

# PCAN-Wireless Gateway

CAN to WLAN Gateway

## User Manual



Document version 1.4.1 (2018-07-10)

**PEAK**  
System

## Relevant products

Product Name	Model	Software Version	Part Number
PCAN-Wireless Gateway with D-Sub connectors	Industry	2.7.0	IPEH-004020
PCAN-Wireless Gateway with automotive connector	Automotive	2.7.0	IPEH-004020-A

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# Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
1.1	Properties at a Glance	5
1.2	Prerequisites for Operation	6
1.3	Scope of Supply	7
<b>2</b>	<b>Connectors</b>	<b>8</b>
2.1	D-Sub Connector (Industry)	8
2.1.1	Voltage Supply of External Devices (Industry)	8
2.2	Automotive Connector (Tyco)	11
2.3	Antenna	11
2.4	Power Supply (Industry)	12
<b>3</b>	<b>Putting into Operation</b>	<b>13</b>
3.1	First Connection to the Gateway	13
3.1.1	Preparing the Computer	13
3.1.2	Establishing the Connection	14
3.2	Basic Configuration	16
3.2.1	Changing Login Data	16
3.2.2	Setting up CAN	16
3.2.3	Connecting to the WLAN Network	17
3.3	Installing the PCAN-Gateway	19
<b>4</b>	<b>Operation</b>	<b>20</b>
4.1	Status LEDs	20
4.2	Reset Button	20
4.3	wake-Up	21
4.4	Signal Delay	21

<b>5</b>	<b>Configuration</b>	<b>22</b>
5.1	Structure of the Website	24
5.1.1	Header	24
5.1.2	Navigation	24
5.1.3	General Symbols	25
5.2	Status	26
5.3	Routing	28
5.3.1	Manage Routes	29
5.3.2	Add / Edit Route	31
5.3.3	Scan for Devices	36
5.4	Filters	37
5.4.1	Manage Filters	37
5.4.2	Add / Edit Filter	39
5.5	Network	42
5.5.1	CAN	42
5.5.2	WLAN	47
5.5.3	WLAN Network Scan	51
5.6	Device	52
5.6.1	Device Configuration	53
5.6.2	User Management	57
5.6.3	Software Update	59
5.7	Help	60
5.8	Support	60
<b>6</b>	<b>Application Examples</b>	<b>61</b>
6.1	Unidirectional Data Transmission	61
6.2	Bidirectional Data Transmission	64
<b>7</b>	<b>Technical Specifications</b>	<b>68</b>
<b>Appendix A</b>	<b>CE Certificate</b>	<b>70</b>
<b>Appendix B</b>	<b>Dimension Drawings</b>	<b>71</b>
<b>Appendix C</b>	<b>Disposal Information (Battery)</b>	<b>73</b>

# 1 Introduction

The PCAN-Wireless Gateway allows the connection of different CAN busses over IP networks. CAN frames are wrapped in TCP or UDP message packets and then forwarded via the IP network from one device to another.

The PCAN-Wireless Gateway provides one WLAN connection and two High-speed CAN interfaces. The module is supplied in a plastic case with two D-Sub connectors or a Tyco automotive connector.

The PCAN Gateway product family is configured via a convenient web interface. Alternatively, the JSON interface allows access via software. Both options provide status information and settings of the devices, the various communication interfaces, message forwarding, and filters.

## 1.1 Properties at a Glance

- └ ARM9 Freescale iMX257 with 16 kByte Level 1 Cache and 128 kByte internal SRAM
- └ 256 MByte NAND Flash and 64 MByte DDR2 RAM
- └ Linux operating system (version 2.6.31)
- └ CAN bus connection via D-Sub, 9-pin (in accordance with CiA<sup>®</sup> 303-1) or via automotive connector, 12-pin (Tyco)
- └ Wake-up function using CAN bus or separate input
- └ Monitoring and configuration of the devices via the web interface or JSON interface
- └ Reboot and reset of the device to factory defaults with a reset button

- └ Plastic casing with flange, dimensions: 130 x 110 mm
- └ LEDs for device status, WLAN, and power supply
- └ Voltage supply from 8 to 30 V
- └ 5-Volt supply to the CAN connection through a solder jumper, e.g., for external bus converter (only for IPEH-004020)
- └ Extended operating temperature range from -40 to 85 °C (-40 to 185 °F)

### **wireless properties:**

- └ WLAN IEEE 802.11 b/g
- └ Internal chip antenna
- └ Data transmission using TCP or UDP

### **CAN properties:**

- └ Two High-speed CAN channels (ISO 11898-2)
- └ Bit rates from 40 kbit/s up to 1 Mbit/s
- └ TJA1041 CAN transceiver
- └ Compliant with CAN specifications 2.0A and 2.0B

## **1.2 Prerequisites for Operation**

- └ Voltage supply in the range of 8 to 30 V DC

## 1.3 Scope of Supply

- └ PCAN-Wireless Gateway in plastic casing
- └ IPEH-004020: Mating connector for voltage supply (Phoenix Contact MC 1,5/2-STF-3,81 - 1827703)
- └ IPEH-004020-A: Tyco mating connector including crimp contacts (Tyco929051-1, Tyco968473-1, and Tyco928999-1)
- └ Manual in PDF format
- └ Printed quick start guide

## 2 Connectors

The PCAN-Wireless Gateway is offered as a module with two D-Sub connectors or with a Tyco automotive connector.

### 2.1 D-Sub Connector (Industry)

A High-speed CAN bus (ISO 11898-2) is connected to the 9-pin D-Sub connector. The pin assignment for CAN corresponds to the specification CiA® 303-1.

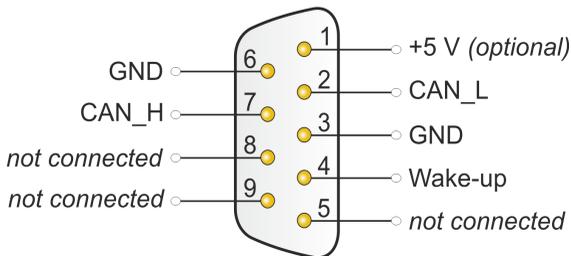


Figure 1: Pin assignment High-speed CAN

#### 2.1.1 Voltage Supply of External Devices (Industry)

External devices with low power consumption (e.g. bus converters) can be directly supplied via the CAN connector. With a solder bridge per CAN channel on the PCAN-PCI Express FD board, a 5-Volt supply can optionally be routed to pin 1 of the D-Sub connector. The current output is limited to 50 mA.

▶ Do the following to activate the voltage supply:



**Risk of short circuit!** Solder with great care to avoid unwanted short circuits on the card.



**Attention!** Electrostatic discharge (ESD) can damage or destroy components on the card. Take precautions to avoid ESD.

1. Remove the 4 screws at the bottom of the casing.
2. Lift off the casing cover parallel to the bottom.  
You now have access to the circuit board.
3. Set the solder bridges corresponding to the desired settings.  
Figure 2 shows the solder field positions on the board. The table below contains the possible settings.
4. Close the casing with the cover and fix the 4 screws at the bottom.

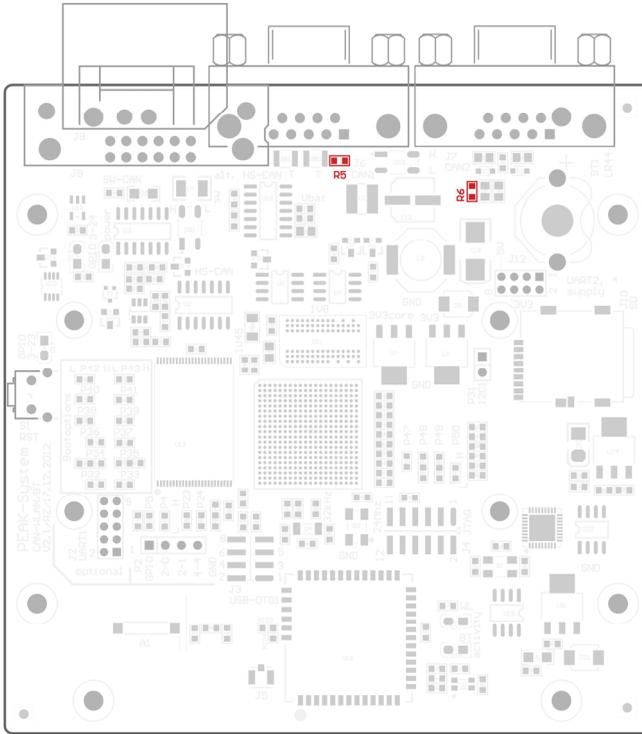


Figure 2: Position of the solder fields on the board for a 5-Volt supply at the CAN connection

D-Sub connector	Solder field	5-Volt supply	
		Without (standard)	With (Pin 1)
CAN1	R5		
CAN2	R6		

**Risk of short circuit!** The 5-Volt supply is not protected separately. Therefore, turn off the device before you connect and disconnect CAN cables or peripheral systems.

## 2.2 Automotive Connector (Tyco)

The pin assignment for the automotive connector (Tyco1355505-1) is as follows:

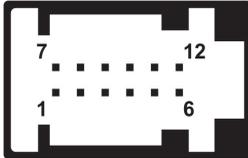


Figure 3: Pin assignment automotive connector (Tyco)

Pin	Function
1	Vb
2	GND
3	CAN1-Low
4	CAN1-High
5	CAN2-Low
6	CAN2-High
7	Wake-up
8	GND
9	CAN1-Low
10	CAN1-High
11	CAN2-Low
12	CAN2-High

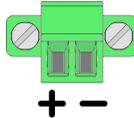
The mating connector is included in the scope of supply and consists of the components: Tyco929051-1, Tyco968473-1, and Tyco928999-1.

## 2.3 Antenna

The PCAN-Wireless Gateway is equipped with an internal chip antenna. The connection to WLAN will be established via the antenna.

## 2.4 Power Supply (Industry)

The connection for the power supply is located on the front side of the casing. The connection is done with a mating connector for fastening cable standards. The polarity is as follows:



The mating connector (Phoenix Contact MC 1,5/2-STF-3,81 - 1827703) is included in the scope of supply.

## 3 Putting into Operation

The PCAN-Wireless Gateway is configured via a web interface. In the delivery state and after resetting to factory defaults, the device provides a Micro Access Point network you can connect to via WLAN.

 **Note:** Devices with a serial number below 200 provide an Ad-Hoc network instead of a Micro Access Point. Unfortunately, the connection to Ad-Hoc networks is no longer supported by Windows since version 8.1 and Android. Please use a computer with another operating system.

### 3.1 First Connection to the Gateway

During initial installation or after resetting to factory defaults, you must pre-configure the PCAN-Gateway for your WLAN. The default login data is written on the label on the top of the PCAN-Gateway. Proceed as described in the following subsections:

#### 3.1.1 Preparing the Computer

 Your computer must be configured with an appropriate IP address to connect to the device via WLAN. To determine your IP address and to change it if necessary, follow these steps.

1. Open the Windows Start menu.
2. Type **ncpa.cpl** and press Enter.

The overview of the network adapters appears.

3. Do a right-click on the adapter that will be used for the connection to the PCAN-Gateway and select **Properties**.

4. Open the properties of **Internet Protocol Version 4 (TCP/IPv4)**.
5. Make a note of the current settings in order to reset the computer later on.
6. Select **Use the following IP address**.
7. Enter an **IP address** in the range from 192.168.1.1 to 192.168.1.254 (but not the PCAN-Gateway's own address which is written on the label at the top).
8. Click on **Subnet mask**. 255.255.255.0 is shown. Leave this entry unchanged.
9. Confirm the changes with **OK**.

### 3.1.2 Establishing the Connection

1. Connect the device to a suitable power supply (8 - 30 V).
2. Wait until the PCAN-Gateway is ready (Status LED is blinking green).
3. Connect the computer to the Micro Access Point network. The name (SSID) and network key can be found at the top of the PCAN-Gateway.
4. Open a web browser on the computer.
5. In the browser's address bar, enter the address of the PCAN-Gateway (see the label at the top of the device).



Figure 4: Address bar of the web browser

This opens the configuration website.

6. In the upper right area of the configuration website you can find the login. Enter “admin” for each the username and the password and confirm with **Enter**.

The restricted area appears and you can start setting up the PCAN-Wireless Gateway. You can find a description of the basic configurations in the following section 3.2.



**Note:** Afterwards reset the computers IP address to the previously noted address.

## 3.2 Basic Configuration

Change your login data first and then set up the PCAN-Gateway connection to CAN and the WLAN network.

### 3.2.1 Changing Login Data

1. Open the page **Device > User Management**.
2. Change the login data on this page. Create a new username and a new password.

To ensure a minimum level of security, the password should have at least 8 characters. If possible, use letters, numbers, and special characters.

 **Important note: Login data is confidential!** Do not act carelessly and leave your system open to attack. Never deposit the login data in any form on the Internet or make it easily accessible. Do not give the new login data carelessly to third parties or send it by e-mail.

### 3.2.2 Setting up CAN

 Enter the following settings to configure the CAN channels:

Open the page **Network > CAN**.

1. **Bit rate:** For setting the bit rate, click the drop-down menu and select the value that is used on the CAN bus to be connected.
2. **Listen-Only-Mode:** If the PCAN-Gateway should act as a pure observer, not affecting the data traffic, Listen-Only-Mode must be enabled. Activate Listen-Only-Mode with a click on the checkbox.

Confirm the entries with **Save Settings**.

### 3.2.3 Connecting to the WLAN Network

▶ Accommodate the IP address data of the PCAN-Gateway to the future WLAN network.

1. Open the page **Network > WLAN**.
2. While in the *Operation Mode* form, choose *Infrastructure Mode (Client)* in order to connect with an existing WLAN network.
3. In the middle of the page, enter the connection data for the network: Name (SSID), Encryption Type, and Network Key.

 **Note:** Regardless of the DHCP configuration (Enable/Disable), the connection data must be entered.

#### Automatic Access Assignment via DHCP

1. If the future WLAN network uses DHCP (Dynamic Host Configuration Protocol), the PCAN-Gateway IP address and Subnet mask are assigned automatically. Enable DHCP to use this feature.
2. Confirm the entry by **Save Settings**.

You are automatically logged out and the basic setup of the device is now completed. After the initial configuration, the Micro Access Point network is no longer available. The PCAN-Gateway connects to the WLAN, and automatically receives its new address data via DHCP.

 **Note:** DHCP is not recommended, because it is necessary to know the IP address of the device to access the configuration website. Furthermore the IP address may change after a restart of the device or the DHCP server. In this case the existing routes won't work.

## Manual Address Assignment

1. If the WLAN network does not provide DHCP, enter the address data that the PCAN-Gateway uses in the WLAN Network at the bottom of the page: IP address and Subnet mask. The gateway address can optionally be specified.
2. Confirm the entry by **Save Settings**.

You are automatically logged out and the basic setup of the device is now completed. After the initial configuration, the Micro Access Point network is no longer available. The PCAN-Gateway connects to the WLAN, and is reachable under the new fixed IP address.

### 3.3 Installing the PCAN-Gateway

▶ Do the following to connect the PCAN-Wireless Gateway to the IP network (WLAN):

1. Mount the PCAN-Wireless Gateway at the appropriate position.
2. Connect each of the two CAN ports with the affiliated CAN network.

 **Note:** A High-speed CAN bus needs to be electrically terminated on both ends using resistors of 120 Ω. The device does not have an internal termination.

3. Connect the PCAN-Wireless Gateway to a suitable power supply (8 - 30 V DC).

The PCAN-Gateway starts automatically. When the Status LED is blinking green the device is ready and the current configuration is executed. After the start, the PCAN-Gateway automatically connects to the IP network.

Enter the previously assigned IP address in the browser address bar. If no connection can be established, an error may have been made when entering the WLAN connection data.

In this case, a reset to factory settings is needed to reactivate the Micro Access Point mode and to repeat the configuration process (see section 4.2 on page 20).

 **Note:** In case of a dynamic address assignment via DHCP, the new IP address must first be determined. Commercial routers list all connected devices with their current IP address.

## 4 Operation

### 4.1 Status LEDs

The PCAN-Wireless Gateway has different status LEDs that represent the following conditions:

LEDs	Status	Condition
Status	Green on	System start
	Green blinking	Ready for operation
WLAN	Green on	Active connection <sup>1</sup>
Power	Green on	Power supply is applied
BT	No function. Reserved for future extensions.	

### 4.2 Reset Button

If the PCAN-Wireless Gateway is no longer accessible due to an incorrect configuration, the device can be reset to factory defaults using the reset button.

To perform a reset, press with a paper clip for example into the small hole on the right side of the casing. Press for 1 second to restart the device. Press for more than 5 seconds to reset the PCAN-Gateway to factory defaults.

With a reset to the factory defaults, the IP address and the login data are reset to the initial values (see the label at the top of the PCAN-Gateway), and the Micro Access Point mode will be reactivated. Afterwards you can perform a reconfiguration of the device (see chapter 3 on page 13).

<sup>1</sup> The WLAN LED is not active while running the device in Micro Access Point mode.

### 4.3 wake-Up

If the PCAN-Wireless Gateway is in power-off mode (supply voltage is applied, power LED off) a wake-up signal is required so that it starts to operate.

When a message is received on a CAN channel, the PCAN-Wireless Gateway turns on. Within the wake-up time further incoming CAN messages are not processed.

In addition, the device can be activated with a High level on the wake-up pin (see chapter 2.1 on page 8 and 2.2 on page 11 for the pin assignment).

### 4.4 Signal Delay

The signal delay between the CAN connection and WLAN may vary.

The transmit time of the signal in the IP network depends on the expansion and structure of the network as well as the configuration of the message forwarding. Therefore, a fixed value cannot be specified.

## 5 Configuration

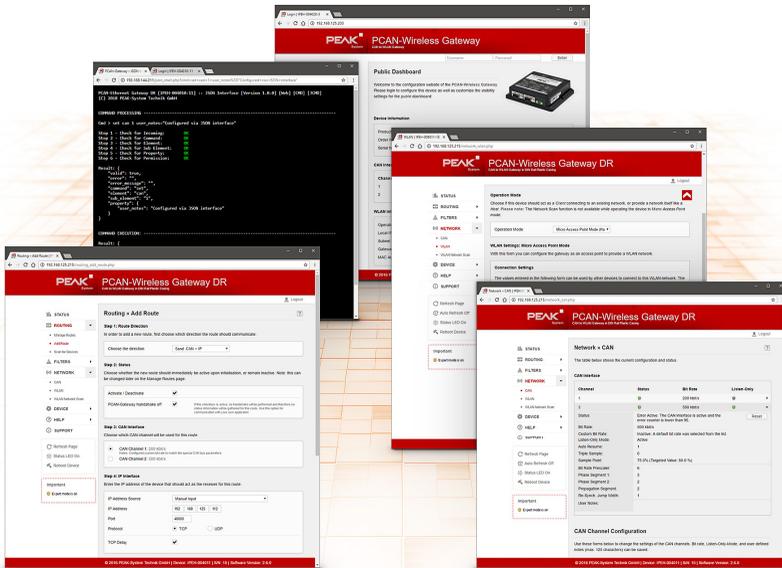


Figure 5: Configuration Website

The configuration of the device is done via a comfortable web interface. Enter the IP address of your PCAN-Gateway into the address bar of your browser.

Afterwards the configuration website opens. Besides providing a variety of status information, the website can directly manage settings for the device itself, communication interfaces, and message routing.

The information that is visible to non logged in users (Public Dashboard) can be set on the page *Device > User Management* (see section 5.6.2 on page 57). The login area can be found to the upper right of the website.

Enter your username and password, then press **Enter**. After logging in, you will have access to the 7 main areas of the website: Status, Routing, Filters, Network, Device, Help, and Support.



**Note:** For full functionality and an optimal representation of the website, we recommend one of the following Internet browsers: Internet Explorer 8 or higher, Mozilla Firefox, Safari, Opera, or Chrome.

The storing of cookies by the browser is required to access the website.

Some features of this website require JavaScript. Please enable support for this scripting language if a prompt appears on the website.

## 5.1 Structure of the website

### 5.1.1 Header

The header area of the website displays the product name, as well as a user defined name and description that can be set on the *Device > Configuration* page. This information is used to identify the device.

### 5.1.2 Navigation

On the left side is the main navigation menu:

- └ The main pages (Status, Routing, Filters, Network, Device, Help, and Support) display general information
- └ The subpages of *Network* and *Device* provide configuration options for the device and for the network
- └ The subpages of *Routing* can be used to add, manage, edit or delete routes, as well as to search for other devices in the network
- └ The subpages of *Filters* can be used to add, edit, or delete filters

The links in the control box (below the menu) perform additional website and device functions

- └ **Refresh:** Clicking Refresh will perform a page reload, for example to update the current route status

 **Note:** The information displayed on the website is not updated automatically by default.

- └ **Auto Refresh On / Off:** When you activate this function by left clicking the link, the website will begin to automatically update the information on the page every 10 seconds. You can manually turn this function off by left clicking the link again.

Navigating away from the current page will automatically deactivate this function too

- **Status LED On:** The status LED on the device will light up for approximately 10 seconds. This function can be used to identify the device
- **Reboot Device:** Use this link to restart the device. During this process, the PCAN-Gateway will be unreachable for a short time
- **Power off:** Use this link to shut down the device. It will start automatically if CAN traffic is detected or a High level is applied to terminal 15 (Wake-up pin)

The red framed Info box at the end of the navigation lists important information about the current configuration.

### 5.1.3 General Symbols

The configuration website uses a variety of different symbols and icons to convey general information that is valid for many situations.

In some cases, additional information is displayed as a tooltip when you hover the mouse cursor over the icon.

LED Symbol	Meaning
	ON / active
	OFF / inactive
	Warning! The execution / function is prevented. The problem is well known and can be eliminated.
	Attention! An error prevents the execution / function.

## 5.2 Status

On the *Status* page the current device configuration is displayed.

### Device Information:

In this box the product name, the order number, and the serial number of the device are displayed. This information can be used to uniquely identify the device.

- On the *Device* page you will find detailed information about the device

### CAN Interfaces:

For each CAN channel the status, bit rate, and the setting of the Listen-Only-Mode are displayed.

- The CAN interfaces can be configured on the *Network > CAN* page. In addition, this page provides detailed information about the interfaces

### WLAN Interface:

This box displays the WLAN interface settings. Operation mode, IP address, Subnet mask, and gateway are adjustable. The MAC address cannot be changed. Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

- The WLAN interface, its operation mode, and the connection settings can be configured on the *Network > WLAN* page. The page *Network > WLAN Network Scan* displays all networks that are available for connection

## Defined Routes:

Here, each message forwarding is displayed with its basic information. For each of these, the index, the status, the used transmission protocol, the source and destination, as well as the used filters are specified.

- └ On the *Routing > Manage Routes* page, the routes can be managed, edited, and deleted
- └ On the *Routing > Add Route* page new message forwarding instances can be created

## Defined Filters:

This box contains an overview of all defined filters with basic information. Starting with the index, every filter is displayed with its usage, name, type, and mode.

- └ On the *Filters > Manage Filters* page, the filters can be managed, edited, and deleted
- └ On the *Filters > Add Filter* page new filters can be created

## 5.3 Routing

*Routing* displays basic information about the created routes and PCAN-Gateways detected on the network.

### Defined Routes:

Here, each message forwarding is displayed with its basic information. For each of these, the index, the status, the used transmission protocol, the source and destination, as well as the used filters are specified.

- On the *Routing > Manage Routes* page, the routes can be managed, edited, and deleted
- On the *Routing > Add Route* page new message forwarding instances can be created

### Detected Devices:

This table shows all PEAK-System gateways that were detected during the last network broadcast scan. If no other devices are currently in the network or no scan has been performed, this table will not be shown.

Each PCAN-Gateway is displayed with its product name, the custom device name, MAC address, and serial number. This information can be used to identify the device. In addition, the IP address and a small icon of the device are displayed. With a left-click the configuration website of this device can be opened in a new tab.

- On the *Routing > Scan for Devices* page, a search for available devices on the network can be performed



**Note:** When changing the network topology, the list is not updated automatically. If a device is removed from the network, it will remain visible in the list of detected devices until the scan is performed again and the list is updated.

### 5.3.1 Manage Routes

On the page *Routing > Manage Routes* the message forwarding instances are listed with basic information and control options. For each of these, the index, the status, the used transmission protocol, the source and destination, as well as the used filters are specified.

**Index:** For saving routes, the PCAN-Gateway uses a table with 8 rows that are addressed with this unique index.

**Status:** The LED indicates the status of a route.

LED Symbol	Meaning
	The route is inactive.
	For send routes: The route is active.
	For receive routes: The route is active and connected with the remote site.
	Warning! The route is active but not connected with the remote site.
	Warning! More than one remote site tries to connect to this route.
	The PCAN-Gateway handshake is inactive. No status information are gathered for this route.

**Filter:** Hover the filter icon with the mouse cursor to display a list of the attached filters. The list refers to the indices of the filters. Perform a left-click on the icon to open the page *Filters > Manage Filters* with the corresponding rows highlighted. The icon is not visible if no filter was defined.

**Notes:** Hover this icon with the mouse cursor to display the user notes of this route. The icon is not visible if no user notes are available.

**Source / Destination:** The source and the destination depend on the direction of the message forwarding.

In a Receive route the PCAN-Gateway receives data via the IP interface and forwards it to a CAN channel. The IP address is displayed in this case as "Local IP".

In a Send route the data of a CAN channel is forwarded over the IP interface. By left-clicking the IP address of the receiver, its configuration website can be opened.

**Protocol:** Routes can use TCP or UDP as the transmission protocol in the IP network.

TCP (Transmission Control Protocol) establishes a connection between two participants and monitors their communication. If data packets are lost for example, they are retransmitted.

UDP (User Datagram Protocol) sends the data packets directly into the network without establishing a connection. With this protocol, error free transmission is not guaranteed. The advantage UDP has over TCP is the lower demand on performance.

### Control Elements:

Symbol	Meaning
	Switch ON / Switch OFF (depending on the current state)
	Delete
	Edit

**ON/OFF:** Use the "ON / OFF" switch to activate or deactivate a route.

**Delete:** Click on the trash can icon to remove the route.

**Edit:** Click on the pencil icon to edit the route. The route is loaded into the forms of the page *Routing > Add Route*. The same input and configuration options are available there. Detailed information can be found in the following chapter 5.3.2.

**Add Route**: This button opens the *Routing > Add Route* page on which you can set up a new message forwarding instance.

### **Additional information:**

Each route is provided with additional information about its connection and data transfer status. This additional information can be viewed by clicking on the triangle icon located on the right edge of the route.

In Expert mode (see chapter 5.6.2 *Device > User Management*) detailed connection status information are displayed. With the

**Reset** button you can reset the values of the route to 0.

### **5.3.2 Add / Edit Route**

On the *Routing > Add Route* page you can set up a new route. Similarly, an existing route can be edited via the form displayed. For this, the current settings are loaded into the form fields. Editing a route is done via the page *Routing > Manage Routes*.

For saving routes, the PCAN-Gateway uses a table with 8 rows that are addressed with a unique index. If a new route to be set up, the lowest free index will be assigned. Because of that, only up to 8 routes can be created regardless of the status. Then the *Add Route* function is no longer available.

### **Route Direction:**

When you create a route, you should start with the selection of direction since the following input and output fields are determined by this.

**Receive IP > CAN:** In a Receive route the PCAN-Gateway receives data via the IP interface and forwards it to a CAN channel. The IP

address shown in this case is "Local IP". The configuration of the local IP interface is done on the *Network > WLAN* page.

**Send CAN > IP:** In a Send route the data of a CAN channel is forwarded over the IP interface. If other PCAN-Gateways were discovered during a broadcast scan, they can be selected for the destination of the route. On the page *Routing > Scan for Devices* you can search for other PCAN-Gateways in the network.

### Status:

Use this setting to determine the state of the route after it is created. Ticking the checkbox will have the effect of immediately activating the route after the completed form is saved. Port 45321 is required for the transmission of status information.

**PCAN-Gateway handshake off:** (Expert mode only) If this checkbox is active, no handshake will be performed and therefore no status information will be gathered for this route. Use this option for communication with your own application<sup>2</sup>.

### CAN Interface:

Choose one of the available CAN channels. The configuration of the CAN interfaces is done on the page *Network > CAN*.

### IP Interface:

**IP Address Source:** This field only appears when PCAN-Gateways were detected during a network broadcast scan and the direction "Send CAN > IP" is selected.

<sup>2</sup> For information about the data protocol see the PCAN-Gateway developer documentation.

Select the desired device from this drop-down menu. The following IP address is automatically set to the appropriate value. If you prefer to enter the IP address yourself, select "Manual Input".

**IP Address:** Enter the IP address (IPv4) of the destination device. It should be noted that only values from 0 to 255 may be used and certain address ranges are reserved.

- In the first field, enter a value less than 224, since addresses starting from this value are reserved for Multicast messages
- Depending on the Subnet mask, the highest device address is reserved for broadcast messages. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.255
- Depending on the Subnet mask the lowest device address is reserved for messages that are addressed to the entire network. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.0

**Port:** Enter a port between 1024 and 65535. Values below 1024 are reserved for various system services and must therefore not be used. Port 45321 is reserved for the transmission of status information and to perform a handshake between PCAN-Gateways.

**Protocol:** Select which transmission protocol should be used by the route in the IP network.

TCP (Transmission Control Protocol) establishes a connection between two participants and monitors their communication. If data packets are lost for example, they are retransmitted.

UDP (User Datagram Protocol) sends the data packets directly into the network without establishing a connection. With this protocol,

error free transmission is not guaranteed. The advantage UDP has over TCP is the lower demand on performance.

 **Note:** Any combination of the IP address, port, and protocol can only be used once.

**Frames per Packet:** This value specifies how many CAN frames are transmitted per IP packet. The higher the value, the greater the delay in the transmission of CAN messages. However, the demand on performance is lower in this case. This selection is only available for Send routes when using the UDP protocol.

**TCP Delay:** (Expert mode only) If this checkbox is active, TCP delay is enabled. In this case, the transmission of data packets via TCP might be delayed to lower the demand on performance. If this option is disabled, every CAN frame is transmitted as fast as possible.

## Filter:

The defined filters are listed in this formula. A single one can be attached or detached to Send routes via the radio buttons. If Expert mode is active, the radio buttons will be replaced with checkboxes and multiple filters can be selected.

**Filters are joined with:** This property specifies how multiple filters are linked. If you use several Whitelist filter, you should choose Logical OR. If you attach multiple Blacklist filter to a single route, the selection Logical AND is recommended.

 **Note:** A single *Range* filter is realized with a composition of multiple *Mask* filters. The Joined Filters property will also affect this.

## User Notes:

Additional information with a length of 125 characters can be entered for each route. This text is available on the page *Routing > Manage Routes*.

Finally you can create a new route with the **Add Route** button or save the changes after editing with the **Save Settings** button.



**Note:** Transferring data between 2 PCAN-Gateways always consists of a Send and a Receive route. Note that both should use the same transmission protocol (TCP or UDP) and the same port.

### 5.3.3 Scan for Devices

Using the *Routing > Scan for Devices* page a broadcast message can be sent to the IP network, to which all PCAN-Gateway products report. From the obtained information, a list of available devices is created. The detected devices can then be used as target destinations while creating or editing routes.

 **Note:** When changing the network topology, the list is not updated automatically. If a device is removed from the network, it will remain visible in the list of detected devices until the scan is performed again and the list is updated.

#### Detected Devices:

This table shows all PEAK-System gateways that were detected during the last network broadcast scan. If no other devices are currently in the network or no scan has been performed, this table will not be shown.

Each PCAN-Gateway is displayed with its product name, the custom device name, MAC address, and serial number. This information can be used to identify the device. In addition, the IP address and a small icon of the device are displayed. With a left-click the configuration website of this device can be opened in a new tab.

**Perform Scan:** By clicking on the  button, the list of available devices is updated. The scan takes a short time. Please wait until you are forwarded.

## 5.4 Filters

Filters are used to filter CAN messages by their ID. It is possible to create up to 32 of them. Each filter can be attached to multiple Send routes via the page *Add Route* or *Edit Route*.

The page *Filters* displays basic information about the created filters.

### Defined Filters:

This box contains an overview of all defined filters with basic information. Starting with the index, every filter is displayed with its usage, name, type, and mode.

- └ On the *Filters > Manage Filters* page, the filters can be managed, edited, and deleted
- └ On the *Filters > Add Filter* page new filters can be created

### 5.4.1 Manage Filters

On the page *Filters > Manage Filters* the existing filters are listed with basic information and control options. Each of them is specified with its index, usage, name, type, and mode.

**Index:** For saving filters, the PCAN-Gateway uses a table with 32 rows that are addressed with this unique index.

**Usage:** The badge on the left shows how many times the filter is used. The information to which routes it is attached to, is displayed as a tooltip when hovering with the mouse cursor. The list refers to the indices of the routes. If you click on the badge, the page *Manage Routes* will be opened with the corresponding routes highlighted.

**Notes:** Hover this icon with the mouse cursor to display the user notes of this filter. The icon is not visible if no user notes are available.

**Name:** While creation a name can be assign to a filter. It can be used for identification while managing the filters or attaching them to routes.

**Type:** This column displays the filter type (*Range* or *Mask*) and the used CAN ID mode (11- or 29 Bit). Detailed information can be found in chapter *5.4.2 Add / Edit Filter*.

**Mode:** The filter mode (*Blacklist* or *Whitelist*) indicates if the defined filter is inverted or not.

### Control Elements:

Symbol	Meaning
	Delete: Click the trash icon to remove the filter. If it is attached to one or more routes, it will be automatically detached
	Edit: Click on the pencil icon to edit the filter. The filter is loaded into the forms of the page <i>Filters &gt; Add Filter</i> . The same input and configuration options are available there. Detailed information can be found in chapter <i>5.4.2 Add / Edit Filter</i>

**Add Filter:** The button below the information table opens the *Filters > Add Filter* page on which you can set up a new filter. It is not available if the limit of 32 filters is reached.

### Detailed Information:

The filters are provided with detailed information. This additional information can be viewed by clicking on the triangle icon located on the right edge of the filter.

### 5.4.2 Add / Edit Filter

On this page you can set up a new filter. Similarly, an existing one can be edited via the form displayed. For this, the current settings are loaded into the form fields. Editing a filter is done via the page *Filters > Manage Filters*.

For saving filters, the PCAN-Gateway uses a table with 32 rows that are addressed with a unique index. If a new filter to be set up, the lowest free index will be assigned. Because of that, only up to 32 filters can be created regardless of their status. If the limit is reached, the *Add Filter* function is no longer available.

#### Type and ID Mode:

When you create a filter, you should start with the selection of the type and ID mode since the following input and output fields are determined by this. The filter types *Range* and *Mask* specify how the CAN IDs, to be filtered, are defined.

The ID modes specify if the CAN message will be a Standard frame with an 11 Bit identifier or an Extended frame with a 29 Bit identifier. This changes the ID value range that can be entered in the following forms.

#### Mode:

The mode indicates how the defined filter is interpreted.

- **Whitelist:** A filter using this mode will transmit every CAN message whose ID matches the filter specifications
- **Blacklist:** If this mode is selected, the filter will be inverted. That means every message with a CAN ID that matches the filter specifications will not be transmitted

### Type Range:

If the filter type *Range* was chosen, a lower and an upper limit have to be specified to set the range. This can be done via the slider (JavaScript support required) or with the input forms.

**From:** This value marks the lower limit of the filter range.

**To:** This value marks the upper limit of the filter range.

While entering the values the following should be considered:

- └ The values are entered in hexadecimal format.
- └ The *From* value has to be lower than the *To* value.

### Type Mask:

The working principle of this acceptance filtering is based on the SJA1000 CAN controller. Detailed information can be found in the NXP Application Note *AN97076 - SJA1000 Stand-alone CAN controller* chapter 4.1.2.

The ID of the CAN message to be transmitted is compared bitwise with the *Acceptance Code* value. The *Acceptance Mask* specifies which bit positions are relevant.

- └ 0 = relevant. The CAN ID at the corresponding bit position has to match the value of the Acceptance Code
- └ 1 = not relevant. The CAN ID at the corresponding bit position does not matter

In contrast to the original implementation, the PCAN-Gateway *Mask* filter only looks at the CAN ID. It cannot process any data bytes or the RTR flag.

The size of the *Acceptance Mask* and *Acceptance Code* depends on the ID mode selection above and can be 11 Bit for Standard with a range of 0 to 7FF or 29 Bit for Extended with a range of 0 to 1FFFFFFF.

### Example for 11 Bit identifiers:

IDs											Meaning
0	1	1	1	1	0	1	1	1	1	1	Acceptance-Code
1	1	1	0	0	0	0	1	1	0	1	Acceptance-Mask
X	X	X	1	1	0	1	X	X	1	X	CAN messages with an ID matching this binary value, are accepted. X means that this bit position does not matter.
MSB						LSB					

### Name :

A name with up to 50 characters can be assign to a filter. It can be used for identification while managing filters or attaching them to routes.

### User Notes :

Additional information with a length of 200 characters can be entered for each filter. Besides the pages *Filters > Add / Edit Filter* and *Filters > Manage Filters* this text is available while route creation or editing.

Finally you can create the new filter with the **Add Filter** button or save the changes after editing with the **Save Settings** button.

## 5.5 Network

The *Network* page provides information about the current configuration of available communication interfaces.

### CAN Interfaces:

For each CAN channel the status, the bit rate, and the setting of the Listen-Only-Mode are displayed.

- The CAN interfaces can be configured on the *Network > CAN* page. In addition, this page provides detailed information about the interfaces

### WLAN Interfaces:

This box displays the WLAN interface settings. Operation mode, IP address, Subnet mask, and gateway are adjustable. The MAC address cannot be changed. Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

- The WLAN interface, its operation mode, and the connection settings can be configured on the *Network > WLAN* page. The page *Network > WLAN Network Scan* displays all networks that are available for connection

#### 5.5.1 CAN

The *Network > CAN* page displays the current settings of the CAN interfaces as well as options to configure them. Information about the status, Listen-Only-Mode, and the bit rate is displayed for each CAN channel.

**Channel:** The channel number of the CAN interface. This number is used to select the intended interface while creating a route.

**Status:** The LED indicates the state of the CAN channel.

LED Symbol	Status	Meaning
	Active	The CAN interface is active and the error counter is lower than 96 (Error Active).
	Inactive	The channel is inactive or sleeping.
	Error Warning	Errors were detected on the bus. The error counter reached the threshold of 96.
	Error Passive	Errors were detected on the bus. The error counter reached the threshold of 128. Please check the CAN connection and the configured bit rate. The bit rate of the CAN channel should match the one of the connected CAN bus.
	Bus Off	The CAN controller was switched off. The error counter is higher than 255. A possible cause can be a short circuit on the bus.

**Bit Rate:** CAN channel transmission rate. This value should match that one of the connected CAN bus.

**Listen-Only-Mode:** The state of the Listen-Only-Mode is represented by an LED.

LED Symbol	Meaning
	Active. The CAN channel is not sending messages, nor is it answering incoming messages (Acknowledge).
	Inactive

**Additional information:** Furthermore status information and user defined notes are available for each channel. Click the triangle icon on the right edge of the list item to view the information. With the **Reset** button you can reset the CAN channel.

In Expert mode, (See chapter 5.6.2 *Device > User Management*) further detailed information is displayed.

### **CAN Channel Configuration:**

Each channel is handled and configured by a separate form. Settings can be saved by clicking the **Save Settings** button located underneath the form.

**Activate / Deactivate:** (Expert mode only) Use the Checkbox to activate or deactivate the CAN channel.

**Bit Rate Selection:** For setting the bit rate, click the drop-down menu and select the value that is used on the connected CAN bus.

**Custom Bit Rate:** (Expert mode only) By clicking on this checkbox, a form for configuring a custom transmission rate can be opened. For details, see the following section *Configuring Custom Bit Rates*.

**Listen-Only-Mode:** If the PCAN-Gateway should act as a pure observer, not affecting the data traffic, Listen-Only-Mode must be enabled. Activate Listen-Only-Mode with a click on the checkbox.

**User Notes:** Additional information with a length of 125 characters can be entered for each CAN channel. This text is available while route creation or editing.

## Configuring Custom Bit Rates

In Expert mode, you can create a custom bit rate and configure the sample point. Via the *Custom Bit Rate* checkbox, the necessary input fields for entering the register values of the CAN controller are displayed.

The first four fields have a direct impact on the bit rate and the sample point.

**Bit Rate Prescaler:** With this input field, the ratio of CPI clock and serial clock frequency is set. It accepts values from 1 to 256.

**Phase Segment 1 & 2:** The phase segments are used to compensate edge phase errors at the beginning and end of the bit. Phase Segment 1 expects an input from 1 to 8 and Phase Segment 2 accepts values from 2 to 8.

**Propagation Segment:** This time segment is used to compensate the signal delays over the network and can accept values from 1 to 8.

**Calculated bit rate:** The form checks your entries and calculates the transmission rate using the following formula:

$$\text{Bit Rate} = \frac{24 \text{ MHz} / \text{Bit Rate Prescaler}}{\text{Sync Seg.} + \text{Time Seg.1} + \text{Time Seg.2}}$$

The segment Synchronization is always 1 and is used for the synchronization of each bus node. The sampling time (sample point) is determined via Time Segments 1 and 2. Time Segment 1 consists of Phase Segment 1 and the Propagation Segment. Their

sum must be at least 4. Time Segment 2 is defined by Phase Segment 2.

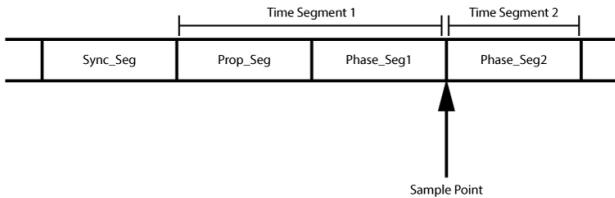


Figure 6: Bit Timing

 **Note:** When entering values the resulting transmission rate is automatically calculated in real time. If the values are incorrect, or the calculated bit rate is beyond the limits of the CAN transceiver (40 kbit/s to 1 Mbit/s), the data can not be saved.

**Re-Synch. Jump Width (1 – 4):** The Resynchronization Jump Width defines the maximum extension or shortening of the Phase Segments for the signal resynchronization. This value is not used for the calculation of the bit rate. It accepts values from 1 to 4.

By clicking on the  button you can save your previously defined bit rate.

## 5.5.2 WLAN

The *Network > WLAN* page displays the current settings of the WLAN interface and provides options for configuration.

### WLAN Interface

In this box the settings of the WLAN interface will be displayed. Operation mode, IP address, Subnet mask, and gateway are adjustable. The MAC address cannot be changed. Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

### Operation Mode

The Gateway's operating mode is selected in this menu. The following WLAN Connection Settings form and its options are directly affected by this.

**Infrastructured Mode (Client):** The Gateway must connect to a WLAN network of an existing access-point.

**Ad-Hoc Mode:** The Gateway provides a WLAN network of its own. Other devices can connect to this network as an equal participant. The SSID entered in the following form is used as the network's name. This operation mode does not require an additional access-point.



**Note:** Since Windows 8.1, the connection to Ad-Hoc networks is no longer supported.

**Micro Access Point Mode (Host):** The PCAN-Gateway hosts a WLAN network of its own. Up to seven devices can connect as a client. The SSID entered in the following form is used as the network's name. This operation mode does not require an additional access-point.

 **Note:** The Network Scan function is not available while operating the device in *Micro Access Point* mode. The following connection settings have to be entered manually.

The WLAN LED is not active while running the device in Micro Access Point mode.

## WLAN Settings

With this form you can establish a connection to an existing WLAN or define your own network depending on the operation mode. All input fields are mandatory. Please note that these settings are saved together with the address settings below.

Alternatively, you can select an existing WLAN network on the web page *WLAN Network Scan*. Open the page with the link and select the desired network from the list.

## Connection Settings

**Name (SSID):** Enter the name of the WLAN you would like to connect to.

**Encryption Type:** Choose the encryption type that is used by your WLAN from this list.

**Network Key:** Enter the password that is required to gain access to the WLAN.

In order to save all changes, click  at the end of this box.

 **Note:** Using the character # for the SSID or Network Key is not allowed.

## Address Settings

The WLAN interface can be configured by using this form. Settings can be saved by clicking the **Save Settings** button located below the form.

**DHCP:** If the IP network uses DHCP (Dynamic Host Configuration Protocol), the PCAN-Gateway IP address, Subnet mask, and gateway address are assigned automatically. Otherwise, you must manually enter the information. Switch DHCP on if required (Enable).



**Note:** DHCP is not recommended, because it is necessary to know the IP address of the PCAN-Gateway to access the configuration website. Furthermore the IP address may change after a restart of the device or the DHCP server. In this case the existing routes won't work.

**IP Address:** Enter here the IP address (IPv4) of the WLAN interface. It should be noted that only values from 0 to 255 may be used and certain address ranges are reserved.

- └ In the first field, enter a value less than 224, since addresses starting from this value are reserved for Multicast messages
- └ Depending on the Subnet mask, the highest device address is reserved for broadcast messages. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.255
- └ Depending on the Subnet mask the lowest device address is reserved for messages that are addressed to the entire network. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.0

**Subnet mask:** The Subnet mask indicates which part of the IP address represents the network, and which part represents the device. This subdivision is achieved by filling in the (binary) Subnet mask from left to right with the number “1”. The resulting values for the individual fields are: 0, 128, 192, 224, 240, 248, 252, 254 and 255.

While entering values from left to right, as soon as a value smaller than “255” is entered, a “0” must follow. For example 255.255.128.0 is valid, while 255.128.255.0 is false.

**Gateway:** Enter the IP address (IPv4) of the gateway that manages the IP network. Proceed with the same guidelines as outlined for local IP address entry. Entering a gateway address is optional.



**Note:** Please note that after modifying these settings, the device may not be reachable. Possible causes for this are:

- You have activated DHCP. The IP address of the device is not known, because it has been acquired dynamically from the gateway. The address can often be found on a list provided by the gateway.
- You have changed the part of the address assigned to the network (see Subnet mask information). In this case the device is now part of a different network than the one your computer is a part of. Connecting to the device is only possible by respectively adapting your computer’s IP address to the different network that the device is in.

## WLAN Region Selection

The number of channels respectively frequencies which may be used for WLAN, differ depending on the region. Use this form to specify this setting. Select your region from the list and save the value using the  button.

 **Note:** The selected region must correspond to the setting of your wireless router. Otherwise, the wireless network may not be found and no connection can be established.

### 5.5.3 WLAN Network Scan

While operating the device in *Infrastructured* or *Ad-Hoc* mode this website lists all available WLAN networks according to their signal strength. Thereby, each net is listed with its name (SSID), the transmit frequency including channel specification, and the encryption type.

Use the  button to choose the network which you like to connect to. The data will be transferred to the website *WLAN* where you can save the information along with the IP address settings. The operation mode is automatically switched to *Client*.

 **Note:** Please check the information from the *Network Scan* to prevent problems when establishing a connection.

## 5.6 Device

The *Device* page displays detailed information about your PCAN-Gateway.

**General Product Information:** In this area, the product name, order number, and the serial number of the device are displayed. This information can be used to uniquely identify the device.

**User defined Device Information:** The information displayed here can be defined by the user on the *Device > Configuration* page. This information can be used to uniquely identify the device.

**Interface Information:** This area lists all available communication interfaces regardless of their state.

**Version Information:** This area shows different information concerning versions:

- └ Hardware Version: The hardware version indicates the revision of the circuit board
- └ Software Version: This version number indicates the version of the installed software package. This, additionally to the software, includes the firmware and the website. The software package can be updated on the page *Device > Software Update*
- └ Website version: This number indicates the version of the configuration website that you are currently using. The website is updated automatically when a software update is processed

### 5.6.1 Device Configuration

On the *Device > Configuration* page it is possible to assign a custom name and description to the device. In addition to that, different import and export options are available.

#### Custom Device Name and Description:

Use this form to assign a name and description to the PCAN-Gateway. This will aid in identifying the device among other similar devices. The name and description will be shown in the header of the website and other areas.

**Name:** Enter a name for the device in this field. The maximum length allowed is 50 characters. Please note: This name is separate from the product name that is also displayed in the header area of the website.

Depending on the IP network, it is possible to access the website of the device by typing this name with a previous **http://** in the address bar of the browser.

**Description:** Enter a description for the device in this field. The maximum length allowed is 200 characters.

The entries can be saved by clicking the  button located beneath the form.

## Import Configuration:

This form allows the importing of locally saved configuration files. After an import, all communication interfaces and device settings, as well as the routes and filters are restored. The current configuration is overwritten within that process.

Use the button on the left side to select a configuration file (\*. ini). To start the restoration process, click the **Import** button located on the right.



**Note:** If you import a configuration file from another PCAN-Gateway device that is in the same network, its IP address will also be imported and loaded. Both devices would then have the same IP address. This would cause an address conflict and would result in both devices being non accessible. In such a case, separate one device from the power supply. The other device will then become accessible again and its IP address can be changed manually. This will resolve the address conflict and both devices can be used again.

## Export Configuration:

With the **Export** button an ini file can be downloaded containing all device configurations as well as all route and filter settings.

The file can be freely renamed, the contents of the file however should not be altered. Importing altered configuration files can lead to failures during the import process. Only valid configuration files can be used for device restoration.

## Reload Default Settings:

With the **Reload** button you can restore the device to its factory defaults. During this process the login settings, all device and communication interface settings along with existing routes will be restored to the states they were in at the time of product delivery. The current configuration is overwritten within that process. In addition, the access data will be reset to the default values (see the label on the upper side of the device). The PCAN-Gateway is then reachable under the default IP address.

## Auto Power Off:

With this form you can activate the *Auto Power Off* function. If enabled, the device will switch off, if there is no voltage applied to terminal 15 for more than approx. 5 seconds. It restarts automatically if CAN traffic is detected or a High level is applied to terminal 15 (Wake-up pin).

Activate the function via the checkbox and save the settings with **Save Settings**.



**Note:** As long as a voltage is applied to terminal 15, the *Power Off* from the navigation causes only a short-term shutdown. Because voltage is applied, the device will restart immediately.

## JSON Interface Configuration (Expert mode only):

The JSON interface is an alternative way to access the status information and configuration of the PCAN-Gateways.

The interface is activated and set up once via the configuration website. A specific request is then transmitted as a GET parameter of a URL and the PCAN-Gateway returns a JSON-formatted response.

Based on this, it is possible to monitor and configure the PCAN-Gateway product family via software.

**Enable JSON Interface:** If active, the JSON interface can be used.

**Enable Configuration:** If active, the device can be configured via the JSON interface. This includes the commands set, reset, and delete.

**Enable Shell View:** If active, the Shell view can be used. It is primarily intended for development and familiarization.

**Respect Public Display:** If active, access is only allowed to elements that have been activated on the page *Device > User Management* in the Public Dashboard form.

Save your settings with [Save Settings](#).



**Note:** In the current version there is no access protection for the JSON interface. Once you have activated the interface and **Enable Configuration**, the PCAN-Gateway can be configured without logging in.

Detailed information about the JSON interface is included in the PCAN-Gateway developer documentation.

## 5.6.2 User Management

The *Device > User Management* page provides options for entering new login credentials, changing and defining the display mode, and determining what information should be visible on the login page.

### Login Settings:

Enter your current login details in the upper part of the form. In the lower part you can enter a new username and a new password. The new password must be confirmed in order to exclude accidental input.

To ensure a minimum level of security, the password should have at least 8 characters. If possible, use letters, numbers, and special characters.

Save your inputs with the  button.

 **Important notice: Login data is confidential!** Do not act carelessly and leave your system open to attack. Never deposit the login data in any form on the Internet or make it easily accessible. Do not give the new login data carelessly to third parties or send it by e-mail.

## Display Mode Setting:

This form provides the opportunity to change the display mode. Expert mode enables access to more detailed information and professional settings. Interpreting this information and using these features requires advanced knowledge of TCP/IP, CAN, and the message forwarding of the PCAN-Gateways.

Click on the drop-down menu and choose one of the two modes. This setting only applies for the current session and will be reset with your next login.

**Reset after Login:** If you deactivate this checkbox, the display mode is not reset after a new login.

Save the settings by clicking the  button.

## Public Dashboard:

This form is responsible for defining what information is visible on the website to non-logged in users. Only basic status information can be made visible, configuration options cannot be unlocked publicly.

Activate or deactivate the checkboxes to toggle the visibility of their corresponding information. Confirm your choices with the  button.

### 5.6.3 Software Update

Initiating a software update will update the firmware, software, as well as the configuration website. The currently installed software package version is indicated by the software version number. This number can be found on this page *Device > Software Update* itself as well as on the *Device* page.

Current product updates can be downloaded on the PEAK-System website ([www.peak-system.com](http://www.peak-system.com)). Please make sure to download the correct package for your device. Every version of the PCAN-Gateway product family has a separate download package.

It's recommended to backup the current configuration before performing a software update or downgrade. The current settings may get lost if they are not supported by the software package to be installed or if a failure like a power cut happens.

▶ Perform a software update:

1. Use the button on the left to choose the software package (\*.tar).
2. Start the process with the [Start Software Update](#) button. Please note: In order to prevent conflicts all CAN interfaces as well as all created routes will be put on standby.
3. After the software update has completed the device will reboot. You will be forwarded to the login page in which case the process was successful and all routes and CAN interfaces have been reactivated.

 **Note:** If the update process was interrupted, you will have to restart the device in order to reactivate the routes and CAN channels. Use the **Reboot Device** link located near the bottom of the main navigation. Alternatively you can use the physical **Reset button** located on the device itself.



**Note:** Export your current configuration, if you like to downgrade to an older software package. The current settings, routes, and filters may get lost.

## 5.7 Help

The *Help* page contains the complete help information available for your Gateway's Configuration web site. It is nearly identical to chapter 5 of the PDF documentation.

Question mark icons are located next to every page title, clicking on one will open a corresponding help page

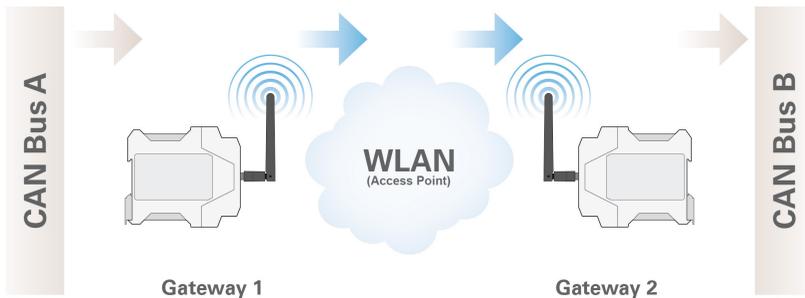
## 5.8 Support

On the *Support* page you will find links to product documentation (German and English) as well as contact information of PEAK-System Technik GmbH.

## 6 Application Examples

The PCAN-Wireless Gateway allows the connection of different CAN busses over IP networks. CAN frames are wrapped in TCP or UDP message packets and then forwarded via the IP network from one device to the other. This makes it possible for CAN networks to connect to each other over large distances.

### 6.1 Unidirectional Data Transmission



For unidirectional data transmission the message traffic from CAN bus A is to be forwarded to CAN bus B via a WLAN network. Necessary for this are two PCAN-Wireless Gateways and the creation of a route on each device.

In this example Gateway 1's IP address is 192.168.1.201 and it is connected to CAN bus A via CAN channel 1. Gateway 2's IP address is 192.168.1.202 and it is connected to CAN bus B via CAN channel 2.

## Creating a Send Route:

Incoming messages from Gateway 1 are to be transferred into the WLAN network. For this, a Send route with the following values must be created.

Gateway 1 > Send Route		
Route Direction	Send: CAN > IP	
Status	Activate	
CAN	Channel 1 (connected to CAN bus A)	
IP Interface	IP-Address	192.168.1.202 (address of Gateway 2)
	Port	50000
	Protocol	TCP

After saving, the route on Gateway 1 will be displayed on the *Routing > Manage Routes* page as follows.

Status	Source	Destination	Protocol	
1 	CAN Channel 1	 192.168.1.202:50000	TCP	   

## Creating a Receive Route

Gateway 2 is to accept the data packets sent via WLAN network by Gateway 1, and pass the containing CAN messages through CAN channel 2 into CAN bus B. For this, a Receive route with the following values must be created.

Gateway 2 > Receive Route		
Route Direction	Receive: IP > CAN	
Status	Activate	
IP Interface	Port	50000 (like the Send route)
	Protocol	TCP (like the Send route)
CAN	Channel 2 (connected to CAN bus B)	

Transferring data between 2 PCAN-Gateways always consists of a Send and a Receive route. Note that both should use the same transfer protocol (TCP or UDP) and the same port.

After saving, the route on Gateway 2 will be displayed on the *Routing > Manage Routes* page as follows.

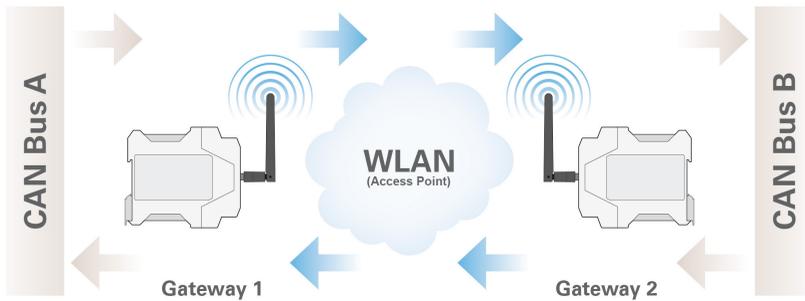
Status	Source	Destination	Protocol	
1 	Local IP - Port:50000	CAN Channel 2	TCP	   

A short time after both routes have been created and activated, the connection will establish. You can interrupt the connection by deactivating or erasing one of the routes on the *Routing > Manages Routes* page.



**Note:** The putting into operation of a PCAN-Wireless Gateway is described in detail in chapter 3 *Putting into Operation*. Detailed information concerning the creation of routes, as well as input and selection options, can be found in chapter 5.3.2 *Add / Edit Route*.

## 6.2 Bidirectional Data Transmission



For bidirectional data transmission the message traffic occurring between CAN busses A and B is to be forwarded via the WLAN network. For this two PCAN-Wireless Gateways are needed, where for each one, a Send and Receive route must be created.

In this example Gateway 1's IP address is 192.168.1.201 and it is connected via CAN channel 1 to CAN bus A. Gateway 2's IP address is 192.168.1.202 and it is connected via CAN channel 2 to CAN bus B.

The difference here, when compared with the example in chapter 6.1, is solely that the opposite message forwarding from CAN bus B to CAN bus A must also be realized.

### The Routes on Gateway 1:

Incoming messages from Gateway 1 are to be transferred into the WLAN network. For this, a Send route with the following values must be created.

**Gateway 1 > Send Route A**

Route Direction	Send: CAN > IP	
Status	Activate	
CAN	Channel 1 (connected to CAN bus A)	
IP Interface	IP-Address	192.168.1.202 (address of Gateway 2)
	Port	50000
	Protocol	TCP

Gateway 1 is to accept the data packets sent via WLAN network by Gateway 2, and pass the containing CAN messages through CAN channel 1 into CAN bus A. For this, a Receive route with the following values must be created.

**Gateway 1 > Receive Route B**

Route Direction	Receive: IP > CAN	
Status	Activate	
IP Interface	Port	25000 (like the Send route B)
	Protocol	TCP (like the Send route B)
CAN	Channel 1 (connected to CAN bus A)	

After saving, the routes on Gateway 1 will be displayed on the *Routing > Manage Routes* page as follows.

Status	Source	Destination	Protocol	
1 	CAN Channel 1	 192.168.1.202:50000	TCP	   
2 	Local IP - Port:25000	CAN Channel 1	TCP	   

## The Routes on Gateway 2:

Gateway 2 is to accept the data packets sent via WLAN network by Gateway 1, and pass the containing CAN messages through CAN channel 2 into CAN bus B. For this, a Receive route with the following values must be created.

Gateway 2 > Receive Route A		
Route Direction	Receive: IP > CAN	
Status	Activate	
IP Interface	Port	50000 (like the Send route A)
	Protocol	TCP (like the Send route A)
CAN	Channel 2 (connected to CAN bus B)	

Gateway 2 should transmit incoming message traffic from CAN bus B into the WLAN network. For this a Send route with the following values must be created.

Gateway 2 > Send Route B		
Route Direction	Send: CAN > IP	
Status	Activate	
CAN	Channel 2 (connected to CAN bus B)	
IP Interface	IP-Address	192.168.1.201 (address of Gateway 1)
	Port	25000
	Protocol	TCP

Transferring data between 2 PCAN-Gateways always consists of a Send and a Receive route. Note that both should use the same transfer protocol (TCP or UDP) and the same port.

After saving, the routes on Gateway 2 will be displayed on the *Routing > Manage Routes* page as follows.

Status	Source	Destination	Protocol	
1 	Local IP - Port:50000	CAN Channel 2	TCP	<input checked="" type="checkbox"/> ON   
2 	CAN Channel 2	 192.168.1.201:25000	TCP	<input checked="" type="checkbox"/> ON   

A short time after all routes have been created and activated, the bidirectional connection will establish. You can interrupt the connection by deactivating or erasing one of the routes on the *Routing > Manages Routes* page.



**Note:** The putting into operation of a PCAN-Wireless Gateway is described in detail in chapter 3 *Putting into Operation*. Detailed information concerning the creation of routes, as well as input and selection options, can be found in chapter 5.3.2 *Add / Edit Route*.

## 7 Technical specifications

### Connectors (IPEH-004020)

CAN	2 x D-Sub, 9-pin (Pin assignment according to specification CiA® 303-1)
Power	Phoenix connector 2-pin; Mating connector: Phoenix Contact MC 1,5/2-STF-3,81 - 1827703

### Connectors (IPEH-004020-A)

CAN & Power	Automotive connector, 12-pin (Tyco1355505-1); Mating connector consists of: Tyco929051-1, Tyco968473-1, and Tyco928999-1
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### CAN

Specification	ISO 11898-2; High-speed CAN 2.0A (standard format) and 2.0B (extended format)
Bit rates	40 kbit/s - 1 Mbit/s
Transceiver	NXP TJA1041
Supplying external devices	IPEH-004020: D-Sub pin 1; 5 V, max. 50 mA not assigned at delivery IPEH-004020-A: Not available
Internal termination	Not available
Listen-only mode	Separately switchable for both CAN channels

### WLAN

Protocol	TCP, UDP
Antenna	Internal chip
Encryption	WPA, WPA2
Bit rates	11 Mbit/s – 54 Mbit/s
Frequency	2.4 GHz, 14 channels
Standard	IEEE 802.11 b/g
Output power	IEEE 802.11 b: 18 dBm IEEE 802.11 g: 15 dBm
Reserved ports	45321: Used to transmit status information and to perform a handshake between PCAN-Gateways

Wireless module	WIBEAR-SF1 FCC ID: PV7-WIBEAR-SF-STA  EN 300328: V.1.9.1 EN 301489-17: V2.2.1 Directive 1999/5/EC
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### Power supply

Supply voltage	8 - 30 V DC
Max. current consumption	396 mA at 8 V 277 mA at 12 V 255 mA at 13,8 V 220 mA at 14,5 V 140 mA at 24 V 114 mA at 30 V
Current consumption in Sleep mode	max. 600 $\mu$ A
Buffer battery for $\mu$ C	Button cell LR44 1.5 V

### Measures

Size	130 x 33.3 x 110.6 mm (W x H x D) See also dimension drawing Appendix B on page 71
Weight	IPEH-004020: 164 g IPEH-004020-A: 156 g

### Environment

Operating temperature	-40 - 85 °C (-40 - 185 °F)
Temperature for storage and transport	-55 - 125 °C (-67 - 257 °F)
Relative humidity	15 - 90 %, not condensing
EMC	Directive 1999/5/EC DIN EN 55024:2010 DIN EN 55022:2010
Ingress protection (IEC 60529)	IP20

# Appendix A CE Certificate

EC Declaration of Conformity  
PEAK-System Technik GmbH



**Declaration of Conformity in accordance with the Radio and Telecommunications Terminal Equipment Act (FTEG) and Directive 1999/5/EC (R&TTE Directive)**

Manufacturer:  
PEAK-System Technik GmbH  
Otto-Roehm-Strasse 69  
64293 Darmstadt, Germany

declares under our own responsibility that the radio-equipment

PCAN-Wireless Gateway  
Item number(s) IPEH-004020(-A)

to which this declaration refers, conforms with the relevant standards or other standardizing documents, complies with the essential requirements of §3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

Harmonised standards applied:

**Health and safety requirements pursuant to § 3 (1) 1. (Article 3(1) a):**  
EN 62479: 2010 (WLAN-Module Wibear-SF is below SAR Limits specified in  
EU recommendations 1999/519/EC)  
EN 62368-1: 2014

**Protection requirements concerning electromagnetic compatibility § 3(1)(2), (Article 3(1)(b)):**  
EN 55024: 2010  
EN 55022: 2010  
EN 301 489-17: V2.2.1 (WLAN-Module Wibear-SF)

**Measures for the efficient use of the radio frequency spectrum pursuant to § 3(2) (Article 3(2)):**  
EN 300 328: V1.9.1 (WLAN-Module Wibear-SF)

A handwritten signature in black ink, appearing to read "Uwe Wilhelm".

Uwe Wilhelm  
General Manager

Darmstadt 18<sup>th</sup> day of April 2017

## Appendix B Dimension Drawings

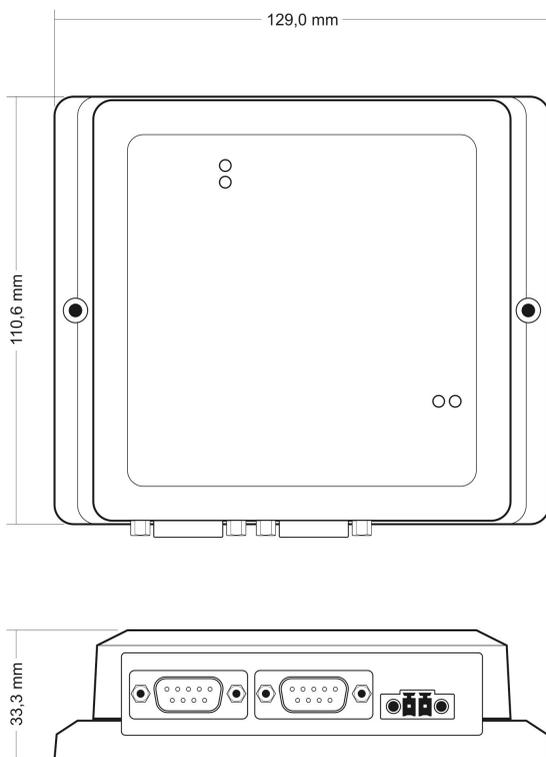


Figure 7: PCAN-Wireless Gateway industrial model (IPEH-004020)

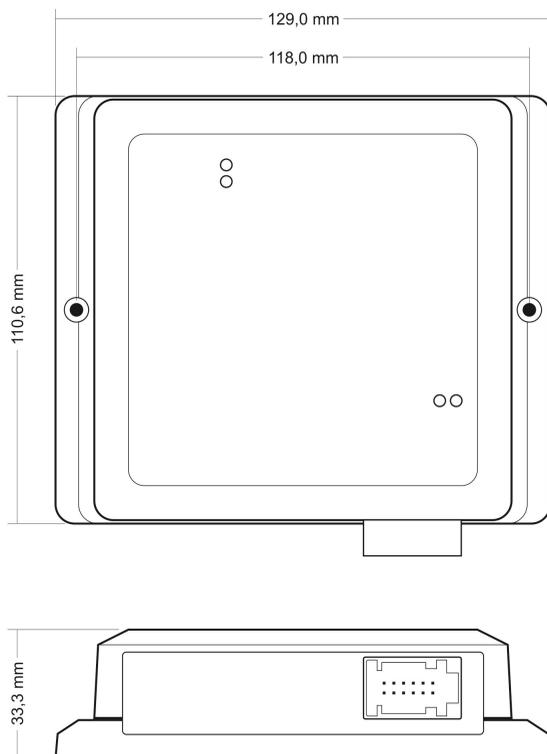


Figure 8: PCAN-Wireless Gateway automotive model (IPEH-004020-A)

The figures don't show the actual size of the products.

## Appendix C Disposal Information (Battery)

The device and the battery it contains must not be disposed of with household waste. Remove the battery from the device for proper separate disposal.

The PCAN-Wireless Gateway contains the following battery:

- └ 1 x button cell LR44 1.5 V