PCAN-Gateways

Connection of CAN Buses over IP networks

Developer Documentation

Document version 1.6.3 (2023-06-21)

PEAK System

Relevant Products

Product name	Model	Part Number
PCAN-Ethernet Gateway DR	Industry	IPEH-004010
PCAN-Ethernet Gateway FD DR	Industry	IPEH-004012
PCAN-Wireless Gateway DR	Industry	IPEH-004011
PCAN-Wireless Gateway with D-Sub connectors	Industry	IPEH-004020
PCAN-Wireless Gateway with automotive connector	Automotive	IPEH-004020-A

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Content

1 Operating Mode

Three operation mode options are available for PCAN-Gateway modules:

In “normal” operation requires two of these devices and tunnels CAN through the IP network (see chapter 1.1 below). There are also the possibilities to communicate with a software of PEAK-System (see chapter 1.2 on page 7) or an own program (see chapter 1.3 on page 8).

1.1 Communication between Two Gateways

With the PCAN-Gateways, CAN buses can be connected via LAN or WLAN. CAN frames are wrapped into TCP or UDP message packets and then forwarded from one device to another. Based on this technology, it is possible to connect CAN networks over a great distance

The configuration of the gateways is done via a web interface. Therefore, the module must be connected to the PC via LAN or WLAN according to the model. Afterwards, a common web browser is suitable to access the device.

The device’s web interface opens and displays public information about the device status and the message forwarding. In order to configure the device, a login on the website is required. Depending on the hardware, different settings are available.

In the following figure, the CAN messages from CAN bus A are transmitted over an IP network to bus B. In addition, the messages from bus B are sent to CAN bus A.

Figure 1: Bidirectional communication

This operating mode is described in detail in the manuals and the Quick Guide of the PCAN-Gateways.

1.2 Communication between Gateway and PC via the Virtual PCAN-Gateway

The Virtual PCAN-Gateway software package provides access for Windows computers to devices of the PCAN-Gateway product line over IP-based networks. Various LAN and WLAN network adapters can be used.

Analog to the bidirectional connection of two PCAN-Gateways, message forwarding with so-called routes must be set up between the hardware and the software.

At first, two routes have to be created on the configuration website of the hardware, one for sending and another for receiving. Then, the appropriate counterparts of these routes must be established within the configuration software.

Due to this connection, the PCAN-Gateways are being integrated in the established PCAN environment and can be used like a conventional PEAK CAN interface. For example, the traffic on the CAN channels can be displayed and traced by the PCAN-View CAN monitor.

Note: The software requires a PCAN-Gateway as a counterpart. It is not possible to establish a connection between two computers with the Virtual PCAN-Gateway.

Figure 2: Connection via the software Virtual PCAN-Gateway

The software is described in detail in the Virtual PCAN-Gateway manual.

1.3 Communication between Gateway and PC via Sockets

To establish a reliable transmission of CAN data over IP networks, two PCAN-Gateways are performing a so called handshake while setting up a route. This is the reason why such a message forwarding can only be made between devices of the PCAN-Gateway product family.

Alternatively, it is possible to disable the handshake protocol for individual transmission routes. The data packets are then sent without any control mechanisms directly to the specified IP address. In this case the communication with the PCAN-Virtual Gateway is not possible.

As a counterpart, for example, a PC can receive the data with a simple software via a socket interface. The PC application must be based on standard sockets (Windows, Linux, or Android).

Figure 3: Connection via a Socket application

For this operating mode, the routes which will communicate with the PC must be specially configured. The so-called "Handshake protocol" should be switched off for each route via the web interface of the device (see chapter 1.3.1 below).

Without handshake no status information for the routes and their transmission are collected. Therefore, every control mechanism is disabled. As a result, the CAN data stream is transmitted and received in a simple socket structure. The corresponding protocol is described in chapter 1.3.2 on page 12.

1.3.1 Deactivate the Handshake

When creating or editing a route, you can disable the handshake.

Log in to the web interface of your PCAN-Gateway. First, the Expert user mode must be activated because the deactivation of the handshake is otherwise not possible.

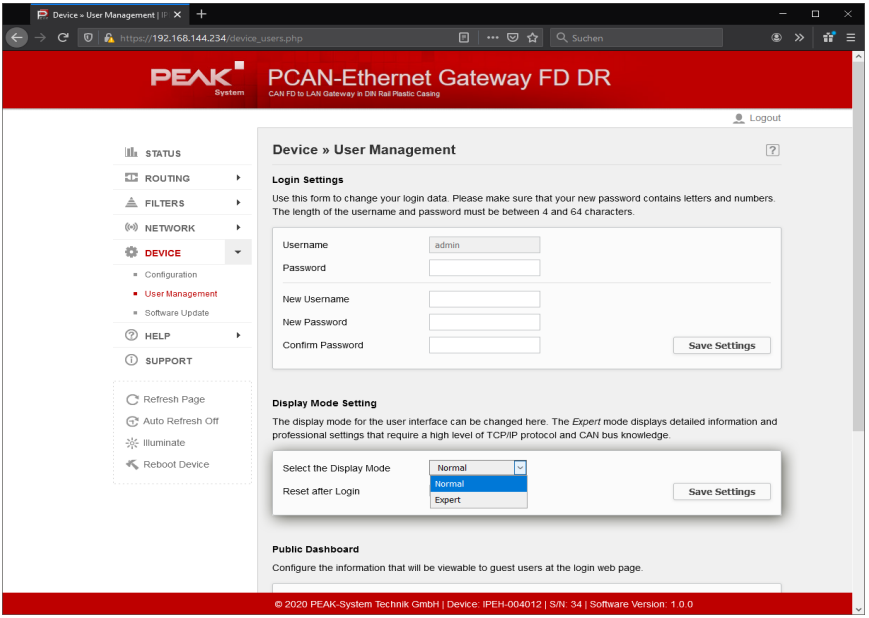

Figure 4: PCAN-Gateway web interface:
Activation of the Expert display mode

- Do the following to switch to Expert user mode:

  1. Open the page **Device > User Management**.
  2. Select the Expert mode from the drop-down menu under **Display Mode Setting**.
  3. If the **Reset after Login** checkbox is set, Expert mode will only remain active for the current session. As soon as you log in again, it is disabled.
  4. Confirm with **Save Settings**.

- Do the following to turn off the handshake for an existing route:

  1. Open the page **Routing > Manage Routes**.

2. Click on the pencil icon of the corresponding route to edit it.

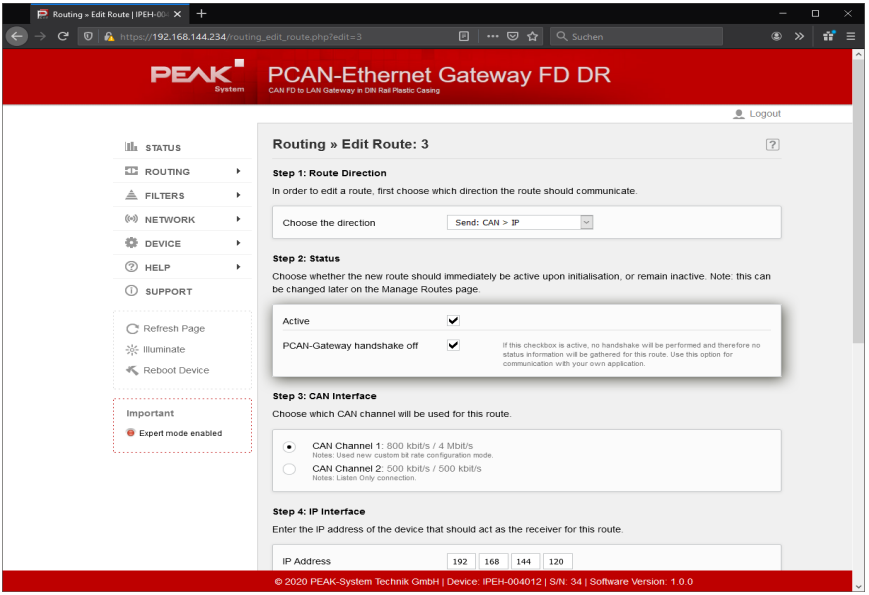

Figure 5: PCAN-Gateway web interface:
Editing a route

3. On the opened page **Routing > Edit Route** under **Step 2: Status** you can find an additional option to deactivate the handshake.
4. Activate the checkbox to switch off the handshake for this route.
5. Confirm the settings with **Save Settings**.

Note: The communication with the PCAN-Virtual Gateway is not possible without the handshake.

1.3.2 Structure of the transmitted CAN Data in the IP Frame

PCAN-Gateways allow the connection of various CAN buses over IP networks. For this CAN frames are wrapped in TCP or UDP messages packets and transmitted over the IP network from one device to another. If all the precautions are taken, you can also use a socket to send and receive CAN data via UDP or TCP.

Depending on the type of the CAN message and if the CRC feature is used, the CAN data is transmitted with a different structure in the IP frame. The possible data structures are shown in the following tables.

The values are stored in Network Byte order. The CAN data is stored as single bytes in ascending order. Whether you send or receive, the structure remains the same. With simple TCP/UDP implementations such as in embedded applications, it is possible to receive the TCP or UDP header in addition.

Note: Sample code is available for download: www.peak-system.com/quick/DPL-GW-Samples.

Data structure for CAN 2.0 A/B frames

Length	Field Name	Meaning
2 Byte	Length	This field specifies the total length of the packet including this Length field in bytes. The maximum length of a classic CAN frame is 0x24, decimal 36.
2 Byte	Message Type	This field specifies the type of the message. The value **0x80** represents a classic CAN frame.
8 Byte	Tag	Not used in the current version.
4 Byte	Timestamp Low	Timestamp of CAN messages in µs. The value has no effect on the transmission of frames. This information is purely informative.
4 Byte	Timestamp High	
1 Byte	Channel	Not used in the current version. **Note:** The CAN channel is determined by the route configuration.
1 Byte	DLC	The Data Length Count (DLC) indicates the length of the CAN data in bytes.
2 Byte	Flags	The following flags are defined for this frame type: • 0x01 - Message is a Remote Transmission Request (corresponds to bit 30 in the ID field) • 0x02 - Message has an Extended ID (corresponds to bit 31 in the ID field)
4 Byte	CAN ID	Bit 0 - 28: ID Bit 29: Fixed value 0 Bit 30: RTR Bit 31: 1 for Extended frame, 0 for Standard frame.
8 Byte	CAN Data	This field always contains 8 x 8 data bits. **Note:** Use only as many bytes as the DLC indicates. All the following bytes are available but invalid.

Data structure for CAN FD frames

Length	Field Name	Meaning
2 Byte	Length	This field specifies the total length of the packet including this Length field in bytes. The length of the packet for CAN FD frames is variable in contrast to the classic CAN frame. Only as many bytes as necessary are transmitted. The maximum length of a CAN FD frame is 0x5C, decimal 92.
2 Byte	Message Type	This field specifies the type of the message. The value **0x90** represents a CAN FD frame.
8 Byte	Tag	Not used in the current version.
4 Byte	Timestamp Low	Timestamp of CAN messages in µs. The value has no effect on the transmission of frames. This information is purely informative.
4 Byte	Timestamp High	
1 Byte	Channel	Not used in the current version. **Note:** The CAN channel is determined by the route configuration.
1 Byte	DLC	The Data Length Count (DLC) indicates the length of the CAN data in bytes.
2 Byte	Flags	The following flags are defined for this message type: • 0x02 - Message has an Extended ID (corresponds to bit 31 in the ID field) • 0x10 - Message with Extended Data Length • 0x20 - Message with activated Bit Rate Switch • 0x40 - Message with set Error State Indicator bit
4 Byte	CAN ID	Bit 0 - 28: ID Bit 29: Fixed value 0 Bit 31: 1 for Extended frame, 0 for Standard frame.
N Byte	CAN Data	This field contains the CAN data bytes. The number of bytes transmitted corresponds to the length specified in the DLC field.

Data structure for CAN 2.0 A/B frames with CRC

Length	Field Name	Meaning
2 Byte	Length	This field specifies the total length of the packet including this Length field in bytes. The maximum length of a classic CAN frame with additional CRC checksum is 0x28, decimal 40.
2 Byte	Message Type	This field specifies the type of the message. The value **0x81** represents a classic CAN frame with additional CRC checksum.
8 Byte	Tag	Not used in the current version.
4 Byte	Timestamp Low	Timestamp of CAN messages in µs. The value has no effect on the transmission of frames. This information is purely informative.
4 Byte	Timestamp High	
1 Byte	Channel	Not used in the current version. **Note:** The CAN channel is determined by the route configuration.
1 Byte	DLC	The Data Length Count (DLC) indicates the length of the CAN data in bytes.
2 Byte	Flags	The following flags are defined for this frame type: • 0x01 - Message is a Remote Transmission Request (corresponds to bit 30 in the ID field) • 0x02 - Message has an Extended ID (corresponds to bit 31 in the ID field)
4 Byte	CAN ID	Bit 0 - 28: ID Bit 29: Fixed value 0 Bit 30: RTR Bit 31: 1 for Extended frame, 0 for Standard frame.
8 Byte	CAN Data	This field always contains 8 x 8 data bits. **Note:** Use only as many bytes as the DLC indicates. All the following bytes are available but invalid.
4 Byte	CRC32	CRC checksum. See the following chapter for details.

Data structure for CAN FD frames with CRC

Length	Field Name	Meaning
2 Byte	Length	This field specifies the total length of the packet including this Length field in bytes. The length of the packet for CAN FD frames is variable in contrast to the classic CAN frame. Only as many bytes as necessary are transmitted. The maximum length of a CAN FD frame with additional CRC checksum is 0x60, decimal 96.
2 Byte	Message Type	This field specifies the type of the message. The value **0x91** represents a CAN FD frame with additional CRC checksum.
8 Byte	Tag	Not used in the current version.
4 Byte	Timestamp Low	Timestamp of CAN messages in µs. The value has no effect on the transmission of frames. This information is purely informative.
4 Byte	Timestamp High	
1 Byte	Channel	Not used in the current version. **Note:** The CAN channel is determined by the route configuration.
1 Byte	DLC	The Data Length Count (DLC) indicates the length of the CAN data in bytes.
2 Byte	Flags	The following flags are defined for this message type: • 0x02 - Message has an Extended ID (corresponds to bit 31 in the ID field) • 0x10 - Message with Extended Data Length • 0x20 - Message with activated Bit Rate Switch • 0x40 - Message with set Error State Indicator bit
4 Byte	CAN ID	Bit 0 - 28: ID Bit 29: Fixed value 0 Bit 31: 1 for Extended frame, 0 for Standard frame.
N Byte	CAN Data	This field contains the CAN data bytes. The number of bytes transmitted corresponds to the length specified in the DLC field.
4 Byte	CRC32	CRC checksum. See the following chapter for details.

1.3.3 Optional CRC32 Checksum

CAN frames can be transmitted over the IP network with an additional CRC32 checksum in the IP packet. It is created from DLC, flags, CAN ID, and data of the CAN frame together with a CRC start value and polynomial. This option was introduced with software version 2.8.1 for classic CAN frames and for CAN FD frames with software version 1.0.0 of the PCAN-Ethernet Gateway FD DR.

The CRC option for routes can be configured via the JSON interface or the INI file. For a valid connection with CRC option, the CRC settings of the Send and Receive route must match.

Note: The CRC option is not available for the Virtual PCAN-Gateway at the moment.

CRC32 example for an incoming message:

Start value: 0x0
Polynomial: 0x04c11db7

```
0028 0081 0000000000000000 060DE1E10005BD06 01      08  ...
|    |    |                |                |       |
Size Type Tag              Timestamp        Channel DLC

... 0000  00000111 FFEEDDCCBBAA9988 49198620
    |     |        |                |
    Flags ID       Data             CRC32
```

The colored values DLC, flags, CAN ID, and CAN data are used for the calculation.

```
crc32([0x08, 0x00, 0x00, 0x00, 0x00, 0x01, 0x11, 0xFF, 0xEE, 0xDD,
0xCC, 0xBB, 0xAA, 0x99, 0x88]) = 0x20861949
```

There is no XOR with 0xFFFFFFFF at the end of the calculation. The CRC32 result is added to the message in little endian byte order.

2 Exported Device Configurations

The current device configuration, as well as the defined routes and filters, can be stored in the form of an INI file.

You can create, open, edit, and change the file with any text editor.

Note: Editing the content may result in the rejection of an import. Only valid configuration files can be used for device restoration.

Do the following to export an INI file:

1. Log in into the web interface of your PCAN-Gateway.
2. Open the page **Device** > **Configuration**.
3. By clicking the **Export** button under **Export Configuration,** you create the INI file.
4. Save the file to your PC.

2.1 Feature Overview and Details

Some features cannot be configured via the website or the JSON interface because advanced knowledge is required or due to their experimental context. However, configuration is possible using the downloaded INI file.

The following table shows the feature support of the different product types. Indicated software versions refer to the packages for the PCAN-Gateways or the PCAN-Ethernet Gateway FD DR (IPEH-004012).

Feature	IPEH-004010	IPEH-004011	IPEH-004020	IPEH-004012	Details
CAN auto resume	x	x	x	x	
CAN loopback mode	x	x	x	x	
CAN single shot mode	x	x	x	x	
CAN triple sampling	x	x	x		
CAN FD support				x	
Selectable clock frequency				x	
Configurable CAN IRQ limits				x from v1.1.1	see chapter 2.1.1
Optional CRC32 checksum	x from v2.8.1	x from v2.8.1	x from v2.8.1	x	see chapter 1.3.3

2.1.1 Configuring CAN IRQ Limits

Note: This feature is available for the PCAN-Ethernet Gateway FD DR (IPEH-004012) beginning with software version 1.1.1.

The CAN IRQ limits can be configured for each CAN interface to balance message latency, throughput, and CPU load. For this, two additional parameters are available:

Parameter	Default	Description
irq_time_limit	10	Specifies the time that the CAN interface waits until an interrupt is triggered. The parameter is set in a range from 1 to 15. The time limit results from the set value multiplied by 100 µs.
irq_count_limit	8	Specifies the number of messages that have to be received by the CAN interface before an interrupt is triggered. The number is set in a range from 1 to 127.

With the default values, an interrupt is triggered either if 8 messages have been received or 1 millisecond has passed. Tracking the time starts with the first incoming message. Both, the IRQ message counter and time are reset if an interrupt was triggered.

To lower the latency of the CAN messages, a single or both parameters must be lowered. In this case, the interrupt load increases and the total message throughput decreases.

2.2 Structure of the INI File (v1.2.0)

The INI file is divided into different sections: general information, interfaces, routes, and filter.

Please note when editing:

- Field names do not distinguish between uppercase and lowercase letters.
- Values must not contain line breaks.
- The default values listed are used when no value has been defined.

2.2.1 General

Some of the values of **General** and **Host** can be configured via the web interface on the page *Device > Configuration*.

Field Name	Default	Description
GENERAL		
username	-	Not used.
description	-	User-defined description of the device.
lighttpdport	80	Not used.
kl15pwdn	0	Power Down on / off (function only for PCAN-Wireless Gateway; for details see manual)
HOST		
devicename	-	User-defined name of the device.

2.2.2 LAN Interface

Some of the values can be configured via the web interface on the page *Network > LAN.*

Field Name	Default	Description
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration
IPv4	192.168.1.10	v4 IP address (e.g. 192.168.1.100)
Subnetmask	255.255.255.0	Subnet mask (e.g. 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.

2.2.3 WLAN Interface

Some of the values can be configured via the web interface on the page *Network > WLAN.*

Field Name	Default	Description
SSID	MyWLAN	Name of the WLAN network
Encryption	0	deprecated
EncryptionType	5	Type of encryption: 0 = none 1 = WEP 2 = WPA-PSK TKIP 3 = WPA-PSK CCMP 4 = WPA2-PSK TKIP 5 = WPA2-PSK TKIP / CCMP 6 = WPA2-PSK CCMP
KeyType	1	Type of key (1 = string / 2 = hex)
Key	-	Key to use
Mode	0	0 = Infrastructured, 1 = Ad-Hoc, 2 = Micro Access Point (if supported)
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration.
IPv4	192.168.1.10	v4 IP address (like 192.168.1.100)

Field Name	Default	Description
Subnetmask	255.255.255.0	Subnet mask (like 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.

2.2.4 CAN Interfaces

Each CAN interface is listed as a block with the channel number (e.g. [can_0]). The number in the INI file is one less than the channel number on the website. **can_0** thus corresponds to the CAN channel 1 from the configuration website.

Some of the values can be configured via the web interface on the page *Network > CAN*.

Field Name	Default	Description
IfName	canN	User-defined description of the CAN channel
Active	1	Activates / deactivates the interface.
Baudrate	500000	Transfer rate of the interface in bit/s
Listenonly	1	Listen only mode on / off
Autoresume	0	Auto resume after Bus Off on / off
ManBr	0	Manual transfer rate calculation on / off
BR_Register	-	Register set for manual transfer rate configuration. If activated: e.g. "BRP %d; RJW %d; TQ %d; PSEG1 %d; PSEG2 %d; PROPSEG %d; SP %0.1f%%"
Loopback	0	Loopback mode on / off
Oneshot	0	Single shot mode on / off
Triplesampling	0	Triple sampling on / off
Samplepoint	800	Sample point (800 equivalent 80%)

2.2.5 GUI

The values define which information is shown to visitors without logging into the configuration website.

The values can be configured via the web interface on the page *Device > User Management*.

Field Name	Default	Description
show_device_info	1	Displays the device information on the Login page.
show_can_info	0	Displays the CAN information on the Login page.
show_lan_info	0	Displays the LAN information on the Login page.
show_wlan_info	0	Displays the WLAN information on the Login page.
show_bt_info	0	Displays the BT information on the Login page (not used).
show_routing_info	0	Displays the routing information on the Login page.
show_contact_info	1	Displays the contact information on the Login page.
show_support_info	1	Displays the support information on the Login page.
show_filter_info	1	Displays the filter information on the Login page.

2.2.6 Routes

After FWD_GEN general information for routes is listed.

Each route is listed as a block with its index (e.g. [rt_0]). The number in the INI file is one less than the index on the website. Therefore, **rt_0** corresponds to the route 1 from the configuration website.

Routes can be created, edited, and deleted via the web interface on the page *Routing > Manage Routes*.

Field Name	Default	Description
FWD_GEN		
Count	0	Number of routes
CANoIPdPort	45321	Port of the handshake channel (do not change!)
ROUTEN		
RtInfo	Route n	Description of the route

Active	0	Route active on / off
Type	can2lan	Direction of the route (CAN2LAN or LAN2CAN)
Interface1	can0	CAN channel
Protocol2	UDP	0 = TCP, 1 = UDP
Destination2	0.0.0.0:5000	IP address (IPv4) and port of the IP participant, regardless of whether it is the source or destination. Use a port between 1024 and 65535. The ports 45321 and 52957 are reserved for system functions.
FPP	15	max. CAN frames per IP packet
TCPDelay	1	TCP delay active
DispIdx	0	Reserved for future use.
SndUdelay	250	Time before re-sending in µs. Maximum: 1000, Minimum: 10
SndMax	15	Number of retries Maximum: 64, Minimum: 6
NoCtrl	0	Handshake on / off
Filters	-	List of filters separated by ,
UnifyFilters	1	Calculating a single filter from all filter entries on / off

2.2.7 Filter

Each filter is listed as a block with its index (e.g. [filter_0]). The number in the INI file is one less than the index on the website. **filter_0** thus corresponds to the filter 1 from the configuration website.

Filters can be created, edited, and deleted via the web interface on the page *Filters > Manage Filters* (only available from software package 2.5).

Field Name	Default	Description
FILTER_GEN		
Count	0	Number of filters that have been defined.
FILTER		

Kind	-	Kind of the filter: 0 = not set 1 = Range, 11 Bit 2 = Range, 29 Bit 3 = Mask, 11 Bit 4 = Mask, 29 Bit
Type	1	The value indicates how the filter is interpreted. 0 = Blacklist; 1 = Whitelist
Term	-	**For Range filters:** The range filter is defined by an upper and lower CAN ID. The indication is hexadecimal and is separated by a hyphen. Example: 0x060-0x120 **For Mask filters:** For this filter, the Acceptance Code and then the Acceptance Mask are defined. These are specified hexadecimal and separated by a slash. Example: 0x060/0x020
Comment	-	User-defined description of the filter
Name	-	User-defined name of the filter

2.3 Structure of the INI File (v1.3.0)

The INI file is divided into different sections: general information, interfaces, routes, and filter.

From software version 2.5.0 PCAN-Gateways create INI files with version 1.3.0.

Please note when editing:

- Field names do not distinguish between uppercase and lowercase letters.
- Values must not contain line breaks.
- The default values listed are used when no value has been defined.

2.3.1 General

Some of the values of *General* and *Host* can be configured via the web interface on the page *Device > Configuration*.

Field Name	Default	Description
GENERAL		
username	-	Not used.
description	-	User-defined description of the device
lighttpdport	80	Not used.
kl15pwdn	0	Power Down on / off (function only for PCAN-Wireless Gateway; for details see manual)
HOST		
devicename	-	User-defined name of the device

2.3.2 LAN Interface

Some of the values can be configured via the web interface on the page *Network > LAN.*

Field Name	Default	Description
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration
IPv4	192.168.1.10	v4 IP address (e.g. 192.168.1.100)
Subnetmask	255.255.255.0	Subnet mask (e.g. 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.

2.3.3 WLAN Interface

Some of the values can be configured via the web interface on the page *Network > WLAN.*

Field Name	Default	Description
SSID	MyWLAN	Name of the WLAN network
Encryption	0	deprecated
EncryptionType	5	Type of encryption: 0 = none 1 = WEP 2 = WPA-PSK TKIP 3 = WPA-PSK CCMP 4 = WPA2-PSK TKIP 5 = WPA2-PSK TKIP / CCMP 6 = WPA2-PSK CCMP
KeyType	1	Type of key (1 = string / 2 = hex)
Key	-	Key to use
Mode	0	0 = Infrastructured, 1 = Ad-Hoc, 2 = Micro Access Point
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration
IPv4	192.168.1.10	v4 IP address (like 192.168.1.100)

Field Name	Default	Description
Subnetmask	255.255.255.0	Subnet mask (like 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
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Netbitsv6	64	Reserved for future use.

2.3.4 CAN Interfaces

Each CAN interface is listed as a block with the channel number (e.g. [can_0]). The number in the INI file is one less than the channel number on the website. **can_0** thus corresponds to the CAN channel 1 from the configuration website.

Some of the values can be configured via the web interface on the page *Network > CAN*.

Field Name	Default	Description
IfName	canN	User-defined description of the CAN channel
Active	1	Activate / deactivate the interface
Baudrate	500000	Transfer rate of the interface in bit/s
Listenonly	1	Listen only mode on / off
Autoresume	0	Auto resume after Bus Off on / off
ManBr	0	Manual transfer rate calculation on / off
BR_Register	-	Register set for manual transfer rate configuration. If activated: e.g. "BRP %d; RJW %d; TQ %d; PSEG1 %d; PSEG2 %d; PROPSEG %d; SP %0.1f%%"
Loopback	0	Loopback mode on / off
Oneshot	0	Single shot mode on / off
Triplesampling	0	Triple sampling on / off
Samplepoint	800	Sample point (800 equivalent 80%)

2.3.5 GUI

The values define which information is shown to visitors without logging in on the configuration website.

The values can be configured via the web interface on the page *Device > User Management*.

Field Name	Default	Description
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show_lan_info	0	Displays the LAN information on the Login page.
show_wlan_info	0	Displays the WLAN information on the Login page.
show_bt_info	0	Displays the BT information on the Login page (not used).
show_routing_info	0	Displays the routing information on the Login page.
show_contact_info	1	Displays the contact information on the Login page.
show_support_info	1	Displays the support information on the Login page.
show_filter_info	1	Displays the filter information on the Login page.

2.3.6 Routes

After FWD_GEN general information for routes are listed.

Each route is listed as a block with its index (e.g. [rt_0]). The number in the INI file is one less than the index on the website. **rt_0** therefore corresponds to the route 1 from the configuration website.

Routes can be created, edited, and deleted via the web interface on the page *Routing > Manage Routes*.

Field Name	Default	Description
FWD_GEN		
Count	0	Number of routes

CANoIPdPort	45321	Port of the handshake channel (do not change!)
ROUTEN		
RtInfo	Route n	Description of the route
Active	0	Route active on / off
Type	can2lan	Direction of the route (CAN2LAN or LAN2CAN)
Interface1	can0	CAN channel
Protocol2	UDP	0 = TCP, 1 = UDP
Destination2	0.0.0.0:5000	IP address (IPv4) and port of the IP participant, regardless of whether it is the source or destination. Use a port between 1024 and 65535. The ports 45321 and 52957 are reserved for system functions.
FPP	15	max. CAN frames per IP packet
TCPDelay	1	TCP delay active
DispIdx	0	reserved for future use
SndUdelay	250	Time before re-sending in µs Maximum: 1000, Minimum: 10
SndMax	15	Number of retries Maximum: 64, Minimum: 6
NoCtrl	0	Handshake on / off
Filters	-	List of filters separated by ,
UnifyFilters	-	Calculating a single filter from all filter entries on / off
JoinFilters	0	Defines the logical operation for joining multiple filters. 0 = OR; 1 = AND

2.3.7 Filter

Each filter is listed as a block with its index (e.g. [filter_0]). The number in the INI file is one less than the index on the website. **filter_0** thus corresponds to the filter 1 from the configuration website.

Filters can be created, edited, and deleted via the web interface on the page *Filters > Manage Filters.*

Field Name	Default	Description
filter_type	-	Kind of the filter: 0 = not set 1 = Range, 11 Bit 2 = Range, 29 Bit 3 = Mask, 11 Bit 4 = Mask, 29 Bit
filter_mode	1	The value indicates how the filter is interpreted. 0 = Blacklist; 1 = Whitelist
Term	-	**For Range filters**: The range filter is defined by an upper and lower CAN ID. The indication is hexadecimal and is separated by a hyphen. Example: 0x060-0x120 **For Mask filters**: For this filter, the Acceptance Code and then the Acceptance Mask are defined. These are specified hexadecimal and separated by a slash. Example: 0x060/0x020
Comment	-	User-defined description of the filter
Name	-	User-defined name of the filter

2.4 Structure of the INI File (v1.4.1)

The INI file is divided into different sections: general information, interfaces, routes, and filter.

From software version 2.7.0, PCAN-Gateways create INI files with version 1.4.0. Revision 1.4.1 which was introduced with software version 2.8.1 added the CAN parameter “enable_error_counter”.

Please note when editing:

- Field names do not distinguish between uppercase and lowercase letters.
- Values must not contain line breaks.
- The default values listed are used when no value has been defined.

2.4.1 General

Some of the values of *General* and *Host* can be configured via the web interface on the page *Device > Configuration*.

Field Name	Default	Description
GENERAL		
username	-	Not used.
description	-	User-defined description of the device
lighttpdport	80	Not used.
kl15pwdn	0	Power Down on / off (function only for PCAN-Wireless Gateway; for details see manual)
HOST		
devicename	-	User-defined name of the device
JSON		
enable_json	1	If active, the JSON interface can be used.
enable_json_shell	0	If active, the Shell view can be used.

enable_json_config	0	If active, the device can be configured via the JSON interface.
respect_gui_pub	1	If active, the JSON interface respects Public Dashboard settings.

2.4.2 LAN Interface

Some of the values can be configured via the web interface on the page *Network > LAN.*

Field Name	Default	Description
Ifname	ethN	Interface designation. Do not change!
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration.
IPv4	192.168.1.10	v4 IP address (e.g. 192.168.1.100)
Subnetmask	255.255.255.0	Subnet mask (e.g. 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.

2.4.3 WLAN Interface

Some of the values can be configured via the web interface on the page *Network > WLAN.*

Field Name	Default	Description
Ifname	wlanN	Interface designation. Do not change!
SSID	PEAK Wireless Default	Name of the WLAN network. Please note: The character # is not allowed.
Encryption	0	Deprecated. Not in use.

Field Name	Default	Description
EncryptionType	5	Type of encryption: 0 = none 1 = WEP 2 = WPA-PSK TKIP 3 = WPA-PSK CCMP 4 = WPA2-PSK TKIP 5 = WPA2-PSK TKIP / CCMP 6 = WPA2-PSK CCMP
KeyType	1	Type of key (1 = string / 2 = hex)
Key	-	Key to use
Mode	0	0 = Infrastructured 1 = Ad-Hoc 2 = Micro Access Point
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration.
IPv4	192.168.1.10	v4 IP address (like 192.168.1.100)
Subnetmask	255.255.255.0	Subnet mask (like 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.

2.4.4 CAN Interfaces

Each CAN interface is listed as a block with the channel number (e.g. [can_0]). The number in the INI file is one less than the channel number on the website. **can_0** thus corresponds to the CAN channel 1 from the configuration website.

Some of the values can be configured via the web interface on the page *Network > CAN*.

Field Name	Default	Description
Ifname	canN	User-defined description of the CAN channel. Do not change!
Active	1	Activate / deactivate the interface

Baudrate	500000	Transfer rate of the interface in bit/s
Listenonly	1	Listen only mode on / off
Autoresume	0	Auto resume after Bus Off on / off
ManBr	0	Manual transfer rate calculation on / off
BR_Register	-	Register set for manual transfer rate configuration. If activated: e.g. "BRP %d; RJW %d; TQ %d; PSEG1 %d; PSEG2 %d; PROPSEG %d; SP %0.1f%%"
Loopback	0	Loopback mode on / off
Oneshot	0	Single shot mode on / off
Triplesampling	0	Triple sampling on / off
Samplepoint	800	Sample point (800 equivalent 80%)
Enable_error_counter	0	Enables / disables error reporting for the CAN channel. With this, the values can_errors_rx and can_errors_tx are counted.

2.4.5 GUI

The values define which information is shown to visitors without logging in on the configuration website. The values can be configured via the web interface on the page *Device > User Management*.

Field Name	Default	Description
show_device_info	1	Displays the device information on the Login page.
show_can_info	0	Displays the CAN information on the Login page.
show_lan_info	0	Displays the LAN information on the Login page.
show_wlan_info	0	Displays the WLAN information on the Login page.
show_bt_info	0	Displays the BT information on the Login page (not used).
show_routing_info	0	Displays the routing information on the Login page.
show_contact_info	1	Displays the contact information on the Login page.
show_support_info	1	Displays the support information on the Login page.
show_filter_info	1	Displays the filter information on the Login page.

2.4.6 Routes

After FWD_GEN general information for routes is listed.

Each route is listed as a block with its index (e.g. [rt_0]). The number in the INI file is one less than the index on the website. **rt_0** therefore corresponds to the route 1 from the configuration website.

Routes can be created, edited, and deleted via the web interface on the page *Routing > Manage Routes*.

Field Name	Default	Description
FWD_GEN		
Count	0	Number of routes
CANoIPdPort	45321	Port of the handshake channel. Do not change!
ROUTEN		
RtInfo	Route n	Description of the route
Active	0	Route active on / off
Type	can2lan	Direction of the route (CAN2LAN or LAN2CAN)
Interface1	can0	CAN channel
Protocol2	UDP	0 = TCP, 1 = UDP
Destination2	0.0.0.0:5000	IP address (IPv4) and port of the IP participant, regardless of whether it is the source or destination. Use a port between 1024 and 65535. The ports 45321 and 52957 are reserved for system functions.
FPP	15	max. CAN frames per IP packet
TCPDelay	1	TCP delay active
DispIdx	0	reserved for future use
SndUdelay	250	Time before re-sending in µs Maximum: 1000, Minimum: 10
SndMax	15	Number of retries Maximum: 64, Minimum: 6
cdm	500	Delay in ms between attempts to establish a connection. Maximum: 1000

invscktmode	0	"inverse socket mode" or "connection inverted" inverts the connection establishment. Instead of the send route, the receive route establishes the connection.
NoCtrl	0	Handshake on / off
Filters	-	List of filters separated by ,
UnifyFilters	-	Calculating a single filter from all filter entries on / off
JoinFilters	0	Defines the logical operation for joining multiple filters. 0 = OR; 1 = AND

2.4.7 Filter

Each filter is listed as a block with its index (e.g. [filter_0]). The number in the INI file is one less than the index on the website. **filter_0** thus corresponds to the filter 1 from the configuration website.

Filters can be created, edited, and deleted via the web interface on the page *Filters > Manage Filters.*

Field Name	Default	Description
filter_type	-	Kind of the filter: 0 = not set 1 = Range, 11 Bit 2 = Range, 29 Bit 3 = Mask, 11 Bit 4 = Mask, 29 Bit
filter_mode	1	The value indicates how the filter is interpreted. 0 = Blacklist; 1 = Whitelist
Term	-	**For Range filters:** The range filter is defined by an upper and lower CAN ID. The indication is hexadecimal and is separated by a hyphen. Example: 0x060-0x120 **For Mask filters**: For this filter, the Acceptance Code and then the Acceptance Mask are defined. These are specified hexadecimal and separated by a slash. Example: 0x060/0x020

Comment	-	User-defined description of the filter
Name	-	User-defined name of the filter

2.5 Structure of the INI File (v1.5.0)

The INI file is divided into different sections: general information, interfaces, routes, and filter.

From software version 2.9.0 PCAN-Gateways create INI files with version 1.5.0.

Please note when editing:

- Field names do not distinguish between uppercase and lowercase letters.
- Values must not contain line breaks.
- The default values listed are used when no value has been defined.

2.5.1 General

Some of the values of *General* and *Host* can be configured via the web interface on the page *Device > Configuration*.

Field Name	Default	Description
GENERAL		
username	-	Not in use.
description	-	User-defined description of the device
lighttpdport	80	Not in use.
kl15pwdn	0	Power Down on / off (function only for PCAN-Wireless Gateway; for details see manual)
HOST		
devicename	-	User-defined name of the device
JSON		
enable_json	1	If active, the JSON interface can be used.
enable_json_shell	0	If active, the Shell view can be used.
enable_json_config	0	If active, the device can be configured via the JSON interface.

respect_gui_pub	1	If active, the JSON interface respects Public Dashboard settings.

2.5.2 LAN Interface

Some of the values can be configured via the web interface on the page *Network > LAN.*

Field Name	Default	Description
Ifname	ethN	Interface designation. Do not change!
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration.
IPv4	192.168.1.10	v4 IP address (e.g. 192.168.1.100)
SubnetMask	255.255.255.0	Subnet mask (e.g. 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.

2.5.3 WLAN Interface

Some of the values can be configured via the web interface on the page *Network > WLAN.*

Field Name	Default	Description
Ifname	wlanN	Interface designation. Do not change!
SSID	PEAK Wireless Default	Name of the WLAN network. Please note: The character # is not allowed.
Encryption	0	Deprecated. Not in use.
EncryptionType	5	Type of encryption: 0 = none 1 = WEP 2 = WPA-PSK TKIP 3 = WPA-PSK CCMP 4 = WPA2-PSK TKIP 5 = WPA2-PSK TKIP / CCMP 6 = WPA2-PSK CCMP

Field Name	Default	Description
KeyType	1	Type of key (1 = string / 2 = hex)
Key	-	Key to use
Mode	0	0 = Infrastructured 1 = Ad-Hoc 2 = Micro Access Point
UseDHCP	0	If not equal 0, the external DHCP server is used for IP configuration.
IPv4	192.168.1.10	v4 IP address (like 192.168.1.100)
SubnetMask	255.255.255.0	Subnet mask (like 255.255.255.0)
IPv6	::	Reserved for future use.
IPv4Gw	0.0.0.0	v4 IP of the default gateway
IPv6Gw	::	Reserved for future use.
Netbitsv6	64	Reserved for future use.
ScanSSID	1	Determines if a connection to a hidden WLAN SSID can be established (1) or not (0).

2.5.4 CAN Interfaces

Each CAN interface is listed as a block with the channel number (e.g. [can_0]). The number in the INI file is one less than the channel number on the website. **can_0** thus corresponds to the CAN channel 1 from the configuration website.

Some of the values can be configured via the web interface on the page *Network > CAN*.

Field Name	Default	Description
Ifname	canN	User-defined description of the CAN channel. Do not change!
Active	1	Activate / deactivate the interface
Baudrate	500000	Bit rate of the interface in bit/s
Listenonly	1	Listen only mode on / off
Autoresume	0	Auto resume after Bus Off on / off
Loopback	0	Loopback mode on / off
Oneshot	0	Single shot mode on / off

Triplesampling	0	Triple sampling on / off
ManBr	0	Manual bit rate configuration on / off
BR_Register	-	Register set for manual bit rate configuration. If activated: e.g. "BRP %d; RJW %d; TQ %d; PSEG1 %d; PSEG2 %d; PROPSEG %d
Samplepoint	800	Sample point (800 equivalent 80%)
Enable_error_counter	0	Enables / disables error reporting for the CAN channel. With this, the values can_errors_rx and can_errors_tx are counted.

2.5.5 GUI

The values define which information is shown to visitors without logging in on the configuration website.

The values can be configured via the web interface on the page *Device > User Management*.

Field Name	Default	Description
show_device_info	1	Displays the device information on the Login page.
show_can_info	0	Displays the CAN information on the Login page.
show_lan_info	0	Displays the LAN information on the Login page.
show_wlan_info	0	Displays the WLAN information on the Login page.
show_bt_info	0	Displays the BT information on the Login page (not used).
show_routing_info	0	Displays the routing information on the Login page.
show_contact_info	1	Displays the contact information on the Login page.
show_support_info	1	Displays the support information on the Login page.
show_filter_info	1	Displays the filter information on the Login page.

2.5.6 Routes

After FWD_GEN general information for routes is listed.

Each route is listed as a block with its index (e.g. [rt_0]). The number in the INI file is one less than the index on the website. **rt_0** therefore corresponds to the route 1 from the configuration website.

Routes can be created, edited, and deleted via the web interface on the page *Routing > Manage Routes*.

Field Name	Default	Description
FWD_GEN		
Count	0	Number of defined routes
CANoIPdPort	45321	Port of the handshake channel. Do not change!
ROUTEN		
RtInfo	Route n	User-defined description of the route
Active	0	Route activated / deactivated
Type	can2lan	Direction of the route: can2lan = Send route lan2can = Receive route
Interface1	can0	Used CAN channel: can0 = CAN channel 1 can1 = CAN channel 2
Protocol2	UDP	Used IP protocol: 0 = TCP 1 = UDP
Destination2	0.0.0.0:5000	IP address (IPv4) and port of the IP participant, regardless of whether it is the source or destination. Use a port between 1024 and 65535. The ports 45321 and 52957 are reserved for system functions.
FPP	15	Max. CAN frames per IP packet
TCPDelay	1	TCP delay active on / off
DispIdx	0	Reserved for future use.
SndUdelay	300	Time before re-sending in µs Maximum: 1000, Minimum: 10

SndMax	30	Number of retries Maximum: 64, Minimum: 6
cdm	500	Delay in ms between attempts to establish a connection. Maximum: 1000
invscktmode	0	"inverse socket mode" or "connection inverted" inverts the connection establishment. Instead of the send route, the receive route establishes the connection.
NoCtrl	0	Disable handshake on / off. 0 = Handshake is used 1 = Handshake is disabled
Filters	-	List of filters separated by ,
UnifyFilters	0	Calculating a single filter from all filter entries on / off
JoinFilters	0	Defines the logical operation for joining multiple filters. 0 = OR; 1 = AND
no_keep_alive	0	Deactivate transmitting TCP keep alive frames
use_crc_frm	0	Transmit CAN frames with CRC checksum on / off
crc_start_value	0x00000000	The CRC start value for creating the CRC32 checksum.
crc_polynom	0x04C11DB7	The CRC polynomial for creating the CRC32 checksum.

2.5.7 Filter

Each filter is listed as a block with its index (e.g. [filter_0]). The number in the INI file is one less than the index on the website. **filter_0** thus corresponds to the filter 1 from the configuration website.

Filters can be created, edited, and deleted via the web interface on the page *Filters > Manage Filters.*

Field Name	Default	Description
filter_type	-	Kind of the filter: 0 = not set 1 = Range, 11 Bit 2 = Range, 29 Bit 3 = Mask, 11 Bit 4 = Mask, 29 Bit
filter_mode	1	The value indicates how the filter is interpreted. 0 = Blacklist 1 = Whitelist
Term	-	**For Range filters**: The range filter is defined by an upper and lower CAN ID. The indication is hexadecimal and is separated by a hyphen. Example: 0x060-0x120 **For Mask filters**: For this filter, the Acceptance Code and then the Acceptance Mask are defined. These are specified hexadecimal and separated by a slash. Example: 0x060/0x020
Comment	-	User-defined description of the filter
Name	-	User-defined name of the filter

2.6 Structure of the INI File (v2.0.1)

The INI file is divided into different sections: general information, interfaces, routes, and filter.

The INI format 2.0 was introduced with the release of the PCAN-Ethernet Gateway FD DR and its software version 1.0.0. There have been major changes compared to the format version 1.5.0:

- The format version has been moved from the header comment to the general section.
- The field names have been revised.
- Unused fields have been removed.
- The CAN section has been extended regarding CAN FD support.
- The CAN field ManBr was replaced by br_def. With br_def a further way to define a custom bit rate was established.
- For the PCAN-Ethernet Gateway FD DR two sections were added: NTP_CLIENT and LEDs.
- The maximum number of routes can be specified with the parameter count_max in the range of 0 to 64.

With the update 2.0.1 further parameters were added:

- CAN interface settings for IRQ limits irq_time_limit and irq_count_limit. This can be used to balance message latency, throughput and CPU load.
- WLAN settings startup_delay and monitoring_delay.

Please note when editing:

- Field names do not distinguish between uppercase and lowercase letters.
- Values must not contain line breaks.

- The default values listed are used when no value has been defined.

2.6.1 General

Some of the values of *General* and *Host* can be configured via the web interface on the page *Device > Configuration*.

Field Name	Default	Description
GENERAL		
ini_version	2.0.1	Format version of the INI file. Do not change!
description	-	User-defined description of the device
kl15_pwdn	0	Power Down on / off (function only for PCAN-Wireless Gateway; for details see manual)
device_id	4294967295	The Device ID is used to differ multiple devices in the PCAN driver and software environment for Windows.
HOST		
devicename	-	User-defined name of the device
JSON		
enable_json	1	If active, the JSON interface can be used.
enable_json_shell	0	If active, the Shell view can be used.
enable_json_config	0	If active, the device can be configured via the JSON interface.
respect_gui_pub	1	If active, the JSON interface respects Public Dashboard settings.
NTP_CLIENT		
active		Enable / disable the use of the NTPD (Network Time Protocol daemon) service.
server_1	0.de.pool.ntp.org	URL of the first NTP server to be used
server_2	-	URL of the second NTP server to be used

2.6.2 LAN Interface

Some of the values can be configured via the web interface on the page *Network > LAN.*

Field Name	Default	Description
if_name	ethN	Interface designation. Do not change!
use_dhcp	0	If not equal 0, the external DHCP server is used for IP configuration.
ip_v4	192.168.1.10	v4 IP address (e.g. 192.168.1.100)
subnet_mask	255.255.255.0	Subnet mask (e.g. 255.255.255.0)
ip_v6	::	Reserved for future use.
ip_v4_gw	0.0.0.0	v4 IP of the default gateway
ip_v6_gw	::	Reserved for future use.
netbits_v6	64	Reserved for future use.

2.6.3 WLAN Interface

Some of the values can be configured via the web interface on the page *Network > WLAN.*

Field Name	Default	Description
if_name	wlanN	Interface designation. Do not change!
ssid	PEAK Wireless Default	Name of the WLAN network. Please note: The character # is not allowed.
encryption_type	5	Type of encryption: 0 = none 1 = WEP 2 = WPA-PSK TKIP 3 = WPA-PSK CCMP 4 = WPA2-PSK TKIP 5 = WPA2-PSK TKIP / CCMP 6 = WPA2-PSK CCMP
key_type	1	Type of key: 1 = string 2 = hex
key	-	Key to use

Field Name	Default	Description
mode	0	0 = Infrastructured 1 = Ad-Hoc 2 = Micro Access Point
use_dhcp	0	If not equal 0, the external DHCP server is used for IP configuration.
ip_v4	192.168.1.10	v4 IP address (e.g. 192.168.1.100)
subnet_mask	255.255.255.0	Subnet mask (e.g. 255.255.255.0)
ip_v6	::	Reserved for future use.
ip_v4_gw	0.0.0.0	v4 IP of the default gateway
ip_v6_gw	::	Reserved for future use.
netbits_v6	64	Reserved for future use.
scan_ssid	1	Determines if a connection to a hidden WLAN SSID can be established (1) or not (0).
startup_delay	0	Specifies a delay for starting the wireless interface in seconds. This can help if many wireless gateways are powered at the same time.
monitoring_delay	0	Specifies a delay for checking the status of the wireless interface in seconds. If the status is not "up" after that time, a reset of the interface is performed. This is disabled if set to 0.

2.6.4 CAN Interfaces

Each CAN interface is listed as a block with the channel number (e.g. [can_0]). The number in the INI file is one less than the channel number on the website. **can_0** thus corresponds to the CAN channel 1 from the configuration website.

Some of the values can be configured via the web interface on the page *Network > CAN*.

Field Name	Default	Description
if_name	canN	User-defined description of the CAN channel. Do not change!
active	1	Activate / deactivate the interface

listen_only	1	Listen only mode on / off
auto_resume	1	Auto resume after Bus Off on / off
loop_back	0	Loopback mode on / off
one_shot	0	Single shot mode on / off
triple_sampling	0	Triple sampling on / off
fd	1	CAN FD on / off
br_def	0	Specifies how the bit rate is defined: 0 = Bit rates and sample points are determined by the fields bit_rate, data_bit_rate, sample_point, and data_sample_point. 1 = Bit rates and sample points are determined by the fields br_register and data_br_register. 2 = Clock frequency, bit rates, and sample points are determined with the br_string field.
core_clock	80000000	Clock frequency in Hz
bit_rate	500000	Nominal bit rate of the interface in bit/s
sample_point	0	Sample point of the nominal bit rate (800 equivalent 80%)
data_bit_rate	Value from bit_rate	Data bit rate of the interface in bit/s
data_sample_point	0	Sample point of the data bit rate (800 equivalent 80%)
br_register	-	Register set for manual configuration of the nominal bit rate. Example: BRP %d, RJW %d, TQ %d, PSEG1 %d, PSEG2 %d, PROPSEG %d
data_br_register	-	Register set for manual configuration of the data bit rate. Example: BRP %d, RJW %d, TQ %d, PSEG1 %d, PSEG2 %d, PROPSEG %d
br_string	Product specific	Register string for manual configuration of the clock frequency, nominal bit rate, and data bit rate. Example: f_clock=%d,nom_brp=%d,nom_tseg1=%d, nom_tseg2=%d,nom_sjw=%d,data_brp=%d, data_tseg1=%d,data_tseg2=%d,data_sjw=%d

enable_error_counter	0	Enables / disables error reporting for the CAN channel. With this, the values can_errors_rx and can_errors_tx are counted.
measure_bus_load	0	Enables / disables bus load measurement
irq_time_limit	10	Specifies the time that the CAN interface waits until an interrupt is triggered. The time is set in a range from 1 to 15 milliseconds.
irq_count_limit	8	Specifies the number of messages that have to be received by the CAN interface before an interrupt is triggered. The number is set in a range from 1 to 127.

2.6.5 GUI

The values define which information is shown to visitors without logging in on the configuration website.

The values can be configured via the web interface on the page *Device > User Management*.

Field Name	Default	Description
show_device_info	1	Displays the device information on the Login page.
show_can_info	0	Displays the CAN information on the Login page.
show_lan_info	0	Displays the LAN information on the Login page.
show_wlan_info	0	Displays the WLAN information on the Login page.
show_bt_info	0	Displays the BT information on the Login page (not used).
show_routing_info	0	Displays the routing information on the Login page.
show_contact_info	1	Displays the contact information on the Login page.
show_support_info	1	Displays the support information on the Login page.
show_filter_info	1	Displays the filter information on the Login page.

2.6.6 Routes

After FWD_GEN general information for routes is listed.

Each route is listed as a block with its index (e.g. [rt_0]). The number in the INI file is one less than the index on the website. **rt_0** therefore corresponds to the route 1 from the configuration website.

Routes can be created, edited, and deleted via the web interface on the page *Routing > Manage Routes*.

Field Name	Default	Description
FWD_GEN		
count_max	16	Maximum number of definable routes. Value range 0 ... 64
count	-	Number of defined routes
ROUTEN		
rt_info	Route n	User-defined description of the route
active	0	Route activated / deactivated
type	can2lan	Direction of the route: can2lan = Send route lan2can = Receive route
interface_1	can0	Used CAN channel: can0 = CAN channel 1 can1 = CAN channel 2
protocol_2	UDP	Used IP protocol: 0 = TCP 1 = UDP
destination_2	0.0.0.0:5000	IP address (IPv4) and port of the IP participant, regardless of whether it is the source or destination. Use a port between 1024 and 65535. The ports 45321 and 52957 are reserved for system functions.
fpp	15	Max. CAN frames per IP packet
tcp_delay	1	TCP delay active on / off
disp_idx	0	Reserved for future use.

snd_delay_us	300	Time before re-sending in µs Maximum: 1000, Minimum: 10
snd_max	30	Number of retries Maximum: 64, Minimum: 6
connect_delay_ms	500	Delay in ms between attempts to establish a connection. Maximum: 1000
invert_socket_mode	0	"inverse socket mode" or "connection inverted" inverts the connection establishment. Instead of the send route, the receive route establishes the connection.
no_ctrl	0	Disable handshake on / off. 0 = Handshake is used 1 = Handshake is disabled
filters	-	List of filters separated by ,
unify_filters	0	Calculating a single filter from all filter entries on / off
join_filters	0	Defines the logical operation for joining multiple filters. 0 = OR; 1 = AND
no_keep_alive	0	Deactivate transmitting TCP keep alive frames
use_crc_frm	0	Transmit CAN frames with CRC checksum on / off
crc_start_value	0x00000000	The CRC start value for creating the CRC32 checksum.
crc_polynom	0x04C11DB7	The CRC polynomial for creating the CRC32 checksum.

2.6.7 Filter

Each filter is listed as a block with its index (e.g. [filter_0]). The number in the INI file is one less than the index on the website. **filter_0** thus corresponds to the filter 1 from the configuration website.

Filters can be created, edited, and deleted via the web interface on the page *Filters > Manage Filters.*

Field Name	Default	Description
filter_type	-	Kind of the filter: 0 = not set 1 = Range, 11 Bit 2 = Range, 29 Bit 3 = Mask, 11 Bit 4 = Mask, 29 Bit
filter_mode	1	The value indicates how the filter is interpreted. 0 = Blacklist 1 = Whitelist
term	-	**For Range filters**: The range filter is defined by an upper and lower CAN ID. The indication is hexadecimal and is separated by a hyphen. Example: 0x060-0x120 **For Mask filters**: For this filter, the Acceptance Code and then the Acceptance Mask are defined. These are specified hexadecimal and separated by a slash. Example: 0x060/0x020
comment	-	User-defined description of the filter
name	-	User-defined name of the filter

2.6.8 LEDs

The behavior of the LEDs 1 to 3 of the PCAN-Ethernet Gateway FD DR can be configured via the INI file. Under the section [leds] two fields are available for each LED.

Field Name	Default	Description
ledN_tsrigger	none	Defines the trigger for the flashing of the LED: none = LED is off. heartbeat = LED flashes periodically. netdev = LED flashing is connected to a network device (CAN channel). panic = LED is activated in case of kernel panic.
ledN_opts	-	Options are written in one line and separated by spaces. Example: led2_opts = device_name="can0" link rx tx **heartbeat options**:

inverted	Inverts the blinking sequence.
netdev options:	
device_name	Specifies the connected network device. can0 = CAN channel 1 can1 = CAN channel 2
link	LED represents the status of the network device.
rx	LED flashes when receiving a message.
tx	LED flashes when sending a message.
interval	Defines the duration of the flashing in ms.

3 JSON Interface

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

The JSON interface is activated at delivery but cannot be used for configuration. The status and rights of the interface are managed via the website.

3.1 Usage

3.1.1 Activation and Configuration

The JSON interface is activated at delivery but cannot be used for configuration.

For the configuration of the interface, proceed as follows:

1. Open the configuration website and log in.
2. Go to the page **Device > User Management**.

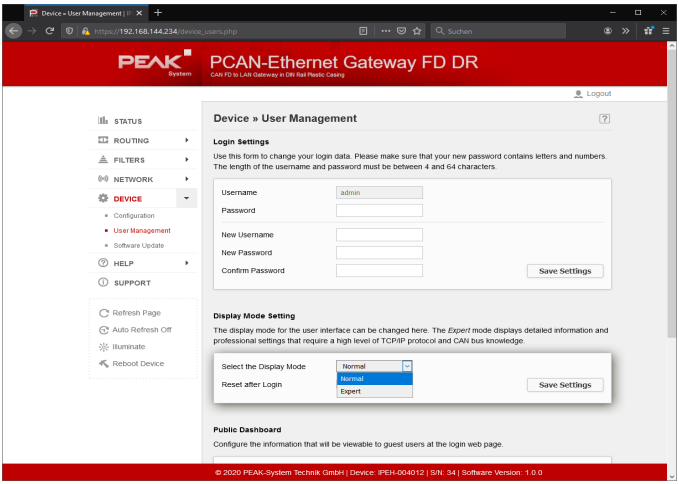

Figure 6: PCAN-Gateway web interface:
Activation of the Expert display mode

3. Set **Display Mode** to **Expert** and save the setting.
4. Go to the page **Device > Configuration**.

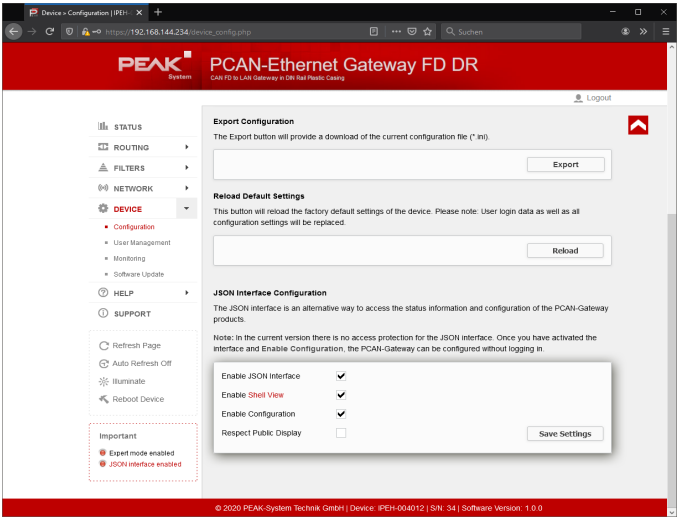

Figure 7: PCAN-Gateway web interface:
Activation of the JSON Interface

5. Activate the interface with the checkbox **Enable JSON Interface** in the form JSON Interface Configuration.

6. Configure the other options in the form:

   Enable Configuration
   If active, the device can be configured via the JSON interface. This includes the commands set, reset, reboot, 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.

7. 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.

3.1.2 Access to the Interface

You can access the JSON interface via two alternative PHP pages:

json.php serves as a software connection for productive use. The interface returns the response in JSON format. Help text output is disabled for this page.

json_shell.php provides a Shell emulation for development. This view displays information about processing the submitted request and the JSON-formatted response. The help documentation for the interface can also be displayed.

Hints for using the Shell:

- The last command is called with the key [arrow up].
- Perform a short click with the left mouse button to enter the input field.
- If you hold down the left mouse button, the cursor is not placed in the input field and you can select text, for example.
- There are three links in the header:

[Web]	Opens the configuration website
[CMD]	Opens the **json.php** page with the last request using the Get parameter **cmd**
[JCMD]	Opens the **json.php** page with the last request in JSON format using the Get parameter **jcmd**

3.1.3 Structure and Sending of a Request

When using the JSON interface, pass your request as a Get parameter. This is appended to the URL of the respective PHP page. If you use the Shell view, you can simply enter the command and send it with [Enter]. The page is then called with the corresponding Get parameter.

Two alternative get parameters are accepted. The parameter **cmd** expects a proprietary request, which is documented later on. The parameter **jcmd** expects a JSON-formatted request.

The request itself consists of up to four components: Command, Element, Sub Element, and Properties. The basic structure is as follows:

```
jcmd: {
     "command": "...",
     "element": "...",
     "sub_element": "...",
     "property": {
            [...]
     }
  }
```

Examples of a request are provided in all three variants ...

... for the JSON formatted request **URL JSON**:

```
[...]/json.php?jcmd={"command":"...","element":"...","sub_elemen
  t":"...", "property":{"...":"..."}}
```

... for the proprietary request **URL**:

```
[...]/json.php?cmd=Command+Element+Subelement+Property
```

... for the request via the shell emulation **Shell Cmd**:

```
Command Element Subelement Property
```

Command

A request starts with one of the following commands:

- get — Reading the status information and configuration.
- set — Configuring the PCAN-Gateway.
- delete — Deleting a route or filter.
- reset — Resetting a CAN channel or a route.
- reboot — Restarting the PCAN-Gateway.
- help — Displaying the help documentation. Only available for Shell view.

In chapter 0, each command is described in detail.

Element

Commands refer via so-called elements to functionally or thematically differentiated parts of the PCAN Gateway. There are the following elements:

- device — Covers information about the PCAN-Gateway such as identification features, number of interfaces, and version information.
- can — Covers information and configuration of the available CAN interfaces.
- lan — Covers information and configuration of the available LAN interfaces.
- wlan — Covers information and configuration of the available WLAN interfaces.
- route — Covers information and configuration of routes.
- filter — Covers information and configuration of filters.

Sub Element

The elements can, lan, wlan, route, and filter can exist several times. A sub element can be used to address a single instance of the element. The sub element is an integer number larger than 0.

Properties

Each element has different information and settings which can be read out and often configured via Properties. In contrast to commands, elements and sub-elements, multiple properties can be addressed with one request.

Chapter 3.3 contains detailed information on the elements and their properties.

3.1.4 Access Permission

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.

On the page **Device > Configuration** of the configuration website, you can configure two settings in Expert display mode that restrict access to the interface.

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

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.

3.1.5 Response and Error Notifications

The JSON interface returns the response to a request in JSON format. The answer contains at least three items of information:

Valid	boolean	Indicates to what extent the request and its processing was valid (true) or invalid (false).
Error	integer	Error code.
error_message	string	Error description.

Example:

```
{"valid":false,"error":200,"error_message":"No command
  received."}
```

As soon as an error occurs during processing of the request, processing is terminated and the error code and its error message are returned. The following errors can be detected in the current version.

GENERAL	
100	The PCAN-Gateway JSON Interface is disabled!

COMMAND	
200	No command received.
201	Command unknown.
202	Forbidden characters were used for the command.
203	This command is not available due to permission restrictions.

ELEMENT	
300	Element unknown.
301	Forbidden characters were used for the element.
302	This command does not expect an element or property.
303	The command was called without an element, but this is required.
304	Element unknown but an element is required for this command.
305	No permission for this element due to the public display settings. Access can be enabled via the website.
306	This element cannot be deleted.
307	This element cannot be reset.

SUB ELEMENT	
400	There are no sub elements for the called element.
401	Command was called without a valid sub element, but this is required.

PROPERTY	
500	Command was called with an invalid property.
501	Forbidden characters were used for the sub element or at least one property.
502	Command was called without a valid property or value to be assigned.
503	For this command, a property is required.

DEVICE COMMUNICATION	
1000	It was not possible to initialize the communication with the device.
1001	It was not possible to finish the communication with the device.

CAN CONFIGURATION	
1100	The submitted CAN channel is not valid.
1101	The submitted channel number is higher than the number of CAN interfaces available.
1102	The CAN stats could not be reset.
1103	The submitted CAN state is not valid.
1104	The CAN state could not be set. The configuration request was canceled.
1110	The submitted nominal bit rate is not valid.
1111	The submitted nominal bit rate is no standard bit rate.
1112	The submitted nominal bit rate is too low.
1113	The submitted nominal bit rate is too high.
1114	The nominal bit rate could not be set. The configuration request was canceled.
1170	The submitted data bit rate is not valid.
1171	The submitted data bit rate is no standard bit rate.
1172	The submitted data bit rate is too low.
1173	The submitted data bit rate is too high.
1174	The data bit rate could not be set. The configuration request was canceled.
1175	The submitted data bit rate is smaller than the nominal bit rate.
1120	The submitted value for the bit rate definition mode is not valid.
1121	The register set of the nominal bit rate is either empty or has wrong values.
1122	The register set of the nominal bit rate could not be set. The configuration request was canceled.
1123	The Bit Rate Prescaler value of the nominal bit rate register set was not valid. Please use a value from 1-1024.

1124	The Phase Segment 1 value of the nominal bit rate register set was not valid. Please use a value from 1-128.
1125	The Phase Segment 2 value of the nominal bit rate register set was not valid. Please use a value from 1-128.
1126	The Propagation Segment value of the nominal bit rate register set was not valid. Please use a value from 1-128.
1127	The Re-Synch. Jump Width value of the nominal bit rate register set was not valid. Please use a value from 1-128.
1181	The register set of the data bit rate is either empty or has wrong values.
1182	The register set of the data bit rate could not be set. The configuration request was canceled.
1183	The Bit Rate Prescaler value of the data bit rate register set was not valid. Please use a value from 1-1024.
1184	The Phase Segment 1 value of the data bit rate register set was not valid. Please use a value from 1-16.
1185	The Phase Segment 2 value of the data bit rate register set was not valid. Please use a value from 1-16.
1186	The Propagation Segment value of the data bit rate register set was not valid. Please use a value from 1-16.
1187	The Re-Synch. Jump Width value of the data bit rate register set was not valid. Please use a value from 1-16.
1128	The bit rate register string is not valid.
11281	The bit rate register string is incomplete. The clock is missing.
11282	The bit rate register string is incomplete. At least one value of the register set for the nominal bit rate is missing.
11283	The bit rate register string is incomplete. At least one value of the register set for the data bit rate is missing.
1129	The bit rate register string could not be set. The configuration request was canceled.
1130	The submitted value for the Listen-Only mode is not valid.
1131	The Listen-Only mode could not be set. The configuration request was canceled.
1140	The CAN user notes could not be set. The configuration request was canceled.
1150	The submitted value for CAN error reporting is not valid.
1151	CAN error reporting could not be set. The configuration request was canceled.
1160	The submitted clock frequency is not valid.
1161	The clock frequency could not be set. The configuration request was canceled.
1162	The submitted CAN FD status is not valid.
1163	The CAN FD status could not be set. The configuration request was canceled.

LAN CONFIGURATION	
1200	The submitted LAN channel is not valid.
1201	The submitted channel number is higher than the number of LAN interfaces available.

WLAN CONFIGURATION	
1300	The submitted WLAN channel is not valid.
1301	The submitted channel number is higher than the number of WLAN interfaces available.
1310	The submitted operation mode is not valid.
1311	The WLAN MODE could not be set. The configuration request was canceled.
1320	The submitted WLAN region is not valid.
1330	The submitted name (SSID) is not valid.
1331	The submitted name (SSID) is not valid, because the character # is not allowed.
1332	The name (SSID) could not be set. The configuration request was canceled.
1340	The submitted encryption type is not valid.
1341	The encryption type could not be set. The configuration request was canceled.
1350	The submitted network key is not valid.
1351	The submitted network key is not valid, because the character # is not allowed.
1352	No network key was submitted.
1353	The submitted network key is not valid. Please enter a key with a exact length of 5 or 13 characters.
1354	The submitted network key is not valid. Please enter a key with a length between 8 and 63 characters.
1355	The network key could not be set. The configuration request was canceled.

IP CONFIGURATION (LAN, WLAN, ROUTES)	
1400	The submitted value for DHCP is not valid.
1401	The submitted value for DHCP could not be set. The configuration request was canceled.
1410	The submitted IP address is not valid. Please only use values between 0 and 255.
1411	The submitted IP address is not valid. A least one value was out of the range of 0 and 255.
1412	The submitted IP address is not valid. The first part must not be larger than 223, because this IP address range is reserved for multicast.
1413	The submitted IP address is not valid. Depending on the given subnet mask and last IP address number this address is reserved for referring to the entire network.

1414	The submitted IP address is not valid. Depending on the given subnet mask and last IP address number this address is reserved for the broadcast address or is out of the valid address range.
1415	The IP address could not be set. The configuration request was canceled.
1420	The submitted subnet mask is not valid. Please use only values from the list: 0,128,192,224,240,248,252,254,255
1421	The submitted subnet mask is not valid. The subnet mask values must be continuous like 255.255.0.0. A sequence like 255.0.255.255 is forbidden.
1422	The subnet mask could not be set. The configuration request was canceled.
1430	The submitted gateway address is not valid. Please only use values between 0 and 255.
1431	The submitted gateway address is not valid. A least one value was out of the range of 0 and 255.
1432	The submitted gateway address is not valid. The first part must not be larger than 223, because this IP address range is reserved for multicast.
1433	The gateway address could not be set. The configuration request was canceled.

ROUTE CONFIGURATION

1500	The submitted route index is not valid.
1501	The route with the submitted route index is not defined.
1502	The submitted route index is higher than the maximum number of routes.
1503	Referring to a single route is required.
1504	The maximum allowed number of routes has been reached. In order to add a new route, a current route must be deleted.
1510	The submitted route direction is not valid.
1511	The transmission direction of the route could not be set. The request was canceled.
1512	The submitted value for the inverted connection establishment of the route was not valid.
1513	The inverted connection establishment of the route could not be set. The request was canceled.
1520	The state of the route is not valid.
1521	The state of the route could not be set. The request was canceled.
1522	The submitted value for the handshake flag of the route is not valid.
1523	The handshake flag of the route could not be set. The request was canceled.
1530	The submitted CAN channel is not valid.
1531	The submitted CAN channel is not available.

1532	The CAN channel of the route could not be set. The request was canceled.
1540	The submitted IP address is not valid.
1541	The submitted IP address is not valid. It is used by the local IP interface. Please select another one.
1542	This route cannot be created. The combination of IP address, port number, and protocol is already in use. Please select another port number.
1543	The IP address of the route could not be set. The request was canceled.
1550	The submitted port number is not valid. Please choose a number between 1024 and 65535.
1551	The submitted port number is not valid. The port must not be smaller than 1024, because this range is reserved for system services.
1552	The submitted port number is not valid. The port 45321 is reserved for the transmission of status information and to perform a handshake between PCAN-Gateways. Please select another port number.
1560	The submitted protocol of the route is not valid.
1561	Inverted connection establishment is not available with the protocol UDP.
1562	The submitted value for the TCP Delay flag is not valid.
1563	The TCP Delay flag of the route could not be set. The request was canceled.
1564	The submitted FPP value (frames per package) is not valid.
1565	The submitted FPP value (frames per package) is out of the range of 1 and 15.
1566	The FPP value (frames per package) of the route could not be set. The request was canceled.
1570	The submitted filter list is not valid.
1572	A submitted filter index is smaller than 1 or larger than the maximum number of filters.
1573	A submitted filter is not defined.
1574	The filter could not be applied to the route. The request was canceled.
1575	The submitted value for the join filter property is not valid.
1576	The join filter property could not be set. The request was canceled.
1580	The user notes could not be set. The configuration request was canceled.
1581	The CRC flag of the route could not be set. The request was canceled.
1582	The submitted CRC start value is not valid.
1583	The submitted CRC start value exceeds the limits.
1584	The CRC start value could not be set. The configuration request was canceled.
1585	The submitted CRC polynomial is not valid.
1586	The submitted CRC polynomial exceeds the limits.
1587	The CRC polynomial could not be set. The configuration request was canceled.

1590	The route status could not be reset.
1591	It was not possible to delete this route.

FILTER CONFIGURATION

1600	The submitted filter index is not valid.
1601	The filter with the submitted filter index is not defined.
1602	The submitted filter index is higher than the maximum number of filters.
1603	Referring to a single filter is required.
1610	No valid filter type was submitted.
1611	The filter type and ID range could not be set. The configuration request was canceled.
1620	No valid filter mode was submitted.
1621	The filter mode could not be set. The configuration request was canceled.
1630	The submitted filter values are not valid.
1631	At least one of the required values for the filter type to be set is not valid.
1632	The submitted filter values exceed the limits.
1633	The submitted From value is larger than the To value.
1634	The filter values could not be set. The configuration request was canceled.
1640	The filter name could not be set. The configuration request was canceled.
1650	The filter description could not be set. The configuration request was canceled.
1690	It was not possible to delete this filter.

DEVICE CONFIGURATION

1700	The submitted device name is not valid.
1701	The device name could not be set. The configuration request was canceled.
1710	The submitted device description is not valid.
1711	The device description could not be set. The configuration request was canceled.

3.2 Commands

3.2.1 Get - Reading Settings

The command **get** is used to read information and settings of one or all instances of an element.

```
get ELEMENT[required] SUBELEMENT[optional] PROPERTIES[optional]
```

Element: Requesting an element is required.

Sub Element: Requesting a sub element is optional. Without a sub element, the information of all instances of an element is returned. If a sub-element is specified, only the information of one instance is returned.

Properties: Requesting one or more properties is optional. If no property is specified, all properties of the element are returned. When multiple properties are requested, they are returned in the specified order.

Examples:

With this request, you can read out the bit rate and the setting of the listen-only mode of CAN channel 1.

URL JSON:

```
[...]/json.php?jcmd={
  "command":"get",
  "element":"can",
  "sub_element":"1",
  "property":{"bitrate":"","listen_only":""}
}
```

URL:

```
[...]/json.php?cmd=get+can+1+bitrate+listen_only
```

Shell Cmd:	
Returns the bit rate and the setting of the listen-only mode in the specified order.	`get can 1 bitrate listen_only`
Further examples for using the command get:	
Returns all information of all CAN channels.	`get can`
Returns the bit rate of all CAN channels.	`get can bitrate`
Returns all information of CAN channel 1.	`get can 1`
Returns the bit rate of CAN channel 1.	`get can 1 bitrate`

3.2.2 Set - Configuring Settings

The command **set** is used to configure the information and settings of an element. Unlike get, the command set requires the specification of a sub element and at least one property including the value to be set.

```
set ELEMENT[required] SUBELEMENT[optional] PROPERTIES[optional]
```

Element: Requesting an element is required.

Sub Element: Requesting a sub element is required. The element device is an exception.

Properties: The specification of at least one property including the value to be set is required. The value is specified as a string in quotation marks, regardless of its variable type.

It is possible and sometimes necessary to configure multiple properties at once, for example the access data for a WLAN network or the creation of a new route.

Examples:

With this request, you can set the bit rate of CAN channel 1 to 500 kbit/s.

URL JSON:

```
[...]/json.php?jcmd={
  "command":"set",
  "element":"can",
  "sub_element":"1",
  "property":{"bitrate":"500"}
}
```

URL:

```
[...]/json.php?cmd=set+can+1+bitrate="500"
```

Shell Cmd:	
Sets the bit rate of CAN channel 1 to 500 kbit/s	`set can 1 bitrate=”500”`
Further examples for using the command set:	
Sets the user-defined name of the PCAN-Gateway. In this case, no sub element is required.	`set device name=”My Gateway”`
Two properties of CAN channel 2 are set with one request.	`set can 2 active=”1” bitrate=”250”`

3.2.3 Delete - Deleting a Route or Filter

The command **delete** is used to delete routes and filters. Please note that no error is returned if the route or filter to be deleted was already deleted.

```
delete ELEMENT [route | filter] SUBELEMENT[optional]
```

Element: Requesting one of the elements **route** or **filter** is required.

Sub Element: Requesting a sub element is required. It is used as an index to delete a specific route or filter.

Examples:

With this request, you can delete route 1.

URL JSON:

```
[.../json.php?jcmd={
  "command":"delete",
  "element":"route",
  "sub_element":"1",
  "property":""
}
```

URL:

```
[.../json.php?cmd=delete+route+1
```

Shell Cmd:

```
delete route 1
```

3.2.4 Reset - Resetting a CAN Channel or a Route

The command **reset** is used to reset CAN interfaces and the status information of routes. Please note that no error is returned, if the route is not defined.

```
reset ELEMENT [route | can] SUBELEMENT[optional]
```

Element: Requesting one of the elements **can** or **route** is required.

Sub Element: Requesting a sub element is required. It is used as an index of the route or as the number of the CAN channel to be reset.

Examples:

With this request, you can reset CAN channel 1, for example after a Bus Off.

URL JSON:

```
[...]/json.php?jcmd={
  "command":"reset",
  "element":"can",
  "sub_element":"1",
  "property":""
}
```

URL:

```
[...]/json.php?cmd=reset+can+1
```

Shell Cmd:

```
reset can 1
```

3.2.5 Reboot - Restarting the PCAN-Gateway

The command **reboot** is used to restart the device. During this process, the PCAN-Gateway cannot be reached.

```
reboot
```

Examples:

With this request you can reboot your PCAN-Gateway.

URL JSON:

```
[...]/json.php?jcmd={
  "command":"reboot",
  "element":"",
  "sub_element":"",
  "property":""
}
```

URL:

```
[...]/json.php?cmd=reboot
```

Shell Cmd:

```
reboot
```

3.2.6 Help - Documentation

In the Shell view, the command **help** can be used to display help for the previous command or element.

Examples:

Opens the help for the JSON interface with an overview of all commands and elements as well as a list of possible errors.	`help`
Opens the help for the command set.	`set help`
Opens the help for the element route with a listing of its properties.	`get route help`

3.3 Elements

3.3.1 Device

The element **device** covers general information about your PCAN-Gateway. This includes the available communication interfaces, different version numbers, and information to identify the device.

The following table lists all properties of the device. Properties printed in bold are writable.

PROPERTY	TYPE	DESCRIPTION
product_name	string	Product name determined by the manufacturer.
order_no	string	Order number determined by the manufacturer.
serial_no	string	Serial number unique for this device determined by the manufacturer.
name	string	Custom device name with a maximum length of 50 characters.
description	string	Custom device description with a maximum length of 200 characters.
hardware_version	string	Version number of the PCAN-Gateway circuit board.
software_version	string	Version number of the installed software package.
website_version	string	Version number of the PCAN-Gateway configuration website which is a part of the software package.
interface_version	string	Version number of the PCAN-Gateway JSON interface which is a part of the website.
CAN_count	integer	Number of available CAN interfaces.
can_fd_support	boolean	Indicates whether CAN FD is supported (true) or not (false). If CAN FD is not supported, all requests for CAN FD properties to the CAN channels are not valid.
LAN_count	integer	Number of available LAN interfaces.
WLAN_count	integer	Number of available WLAN interfaces.

Please note: The element **device** cannot be called with a sub element.

3.3.2 CAN

The element **can** covers information and the configuration of the available CAN interfaces. A sub element is used to access a single channel.

The following table lists all properties of can. Properties printed in bold are writable.

PROPERTY	TYPE	DESCRIPTION
channel	integer	The channel number of the CAN interface.
active	integer	This number indicates if the CAN channel is 1 = active or 0 = inactive.
status	integer	This number indicates the state of the CAN channel. 0 = Error Active: The CAN interface is active and the error counter is lower than 96. 1 = Error Warning: Errors were detected on the bus. The error counter reached the threshold of 96. 2 = Error Passive: Errors were detected on the bus. The error counter reached the threshold of 128. 3 = Bus Off: The CAN controller was switched off. The error counter is higher than 255. 4 = The CAN interface is inactive. 5 = The CAN interface is sleeping.

bitrate	float	This is the nominal bit rate of the CAN channel. This value should match that one of the connected CAN bus. There is a list of available nominal bit rates depending on the clock frequency and the limits of the CAN transceiver. Examples: 1000 = 1 Mbit/s 800 = 800 kbit/s 500 = 500 kbit/s 250 = 250 kbit/s 200 = 200 kbit/s 125 = 125 kbit/s 100 = 100 kbit/s 95.238 = 95.238 kbit/s 83.333 = 83.333 kbit/s 50 = 50 kbit/s 47.619 = 47.619 kbit/s 33.333 = 33.333 kbit/s 20 = 20 kbit/s 10 = 10 kbit/s 5 = 5 kbit/s
clock	integer	This is the clock frequency of the CAN channel. The value is fixed to 24 MHz. On the PCAN-Ethernet Gateway FD DR, the value can be configured to a frequency from the following list. 20 = 20 MHz 24 = 24 MHz 30 = 30 MHz 40 = 40 MHz 60 = 60 MHz 80 = 80 MHz
listen_only	integer	The state of the Listen-Only-Mode is determined with 0 = disabled or 1 = enabled.
user_notes	string	Custom user notes for the CAN channel with a maximum length of 125 characters.

br_def	integer	The bit rate definition mode determines how a bit rate is set. This affects the nominal CAN bit rate and the CAN FD data bit rate if CAN FD is supported by the device. 3 bit rate definition modes are available: 0 = standard bit rates selected from the list. This is the default mode. 1 = custom bit rates defined with the bit rate register properties "br_reg_###" and “can_fd_reg_###". 2 = custom bit rates defined with the bit rate string property "br_def_string".
br_def_string	string	With this string, the nominal and data bit rates can be set, when using bit rate definition mode 2. The string contains the clock frequency and bit rate register properties. The string can be generated with the software Bit Rate Calculation Tool or PCAN-View from PEAK-System. In contrast to configuring custom bit rates with register values, the register string indicates the Time segment values instead of the Phase and Propagation segment values. Examples: • 500 kbit/s Nominal BR, 80% Sample Point = f_clock=80000000, nom_brp=1, nom_tseg1=127, nom_tseg2=32, nom_sjw=32 • 500 kbit/s Nominal BR, 4 Mbit/s Data BR, 75% Sample Point = f_clock=80000000, nom_brp=5, nom_tseg1=23, nom_tseg2=8, nom_sjw=8, data_brp=5, data_tseg1=2, data_tseg2=1, data_sjw=1 • 1 Mbit/s Nominal BR, 4 Mbit/s Data BR, 80% Sample Point = f_clock=80000000, nom_brp=1, nom_tseg1=63, nom_tseg2=16, nom_sjw=16, data_brp=1, data_tseg1=15, data_tseg2=4, data_sjw=4
manual_bitrate	integer	The property is deprecated and replaces by br_def. For backward compatibility, the value is automatically copied to br_def when set.
br_reg_brp	integer	Bit Rate Prescaler (Nominal Bit Rate): This value defines the radio of CPI clock and serial clock frequency. It accepts values from 1 to 1024.

br_reg_rjw	integer	The Resynchronization Jump Width (Nominal Bit Rate) defines the maximum extension or shortening of the Phase Segments for the signal resynchronization. It accepts values from 1 to 128.
br_reg_tq	integer	Time Quantum (Nominal Bit Rate): Results from the other nominal bit rate register values.
br_reg_pseg1	integer	Phase Segment 1 (Nominal Bit Rate): The phase segments are used to compensate edge phase errors at the beginning and end of the bit. Phase Segment 1 accepts values from 1 to 128.
br_reg_pseg2	integer	Phase Segment 2 (Nominal Bit Rate): The phase segments are used to compensate edge phase errors at the beginning and end of the bit. Phase Segment 2 accepts values from 1 to 128.
br_reg_propseg	integer	Propagation Segment (Nominal Bit Rate): This time segment is used to compensate the signal delays over the network and can accept values from 1 to 128.
br_reg_sp	string	This value represents the sample point of the nominal bit rate in %. 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. Time Segment 2 is defined by Phase Segment 2.
can_fd	integer	This value indicates if CAN FD is 1 = enabled or 0 = disabled. If CAN FD is enabled, the CAN data is transmitted with the faster data bit rate. This is only available for devices with CAN FD support.

data_bitrate	float	This is the data bit rate of the CAN channel. This is only available for devices with CAN FD support. This value should match that one of the connected CAN bus. The data bit rate must be equal or higher than the nominal bit rate. There is a list of available data bit rates depending on the clock frequency and the limits of the CAN transceiver. Examples for 80 MHz clock: 10000 = 10 Mbit/s 8000 = 8 Mbit/s 5000 = 5 Mbit/s 4000 = 4 Mbit/s 2000 = 2 Mbit/s 1000 = 1 Mbit/s 500 = 500 kbit/s
can_fd_reg_brp	integer	Bit Rate Prescaler (Data Bit Rate): This value defines the radio of CPI clock and serial clock frequency. It accepts values from 1 to 1024.
can_fd_reg_rjw	integer	The Resynchronization Jump Width (Data Bit Rate) defines the maximum extension or shortening of the Phase Segments for the signal resynchronization. It accepts values from 1 to 16.
can_fd_reg_tq	integer	Time Quantum (Data Bit Rate): Results from the other nominal bit rate register values.
can_fd_reg_pseg1	integer	Phase Segment 1 (Data Bit Rate): The phase segments are used to compensate edge phase errors at the beginning and end of the bit. Phase Segment 1 accepts values from 1 to 16.
can_fd_reg_pseg2	integer	Phase Segment 2 (Data Bit Rate): The phase segments are used to compensate edge phase errors at the beginning and end of the bit. Phase Segment 2 accepts values from 1 to 16.
can_fd_reg_propseg	integer	Propagation Segment (Data Bit Rate): This time segment is used to compensate the signal delays over the network and can accept values from 1 to 16.
can_fd_reg_sp	string	This value represents the sample point of the data bit rate in %. 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. Time Segment 2 is defined by Phase Segment 2.

can_error_reporting	integer	This number indicates if the error reporting for this CAN channel is 1 = active or 0 = inactive. If active, the values can_errors_rx and can_errors_tx are counted.
can_errors_rx	integer	Indicates the number of CAN receive errors.
can_errors_tx	integer	Indicates the number of CAN transmit errors.

Please note:

- The given limits of the bit rate register values are from the PCAN-Ethernet Gateway FD DR. The limits of your device can differ. Please check the online help with the JSON shell view or the manual of your device for the limits.
- If custom bit rates for the nominal and data bit rates are set, the "bitrate" or "data_bitrate" properties are read only. It is not possible to set custom bit rates with these properties.
- If you set the "bitrate" from a custom value to a common value from the list, you must set the property "br_def" to "0".

3.3.3 LAN

The element **lan** covers information and the configuration of the available LAN interfaces. A sub element is used to access a single interface.

The following table lists all properties of lan. Properties printed in bold are writable.

PROPERTY	TYPE	DESCRIPTION
channel	integer	The channel number of the LAN interface.
use_DHCP	integer	If the IP network uses DHCP, the PCAN-Gateway IP address, Subnet mask, and gateway address are assigned automatically. Otherwise, the information must be entered manually. 0 = Disabled 1 = Enabled (Not Recommended)

IPv4	string	The IP address (IPv4) of the LAN interface. It should be noted that only values from 0 to 255 divided by a . may be used and certain address ranges are reserved.
IPv4_subnet	string	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 are: 0, 128, 192, 224, 240, 248, 252, 254 and 255.
IPv4_gateway	string	The IP address (IPv4) of the gateway that manages the IP network.
MAC	string	Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

3.3.4 WLAN

The element **wlan** covers information and the configuration of the available WLAN interfaces. A sub element is used to access a single interface.

The following table lists all properties of wlan. Properties printed in bold are writable.

PROPERTY	TYPE	DESCRIPTION
channel	integer	The channel number of the WLAN interface.
mode	integer	This number indicates the operation mode of the WLAN interface. 0 = Infrastructured Mode (Client): The PCAN-Gateway must connect to a WLAN network of an existing access point. 1 = Ad-Hoc Mode (Host): The PCAN-Gateway hosts a WLAN network of its own. Other devices can connect to this network as an equal participant. 2 = Micro Access Point Mode (Host): The PCAN-Gateway hosts a WLAN network of its own. Other devices can connect to this network as a client.

use_DHCP	integer	If the IP network uses DHCP, the PCAN-Gateway IP address, Subnet mask, and gateway address are assigned automatically. Otherwise, the information must be entered manually. 0 = Disabled 1 = Enabled (Not Recommended)
IPv4	string	The IP address (IPv4) of the WLAN interface. It should be noted that only values from 0 to 255 divided by a . may be used and certain address ranges are reserved.
IPv4_subnet	string	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 are: 0, 128, 192, 224, 240, 248, 252, 254 and 255.
IPv4_gateway	string	The IP address (IPv4) of the gateway that manages the IP network.
MAC	string	Each device receives a unique MAC address during the manufacturing process, which can be used for identification.
SSID	string	If Infrastructured Mode is used, this is the name of the WLAN the PCAN-Gateway is going to connect to. If Ad-Hoc or Micro Access Point mode is used, this is the name of the WLAN provided by the PCAN-Gateway. Please note: The character # is not allowed.
encryption_type	integer	The encryption type that is used by the WLAN. Please note: The Ad-Hoc operation mode does not support any encryption. 0 = No Encryption (Not Recommended) 2 = WPA-PSK TKIP 3 = WPA-PSK AES 4 = WPA2-PSK TKIP 5 = WPA/WPA2-PSK TKIP/AES 6 = WPA2-PSK AES
network_key	string	The password to gain access to the WLAN. Please note: The character # is not allowed.

3.3.5 Route

The element **route** covers information and the configuration of Send routes (CAN-to-IP) and Receive routes (IP-to-CAN) routes. With a sub element the information of a single route can be accessed via its index number.

Please note:

- Properties with a default value are not required for adding a new route.
- 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.
- Any combination of the IP address, port, and protocol can only be used once.

The following table lists all properties of route. Properties printed in bold are writable.

PROPERTY	TYPE	DESCRIPTION
index	integer	For saving routes, the PCAN-Gateway uses a table with 16 rows that are addressed with this unique index.
active	integer	This number indicates if the route is 1 = active or 0 = inactive (default value).

status	integer	This number indicates the status of the route. It is created from the properties active, direction, connection_inverted, peers_connected, and no_handshake. 0 = The route is inactive. 1 = For Send routes: The route is active. 2 = Warning! The route is active but not connected with the remote site. 3 = For Receive routes: The route is active and connected with the remote site. 4 = Warning! More than one remote site tries to connect to this route. Please note: This interference is not possible anymore. The first remote site establishes the connection and further remote sites are ignored. 5 = The route is active, but the PCAN-Gateway handshake is inactive. No status information is gathered for this route.
direction	string	This property determines the direction of the route: send = CAN > IP: Within a Send route the data of a CAN channel is forwarded over the IP interface. When adding a Send route, an IP address is required. receive = IP > CAN: Within a Receive route the PCAN-Gateway receives data via the IP interface and forwards it to a CAN channel. In this case the IP address of the PCAN-Gateway is used and the string “Local IP” is returned. When adding a receive route, an IP address is not required.
no_handshake	integer	If this property 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. 0 = inactive (default value) 1 = active

connection_inverted	integer	This property determines how the connection of the route is established. 0 = Normal (default value). Establishing the connection of a Send route is handled by the sending PCAN-Gateway. 1 = Inverted. Establishing the connection of a Send route is handled by the receiving PCAN-Gateway.
user_notes	string	Custom user notes for the route with a maximum length of 125 characters. By default, the notes are set to be empty when adding a route.
protocol	string	This determines which transmission protocol should be used by the route. Possible values are: 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.
fpp	integer	Frames per Packet: This value specifies the maximum number of CAN frames that can be transmitted with an IP data packet. This selection is only needed for Send routes when using the UDP protocol. Possible values are numbers from 1 to 15. Default value is 15.
peers_connected	integer	This number indicates if a remote site (another PCAN-Gateway or PC with Virtual PCAN-Gateway) is connected to this route or when using older software versions how many Send routes are connected to this Receive route. The value peers_connected is set via the PCAN-Gateway status channel.

tcp_connected	integer	When using the TCP protocol, this number indicates if the remote site (another PCAN-Gateway or PC with Virtual PCAN-Gateway) is connected to this route.
CAN_channel	integer	This number indicates the CAN channel used by this route. 1 = CAN channel 1 2 = CAN channel 2
CAN_packets	integer	Indicates the number of transferred CAN packets. A CAN packet can contain multiple CAN frames.
CAN_frames	integer	Indicates the number of transferred CAN frames.
CAN_errors	integer	Indicates the number of errors occurred when reading or writing CAN frames. Please note: This is not equivalent to CAN error frames.
CAN_frame_drop	integer	Indicates the number of CAN frames which were not transferred.
CAN_frame_retry	integer	Indicates the number of CAN frames which were transferred at retry.
CAN_timeout	integer	Indicates the time between retries of sending a CAN frame.
CAN_retry	integer	Indicates the maximum number of retries before a CAN frame is dropped.
IP_address	string	This is the IP address (IPv4) of the destination device used by this route. It should be noted that only values from 0 to 255 divided by a . may be used and certain address ranges are reserved. When creating a receive route, this value is not required.
IP_port	integer	Indicates the port used by the route. It can be 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.
IP_packets	integer	Indicates the number of transferred IP packets.
IP_errors	integer	Indicates the number of IP errors occurred.

TCP_delay	integer	TCP Delay: If this property is active, 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. 0 = inactive 1 = active (default value)
CRC_on	integer	If this property is active, CAN frames are transmitted with a CRC32 checksum which is created from DLC, flags, CAN ID, and data of the CAN frame together with the CRC start value and polynomial. For a valid connection with CRC, the values CRC_on, CRC_start_value, CRC_polynom of the Send and Receive route must match. 0 = inactive (default value) 1 = active
CRC_start_value	string	The CRC start value is used for creating the CRC32 checksum. Enter a hexadecimal value from 0 to FFFFFFFF. Default is 00000000.
CRC_polynom	string	The CRC polynomial is used for creating the CRC32 checksum. Enter a hexadecimal value from 0 to FFFFFFFF. Default is 4c11db7.
CRC_errors	integer	This indicates the number of incoming frames with wrong CRCs.
filter	string	This property determines the filters used by the route. Every used filter is listed by its index number. Multiple filters are divided by a comma. By default, no filter is set when adding a route.
filter_join	integer	Filters are joined with: This property specifies how multiple filters are linked. If you use several Whitelist filters, you should choose Logical OR. If you attach multiple Blacklist filters to a single route, the selection Logical AND is recommended. 0 = logical OR (default value) 1 = logical AND Note: A single Range filter is realized with a composition of multiple Mask filters. The Joined Filters property will also affect this.

3.3.6 Filter

The element **filter** covers information and the configuration of filters that can be used by routes. With a sub element the information of a single filter can be accessed via its index number.

Please note:

- Properties with a default value are not required for adding a new filter.

The following table lists all properties of filter. Properties printed in bold are writable.

PROPERTY	TYPE	DESCRIPTION
index	integer	For saving filters, the PCAN-Gateway uses a table with 32 rows that are addressed with this unique index.
filter_name	string	A custom name with a maximum length of 50 characters can be assign to a filter. Default value is "Filter" plus its index number.
filter_type	integer	Determines the filter type and the ID mode. 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. 1 = Range filter with 11 Bit IDs 2 = Range filter with 29 Bit IDs 3 = Mask filter with 11 Bit IDs 4 = Mask filter with 29 Bit IDs

filter_mode	integer	The mode indicates how the defined filter is interpreted. 0 = 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. 1 = Whitelist (default value): A filter using this mode will transmit every CAN message whose ID matches the filter specifications.
range_from	string	For Range filters only: A lower and an upper limit have to be specified to set the range. This value marks the lower limit of the filter range. The From value has to be lower than the To value.
range_to	string	For Range filters only: A lower and an upper limit have to be specified to set the range. This value marks the upper limit of the filter range.
mask_acc_code[1]	string	For Mask filters only: The ID of the CAN message to be transmitted is compared bitwise with the "Acceptance Code" value.
mask_acc_mask[1]	string	For Mask filters only: The "Acceptance Mask" specifies which bit positions are relevant when the ID is compared with the "Acceptance Code".
user_notes	string	Additional information with a length of 200 characters can be entered for each filter. By default, the notes are set to be empty when adding a filter.
use_count	integer	This number represents how many times the filter is used.
use_on_routes	string	This property returns the routes to which the filter is attached to. For this, the indices of the routes are listed divided by commas.

[1] **Note:** Up to software version 2.9.0, the mask_acc_code and mask_acc_mask values were swapped internally. After a software update to a higher version, check the correct function of your Mask filter settings.