nothing can be done by the user. Please send the MediaGateway back to Technica Engineering GmbH. Please follow the instructions on our homepage -> Customer Service for return:

https://technica-engineering.de/en/customer-service-and-product-return/

9.2 Four 100BASE-T1 LEDs of one Switch are lit permanently

If 4 LEDs from one switch are on permanently without any link, this switch is damaged. It is possible to use the switches, that are still connected to the microcontroller (S1-P4).
=> Switch 2 is damaged, switch 1 is still working.
=> Switch 3 is damaged, switch 2 and 1 are still working.
If the first switch (Switch 1) is damaged, the MediaGateway is not working anymore.

If there is still warranty, please send it back to Technica Engineering GmbH and we will provide you with a new one.
Also, if there is no warranty any more, you can send it back and our team will try to repair the device. In some cases, these devices perform efficiently again.

9.3 No access to webserver anymore

If the configuration port is correctly configured and you should have access normally, the microcontroller is jammed by too much traffix. Please use a valid VLAN configuration and avoid too much traffic on microcontroller port. For example, too much broadcast packets hit the microcontroller.

9.4 Host LED is blinking fast

Usually 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. By using another Ethernet adapter, it might work better. Please use your integrated LAN adapter of your PC or Laptop.

Note: Please do not reset by pressing the reset button while the MediaGateway is in bootloader mode! This may cause the problem of CHAPTER 9.1!

9.5   Problems with website interface

Please try another browser. Firefox and Chrome are recommended.

9.6   Delay Time for Ethernet packets through the MediaGateway

The propagation delay of the switch depends on the load. The switch works collision-free. It means that buffering is used to avoid collisions. The buffering causes delay jitter sometimes. On high load jitter rises exponential.
On normal load the delay should be about 0.3 ms. But if the packet passes all 3 switches it may sum up to about 1 ms.

9.7   AVB Support

Currently Audio Video Bridging is not supported. Only automotive 802.1AS time synchronization protocol is implemented (PTP).

9.8   Maximum Frame Size

The maximum frame size for all ports is 2000 bytes. Tagged and untagged frames will be dropped if the frame length is larger than 2000 bytes.

10 LIST OF FIGURES

11 CHANGELOG

Version	Chapter	Description	Date
4.98		Added ARL status MediaGateway Remote control revised Added SFP port information and new SFP Modules compatibility CANGateway Chapter updated Removed bootloader update chapter	03.2018
5.0	All	Complete rework of all Chapters	03.2020

12 CONTACT

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