

PCAN-OBD-2 Viewer

User Manual



Document version 1.1.0 (2021-04-08)

Relevant Products

| Product Name |
|--------------|
|--------------|

| |
|-------------------|
| PCAN-OBD-2 Viewer |
|-------------------|

PCAN® is a registered trademark of PEAK-System Technik GmbH.
Other product names in this document may be the trademarks or registered trademarks of their respective companies. They are not explicitly marked by ™ or ®.

© 2021 PEAK-System Technik GmbH

Duplication (copying, printing, or other forms) and the electronic distribution of this document is only allowed with explicit permission of PEAK-System Technik GmbH. PEAK-System Technik GmbH reserves the right to change technical data without prior announcement. The general business conditions and the regulations of the license agreement apply. All rights are reserved.

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

Phone: +49 6151 8173-20
Fax: +49 6151 8173-29

www.peak-system.com
info@peak-system.com

Document version 1.1.0 (2021-04-08)

Contents

| | | |
|----------|-------------------------------------|-----------|
| 1 | Introduction | 5 |
| 1.1 | Features | 5 |
| 1.2 | System Requirements | 6 |
| 1.3 | Scope of Supply | 6 |
| 2 | Installation | 7 |
| 3 | Basic Principles of Use | 8 |
| 3.1 | Browsing OBD-2 Information | 8 |
| 3.2 | Updating OBD-2 Information | 9 |
| 3.3 | Viewing Real-Time Graph Data | 11 |
| 3.4 | Customizing the Real-Time Dashboard | 11 |
| 3.5 | Exporting OBD-2 Information | 13 |
| 4 | User Interface | 14 |
| 4.1 | Main window | 14 |
| 4.2 | Menus | 15 |
| 4.2.1 | File Menu | 15 |
| 4.2.2 | Edit Menu | 15 |
| 4.2.3 | OBD-2 Menu | 16 |
| 4.2.4 | View Menu | 16 |
| 4.2.5 | Help Menu | 17 |
| 4.3 | Toolbar | 17 |
| 4.4 | Status Bar | 18 |
| 4.5 | Connect Dialog Box | 18 |
| 5 | OBD-2 Information Views | 19 |
| 5.1 | Summary | 19 |
| 5.2 | Diagnostic Trouble Codes | 20 |
| 5.3 | Freeze Frames | 20 |

| | | |
|----------|----------------------------------|-----------|
| 5.4 | Test Components | 22 |
| 5.5 | On-Board Monitoring Test Results | 22 |
| 5.6 | Sensors | 23 |
| 5.7 | Real-Time Graph | 24 |
| 5.8 | Vehicle Information | 25 |
| 5.9 | Supported Identifiers | 25 |
| 5.10 | Data Log | 26 |
| 6 | Additional Information | 28 |
| 6.1 | PCAN Fundamentals | 28 |
| 6.2 | Understanding PCAN-OBD-2 | 30 |

1 Introduction

The OBD-2 standard defines the exchange of specific vehicle parameters for on-board diagnostics. As part of OBD-2, the ISO 15765-4 standard describes the CAN bus as a transmission option.

With the Windows software PCAN-OBD-2 Viewer OBD-2 data can be read out from connected control units (ECUs) via the CAN bus for presentation and further processing.

The application was implemented based on the programming interface PCAN-OBD-2 API by PEAK-System and is available free of charge for users of PEAK CAN adapters.



Important note: Use the PCAN-OBD-2 Viewer software on your own risk. PEAK-System assumes no liability.

1.1 Features

- └ On-board diagnostics according to the standard OBD-2 (ISO 15765-4)
- └ Physical communication via CAN using a CAN interface of the PCAN series
- └ Support of all OBD-2 services that can be transmitted with CAN
- └ Configurable graphical data representation on analog and digital instruments in a virtual cockpit
- └ Saving and loading of configurations
- └ Display of Diagnostic Trouble Codes (DTCs) and available test results
- └ Reading of data that is recorded if an error occurs (Freeze Frames)

- └ Listing emission-related data. Optional display of individual parameters as a graph
- └ Exporting graphs and records of the OBD-2 communication

1.2 System Requirements

- └ Windows 10 (32/64-bit)
- └ At least 2 GB RAM and 1.5 GHz CPU
- └ For the CAN bus connection: PC CAN interface from PEAK-System

1.3 scope of supply

- └ PCAN-OBD-2 Viewer software
- └ Documentation in PDF format

2 Installation

To work with PCAN-OBD-2 Viewer, you first need to establish a connection to a PCAN hardware which is connected to the plug of an OBD-2 compliant car. It is also possible to communicate with any OBD-2 compliant Electronic Control Unit (ECU) connected to a CAN bus.

▶ Do the following to connect the PCAN-OBD-2 Viewer to a PCAN hardware:

1. In the **OBD-2** menu, choose the command **Connect**.
The **Connect to** dialog box appears.
2. In the **Connect to** dialog box, select the PCAN hardware with which you want to establish a connection.
3. In the **Bit rate** drop-down list, choose a bit rate or keep Auto-Detect.
4. Confirm with **OK**.
5. If an error occurs or the connection cannot be established, an error message is shown.

3 Basic Principles of Use

3.1 Browsing OBD-2 Information

After the PCAN-OBD-2 Viewer has been successfully connected to a CAN hardware, all OBD-2 requests are automatically transmitted. Once the process is complete, you can select any view to get information.



Note: You can see the current task status on the bottom right corner of the application.

Views can be selected by choosing a command in the **View** menu, or by selecting a tab and a sub-category:

- └ The **Summary** tab presents a dashboard with common emission-related data values updated in real-time.
- └ The **Diagnostic Trouble Code** view (under **Diagnostics** tab) displays all Diagnostic Trouble Codes (DTCs):
 - **Confirmed** Emission-Related DTCs (obtained via OBD service \$03)
 - **Pending** DTCs detected during current or last completed driving cycle (OBD service \$07)
 - **Permanent** DTCs detected during current or last completed driving cycle (OBD service \$07)
- └ The **Freeze Frame** view (under **Diagnostics** tab) lists Powertrain Freeze Frame data (OBD service \$02).
- └ The **Test component** view (under **Diagnostics** tab) lists available controls of On-Board System, Test or Component (OBD service \$08).

- └ The **On-Board Monitoring Test results** view (under **Diagnostics** tab) displays the OBDM test results (OBD service \$06).
- └ The **Sensors** view (under **Monitoring** tab) displays current emission-related data values (OBD service \$01).
- └ The **Real-Time Graph** view (under **Monitoring** tab) allows to plot current emission-related data values in real-time.
- └ The **Vehicle Information** view (under **System information** tab) lists the vehicle information obtained through OBD service \$09.
- └ The **Supported IDs** view (under **System information** tab) summarizes for each known OBD-2 identifier (which identifies a specific feature) if it is supported by the vehicle's ECU(s).
- └ The **Data Log** view (under **System information** tab) outputs all OBD-2 responses.

3.2 Updating OBD-2 Information

After the PCAN-OBD-2 Viewer has been successfully connected to a CAN hardware, all OBD-2 requests are automatically transmitted. You can launch those requests again by choosing the **Full OBD-2 scan** via **F5** in the OBD-2 menu. This complete scan does the following:

- └ Transmits requests to get supported identifiers for each OBD service that requires one. You can see the result of this process in the **Supported IDs** view.
- └ Transmits requests for each OBD service and each supported identifier. The results of this process are stored in different views depending on their context. The **Data Log** view will keep track of every response received.

It is possible to update specific information only. The refresh buttons, present on the different views, will only transmit requests related to the current view:

- └ The **Diagnostic Trouble Code** view updates Diagnostic Trouble Codes through OBD services \$03, \$07, \$0A (which corresponds to “confirmed”, “pending”, and “permanent” emission-related DTCs).
- └ The **Diagnostic Trouble Code** view also has a **Clear DTCs** button which will send a request to Clear/Reset Emission Related Diagnostic Information. It is also accessible through the OBD-2 menu via the command **Clear DTCs**.
- └ The **Freeze Frames** view updates Powertrain Freeze Frame data (OBD service \$02).
- └ The **Test component** view requests control of On-Board System, Test, or Component (OBD service \$08).
- └ The **On-Board Monitoring Test Results** view updates the OBDM test results (OBD service \$06).
- └ The **Sensors** view updates current emission-related data values (OBD service \$01).
- └ The **Vehicle Information** view updates the vehicle information obtained through OBD service \$09.
- └ The **Summary** view and **Real-Time Graph** are updated automatically (OBD service \$01).

3.3 Viewing Real-Time Graph Data

The real-time graph is only available when the Supported Parameter Identifiers are defined.

▶ Do the following to plot an emission-related data value:

1. On the **View** menu, select **Real-Time Graph** or click on the **Monitoring** tab and then on the **Real-Time Graph** button on the left sidebar.
2. Select emission-related data:
 - Choose a single Parameter ID (PID) value from the **Sensor** combo box.
 - Select multiple PIDs by clicking on the dots button (...). Select one or more values in the dialog box and click on the **Ok** button.
3. Set the **Refresh rate** which defines the time in milliseconds between each request.
4. Make sure that the **Enable acquisition** checkbox is checked.



Tip: You can use the mouse wheel to zoom in and out and click and drag the graph to move the time axis.

3.4 Customizing the Real-Time Dashboard

The dashboard on the **Summary** tab displays common emission-related data values:

- └ Engine Coolant Temperature (PID \$05)
- └ Vehicle Speed Sensor (PID \$0D)
- └ Time Since Engine Start (PID \$1F)

- └ Calculated LOAD value (PID \$04)
- └ Engine RPM (PID \$0C)
- └ Barometric Pressure (PID \$33)
- └ Fuel Level Input (PID \$2F)
- └ Intake Air Temperature (PID \$0F)
- └ Air flow rate from Mass Air Flow sensor (PID \$10)
- └ Malfunction Indicator Lamp (MIL) Status (PID \$01)
- └ Distance Traveled while MIL is activated (PID \$21)
- └ Ambient Air Temperature (PID \$46)
- └ Control module voltage (PID \$42)



Note: If one of the default Dashboard Parameter ID is not supported, the gauge or displayed value will be zero by default.

▶ Do the following to customize the dashboard:

1. Click on the **Customize...** button.

The customize dashboard window appears, it displays all the dashboard's components along with a description of their positions.

2. For each component, you can assign an OBD variable by selecting one in the variable's combo box.
3. When a variable is selected, you can edit its displayed title.
4. Once your modification is done, click the **Ok** button.

In addition, you can save and load dashboard configurations with the commands in the **File** menu.

3.5 Exporting OBD-2 Information

Once a full OBD-2 scan is complete, it is possible to export various data by clicking one of the following commands in the **Edit** menu:

- └ **Export OBD-2 Information** opens dialog box for saving the data as a CSV file (comma-separated value file). The exported data matches each view of the application related to an OBD-2 service:
 - Diagnostic: DTCs
 - Diagnostic: Freeze Frames
 - Diagnostic: Freeze Frame snapshot
 - Diagnostic: Test components
 - Diagnostic: On-Board Monitoring Test results
 - Monitoring: Sensors
 - System: Vehicle Information
 - System: Supported IDs
- └ **Export Real-Time graph** opens a dialog box for saving the current graph. Only the visible part of the graph is saved.
- └ **Export Data Log** opens a dialog box for saving the information from the **Data Log** view as a CSV file (comma-separated value file).

4 User Interface

4.1 Main window

The PCAN-OBD-2 Viewer main window contains the following sections, from top to bottom:

- └ **Menus**
- └ **Toolbar:** The toolbar allows quick access to the most frequently used commands.
- └ **Tabs:** The results of a Full OBD-2 scan are arranged on tabs:

| Tab | Description |
|--------------------|--|
| Summary | Shows a small summary of the OBD-2 connection status and a dashboard updated in real-time with the vehicle data. |
| Diagnostics | Regroups information concerning Diagnostic Trouble Codes, Controls and Test results. |
| Monitoring | Displays information about current emission-related data values. |
| System Information | Regroups information of the vehicle and data log of the OBD-2 responses. |





- └ **Status Bar:** Displays information about the CAN connection and the current OBD-2 task. It also displays the status of the real-time thread and eventually an error icon.









Tip: You can change the active tab/view by pressing **Alt** + **1** to **Alt** + **0**. Each number corresponds to a specific view.

4.2 Menus




4.2.1 File Menu

| Command | Symbol | Shortcut | Description |
|------------------------------|---|---|---|
| Fullscreen | none |  | Toggles between full screen and window mode. |
| Load Dashboard Configuration | none | none | Loads and applies the configuration of a previously exported dashboard. |
| Save Dashboard Configuration | none | none | Exports the configuration of the current dashboard. |
| Exit |  |   | Quits the application. |

4.2.2 Edit Menu

| Command | Symbol | Shortcut | Description |
|--------------------------|--------|---|--|
| Refresh Diagnostic view | none |  | Updates OBD-2 information from the Diagnostic tab. |
| Refresh Monitoring view | none | none | Updates OBD-2 information from the Monitoring tab. |
| Clear All | none | none | Clears all data. |
| Clear Log | none | none | Clears the Data Log view. |
| Clear Graph | none | none | Clears the Real-Time Graph view. |
| Export OBD-2 Information | none |   | Exports current OBD-2 information. |
| Export Real-Time Graph | none |    | Exports current real-time graph. |
| Export Data Log | none | none | Exports the Data Log view. |




4.2.3 OBD-2 Menu

| Command | Symbol | Shortcut | Description |
|--------------------|---|----------|---|
| Connect |  | none | Opens the connection dialog. |
| Disconnect |  | none | Disconnects from a PCAN-hardware. |
| Reset |  | none | Clears the internal OBD-2 receive and transmit queues. |
| Clear DTCs | none | none | Makes an OBD-2 request to clear/reset Diagnostic Trouble Codes. |
| Full OBD-2 Scan | none | F5 | Updates every displayed data by making requests to every OBD-2 service. |
| Real-Time Requests | none | Ctrl+P | Enables or disables the thread handling real-time OBD-2 requests. |

4.2.4 View Menu







| Command | Symbol | Shortcut | Description |
|-----------------------------|--------|----------|--|
| Summary | none | Alt+1 | Switches to the Summary view. |
| DTCs | none | Alt+2 | Switches to the Diagnostic Trouble Code view. |
| Freeze Frames | none | Alt+3 | Switches to the Freeze Frames view. |
| Test components | none | Alt+4 | Switches to the Test component view. |
| On-Board Monitoring results | none | Alt+5 | Switches to the On-Board Monitoring Test results view. |
| Sensors | none | Alt+6 | Switches to the Sensors view. |
| Real-Time Graph | none | Alt+7 | Switches to the Real-Time Graph view. |
| Vehicle Information | none | Alt+8 | Switches to the Vehicle information view. |
| Supported OBD-2 Identifiers | none | Alt+9 | Switches to the Supported IDs view. |
| Data Log | none | Alt+0 | Switches to the Data Log view. |

4.2.5 Help Menu

| Command | Symbol | Shortcut | Description |
|---------------------------------|---|-----------|---|
| PCAN-OBD-2 Viewer Help |  | F1 | Opens this PDF software documentation. |
| Automatic check for new version | none | none | Enables checking for a new version, when the software without user interaction. An internet connection is required. |
| Check for new version... |  | none | Checks for a new software version. An internet connection is required. |
| About... |  | none | Displays information about the program, version, and copyright. |

4.3 Toolbar

The Toolbar can be used to quickly access common functions:

| Command | Symbol | Description | Alternative |
|------------|---|---|-------------------------------|
| Exit |  | Quits the application. | Alt+F4 or File Exit |
| Connect |  | Opens the connection dialog. | OBD-2 Connect |
| Disconnect |  | Disconnects from a PCAN hardware. | OBD-2 Disconnect |
| Reset |  | Clears the internal OBD-2 receive and transmit queues. | OBD-2 Reset |
| Help |  | Opens this PDF software documentation. | Help PCAN-OBD-2 Viewer Help |
| About... |  | Displays information about the program, version, and copyright. | Help About... |

4.4 Status Bar

The status bar displays information about the CAN connection and the current OBD-2 task. It also displays the status of the real-time thread and eventually an error icon:

- Click on the real-time thread status icon to enable or disable the thread. It has the same effect as clicking on the **Real-time requests** menu entry in the **OBD-2** menu.
- If an error occurs during an OBD-2 request, a warning icon is displayed. Hover the icon with the mouse cursor to show a tooltip that lists the description of the error(s). You can switch to the **Data Log** view to find more information about the errors. Double click on the warning icon to remove it.

4.5 Connect Dialog Box

After starting the PCAN-OBD-2 Viewer, the **Connect** dialog box will be displayed. To work with the software, you have to establish a connection with a PCAN hardware.

To access the **Connect** dialog box, select the **Connect** menu entry in the **OBD-2** menu or click the button on the toolbar.

- **Available CAN hardware:** this list shows all available PCAN hardware for establishing a connection.
- **Bit rate:** this combo box is used to select the bit rate of the CAN bus. Note that only legislated OBD bit rates are available.
- The **Refresh** button updates the available CAN hardware list.

5 OBD-2 Information Views

The different results of a Full OBD-2 scan are arranged in tabs that can be accessed via the main window and sub views that are provided via a side bar on the left of each tab.

5.1 Summary

The **Summary** tab presents a dashboard with common emission-related data values updated in real-time.

▶ The summary contains three main sections:

1. On the top-left corner is a summary of the CAN connection, the OBD-2 connection type, the Vehicle Identification Number, and the number of Diagnostic Trouble Codes.
2. The real-time dashboard: This is constantly updated through the real-time thread.
3. The **Dashboard Real-Time request** lists the same data as the dashboard but presented as a list. In case of multiple responses for a single request, this list can show the different values received (whereas the graphic dashboard would only display a single value).

A **Customize** button is on the right side of the **Dashboard Real-Time request** section. Click on the **Customize** button to open the **Customize Dashboard** dialog box. This displays all the dashboard's components along with a description of their positions and lets you associate each with an OBD-2 variable.

See also: 3.4 *Customizing the Real-Time Dashboard* on page 11.

5.2 Diagnostic Trouble Codes

The **Diagnostic Trouble Code** view under the **Diagnostics** tab displays all Diagnostic Trouble Codes (DTCs):

- └ **Confirmed** Emission-Related DTCs (obtained via OBD service \$03),
- └ **Pending** DTCs detected during current or last completed driving cycle (obtained via OBD service \$07),
- └ **Permanent** DTCs detected during the current or last completed driving cycle (obtained via OBD service \$07).

The list contains the following columns:

- └ **Code** is the Diagnostic Trouble Code.
- └ **System** indicates which part of the vehicle is bound to the DTC.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Manufacturer** identifies whether this is a generic or vehicle specific value.
- └ **Description** shows information about the DTC.

The **Clear DTCs** button emits an OBD request to clear/reset emission-related DTCs.

The **Refresh** button sends requests to update the list of DTCs.

5.3 Freeze Frames

The **Freeze Frames** view under the **Diagnostics** tab lists **Powertrain Freeze Frame** data (obtained via OBD service \$02).

When an emission-related fault occurs, the OBD-2 system stores a Diagnostic Trouble Code and records a snapshot of the vehicle operating parameters to help identifying the problem. This set of values is referred as Freeze Frame data.

The section **Freeze Frame Diagnostic Trouble Code** lists all the Diagnostic Trouble Codes.

- └ **Frame #** is the frame number.
- └ **Code** is the Diagnostic Trouble Code.
- └ **System** indicates which part of the vehicle is bound to the DTC.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Manufacturer** identifies whether this is a generic or vehicle specific value.
- └ **Description** shows information about the DTC.

The section **Freeze Frame Sensor Snapshot** displays the emission-related values, stored when the emission-related fault occurred, for a single DTC selected in the section **Freeze Frame Diagnostic Trouble Code**.

- └ **Frame #** is the frame number where the snapshot is stored.
- └ **PID** is the Parameter Identifier of the emission-related data.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Mnemonic** of the data.
- └ **Description** shows information about the PID.
- └ **Value** is the actual value of the data.
- └ **Unit** is the unit of the data.
- └ **Min.** is the minimum value for that data.

- └ **Max.** is the maximum value for that data.
- └ **Value information** shows extra information about the data value.

To update the **Freeze Frame Sensor Snapshot** list, select a DTC in the **Freeze Frame Diagnostic Trouble Code** list and click on the **Update snapshot** button.

To refresh the Diagnostic Trouble Codes, click on the **Refresh** button.

5.4 Test Components

The **Test component** view under the **Diagnostics** tab lists available control operations of On-Board System, Test, or Component (OBD service \$08).

- └ **TID** is the Test Identifier.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Description** shows information about this test.
- └ **Status** indicates whether or not the test can be run.

To refresh the list, click on the **Refresh** button.

5.5 On-Board Monitoring Test Results

The view **On-Board Monitoring Test results** under the **Diagnostics** tab displays the OBDM test results (OBD service \$06).

The following identifiers are displayed:

- └ **OBDMID** is the On-Board Monitoring Identifier.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Description** shows information about the OBDMID.
- └ **TID** is the Test Identifier associated with this result.
- └ **Value** is the result value.
- └ **Unit** is the unit of the value.
- └ **Min.** is the minimum value for that data.
- └ **Max.** is the maximum value for that data.

To refresh the list, click on the **Refresh** button.

5.6 Sensors

The **Sensors** view under the **Monitoring** tab displays current emission-related data values (OBD service \$01).

The following identifiers are displayed:

- └ **PID** the Parameter Identifier of the emission-related data.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Mnemonic** of the data.
- └ **Description** shows information about the PID.
- └ **Value** is the actual value of the data.
- └ **Unit** is the unit of the data.
- └ **Min.** is the minimum value for that data.

- └ **Max.** is the maximum value for that data.
- └ **Value information** shows extra information about the data value.

To refresh the whole list, click on the **Refresh All** button.

To refresh a specific set of data, select one or more PIDs in the list using the **Ctrl** or **Shift** key and click on the **Refresh selected PIDs**.

5.7 Real-Time Graph

The **Real-Time Graph** view under the **Monitoring** tab can plot emission-related data values in real-time.

The graph can plot one or multiple values:

- └ To display the value(s) of a single Parameter ID, select it in the **Sensor** drop down box.
- └ To display multiple values from several PIDs, click on the dots button (...) and choose one or more values in the dialog box. Click on the **Ok** button to confirm your selection.

The **Enable acquisition** checkbox has the same effect as clicking on the **Real-Time** status icon in the status bar or the command **Real-Time requests** in the OBD-2 menu.

The refresh rate value is shown in milliseconds and corresponds to the time between each OBD request.

Click on the **Clear** button to reset the graph.

Click on the **Export** button to export the real-time graph. This is the same command that is available in the **Edit** menu.

5.8 Vehicle Information

The **Vehicle Information** view under the **System information** tab lists the vehicle information obtained through OBD service \$09. The following identifiers and values are displayed:

- └ **InfoType** is the InfoType parameter of the OBD service.
- └ **Module** corresponds to the address of the ECU which responded to the OBD request.
- └ **Mnemonic** of the data.
- └ **Description** shows information about the infoType.
- └ **Value** is the actual value of the data.

To refresh the list, click on the **Refresh** button.

5.9 Supported Identifiers

The **Supported IDs** view under the **System information** tab summarizes for each known OBD-2 identifier if it is supported by the vehicle's ECU(s).

The following identifiers are displayed:

- └ **ID #** is the Identifier number in hexadecimal format.
- └ **Parameter IDs** states the number of ECUs which support the **ID #** with OBD service \$01.
- └ **Test IDs** states the number of ECUs which support the **ID #** with OBD service \$08.
- └ **OBD Monitor IDs** states the number of ECUs which support the **ID #** with OBD service \$06.
- └ **FreezeFrame #0 IDs** states the number of ECUs which support the **ID #** with OBD service \$02 with the default freeze frame #0.

For each supported ID two values will be displayed in the cell:

- └ The number of ECUs supporting the identifier for the specified OBD service.
- └ A bit encoded value which represents exactly which ECUs support the ID. The value is written in a binary format where the rightmost digit corresponds to the ECU #1.

5.10 Data Log

The **Data Log** view under the **System information** tab lists each OBD-2 response.

- └ Each result for a request is grouped. The group title is made of:
 - OBD service ID of the request.
 - Parameters associated to the request.
 - Status of the transmitted request.
- └ **Service** defines which OBD service was requested.
- └ **Parameter** displays the parameters which were associated with the request.
- └ **Source** states the address of the ECU which responded to the request.
- └ **Error code** indicates the OBD status code of the response.
- └ **Data** shows the parsed data of the response. Depending on the service request, the data is parsed differently.
- └ **Raw data** displays the received CAN frame without parsing.

If an OBD request returns a non-Ok status all the responses are highlighted in orange-red. The responses are not parsed but their

raw data is still available. This can happen for example if a request is not supported or if an unknown/unlegislated PID is requested.

If an OBD response contains a non-Ok error code, the status value is highlighted in red.

To clear the list, click on the **Clear** button.

To log real-time requests, make sure that the **Log real-time requests** checkbox is active.

6 Additional Information

6.1 PCAN Fundamentals

PCAN is a synonym for PEAK CAN APPLICATIONS and is a flexible system for planning, developing, and using a CAN bus system. Developers as well as end-users get a helpful and powerful product.

Basis for the communication between PCs and external hardware via CAN is a series of Windows Kernel Mode Drivers (Virtual Device Drivers) e.g., `PCAN_USB.SYS`, `PCAN_PCI.SYS`, `PCAN_XXX.SYS`. These drivers are the core of a complete CAN environment on a PC running Windows and work as interfaces between CAN software and PC-based CAN hardware. The drivers manage the entire data flow of every CAN device connected to the PC.

A user or administrator of a CAN installation gets access via the PCAN-Clients (short: Clients). Several parameters of processes can be visualized and changed with their help. The drivers allow the connection of several Clients at the same time.

Furthermore, several hardware components based on the SJA1000 CAN controller are supported by a PCAN driver. So-called Nets provide the logical structure for CAN buses, which are virtually extended into the PC. On the hardware side, several Clients can be connected, too. The following figures demonstrate different possibilities of Net configurations (also realizable at the same time).

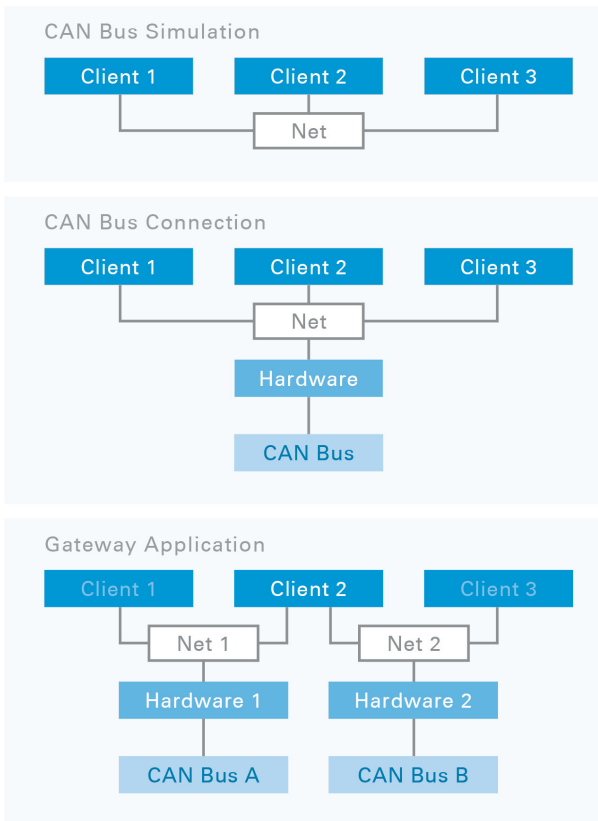


Figure 1: Different possibilities of Net configurations

Following rules apply to PCAN-Clients, Nets, and hardware:

- └ One Client can be connected to several Nets.
- └ One Net provides several Clients.
- └ One piece of hardware belongs to one Net.
- └ One Net can include none or one piece of hardware.

- A message from a transmitting Client is carried on to every other connected Client, and to the external bus via the connected CAN hardware.
- A message received by the CAN hardware is received by every connected Client. However, Clients react only on those messages that pass their acceptance filter.

Users of the PCAN-OBD-2 Viewer do not have to define and manage Nets. If the PCAN-OBD-2 Viewer is instructed to connect directly to a PCAN hardware, the application automatically creates a Net for the selected hardware and automatically establishes a connection with this Net.

6.2 Understanding PCAN-OBD-2

OBD-2 stands for On-Board Diagnostics. It is a standard that specifies the type of a diagnostic connector and its pinout, the electrical signaling protocols available, the messaging format and a candidate list of vehicle parameters to monitor along with information how to encode the data for each.

The OBD communication protocol is defined in SAE J1979 / ISO 15031-5 and the specific implementation for CAN bus is described in ISO 15765-4. It is a Client/Server oriented protocol:

- External test equipment has the role of the client
- Electronic Control Units (ECUs) connected inside the vehicle are servers



Note: There are five signaling protocols that are permitted with the OBD-2 interface. PCAN-OBD-2 is only valid with ISO 15765 CAN signals. PCAN-OBD-2 is the collection of the following standards: ISO 15765-4, ISO 15765-3 (known as Diagnostic/UDS on CAN), and ISO 15765-2 (known as ISO-TP).

The client always starts the communication by sending a request. If a server supports this request, it will reply with a positive or negative response. Otherwise, it can just ignore the request. As the client cannot choose which server replies to its request and the request can be supported by multiple servers, the client should be aware of receiving more than one response to a request.

Since the transport protocol of OBD-2 on CAN is done using ISO-TP, an international standard for sending data packets over a CAN bus, the maximum data length that can be transmitted in a single data-block is 4095 bytes.

The PCAN-OBD-2 API is an implementation of the OBD-2 on CAN standard. The physical communication is carried out by PCAN hardware (PCAN-USB, PCAN-PCI etc.) through the PCAN-UDS, PCAN-ISO-TP, and PCAN-Basic API (free CAN APIs from PEAK-System). Because of this, it is necessary to have also the PCAN-UDS, PCAN-ISO-TP, and PCAN-Basic APIs (PCAN-UDS.dll, PCAN-ISO-TP.dll, and PCANBasic.dll) present on the working computer where PCAN-OBD-2 is intended to be used. PCAN-OBD-2, PCAN-UDS, PCAN-ISO-TP, and PCAN-Basic APIs are free and available for all people who acquire a PCAN hardware.

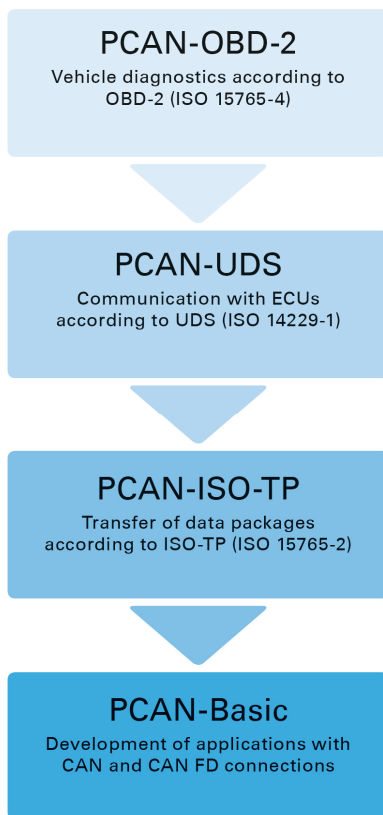


Figure 2: Relationship of the APIs