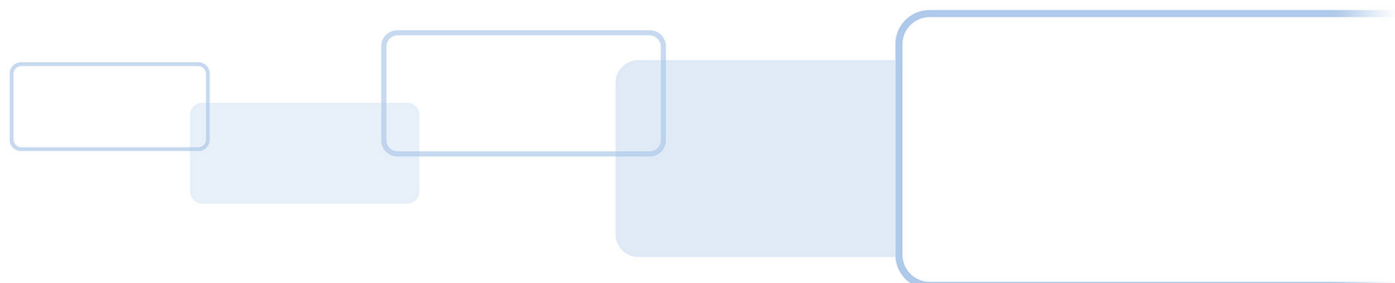


OMNIKEY® WORKBENCH TOOL 2

USER GUIDE

PLT-04346, Rev. A.2
May 2020



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Revision history

Date	Description	Revision
May 2020	Adds EEM interface switching, card technology detection, PACS data decoder, and HID CCID driver configuration.	A.2
November 2019	Firmware update for OMNIKEY 5127 CK and 5427 CK Gen2 readers.	A.1
April 2019	Initial release.	A.0

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Section 1

1 Introduction

1.1 Overview

OMNIKEY® Workbench Tool 2 is a standalone application that allows you to diagnose and configure HID Global® OMNIKEY readers. The application runs on Windows, macOS, and Linux, with the same graphical user interface on all platforms.

OMNIKEY Workbench Tool 2 will be able to support future reader products.

1.2 Supported operating systems

- Windows 7 SP1 x64/x86 with updates KB2999226 and KB2533623
- Windows 8.1 x64/x86 with update KB2999226
- Windows 10 x64/x86
- CentOS 7 x64 (GNOME)
- Debian 9 x64 (GNOME)
- Ubuntu 18 x64 (GNOME)
- macOS x64 (10.15 Catalina)

Note: The application should also run on other Linux and macOS desktop environments, however it has not been formally tested.

1.3 Platform specific behaviors

The preferred way to communicate with a reader is via a transmit channel with a smart card present.

On Windows, when the HID OMNIKEY CCID driver is installed, the application can communicate with a reader without a smart card present via a direct control channel. Alternatively, if the Microsoft CCID driver is used, the application can still acquire direct connection to a reader if support for escape commands has been enabled. See Microsoft documentation for more details.

On Linux, the application can communicate with a reader without a smart card present, if support for escape commands has been enabled in the Info.plist file. To ensure best performance and avoid problems on Linux, make sure you use latest pcsc-lite library available for your platform. You can download the library from <https://github.com/LudovicRousseau/PCSC>.

If you want to integrate OMNIKEY Workbench Tool 2 with your Linux operating system, install the ApplianceLauncher tool available from <https://www.linux-apps.com/p/1228228/>.

On macOS, a smart card must always be present, otherwise OMNIKEY Workbench Tool 2 will not be able to communicate with a reader. MacOS has its own implementation of the PCSC service, called PCSC.framework. It is possible to have both PCSC.framework and pcsc-lite services installed at the same time. However, to allow OMNIKEY Workbench Tool 2 to work properly, you must ensure that only the native PCSC.framework daemon is running.

Starting from macOS 10.15 Catalina onward, if you want to access readers in Keyboard Wedge mode directly from OMNIKEY Workbench Tool 2, you must allow the application to monitor your keyboard. You will be asked for consent upon first run. This preference can also be modified at any time from **System Preferences > Security & Privacy > Privacy > Input Monitoring**. Select the **Workbench** app to allow it to monitor your input devices.

1.4 Installation

1.4.1 Windows - NSIS installer

1. Run the installer executable.
2. Accept the end user license agreement.
3. Click **Install** to start the installation.

1.4.2 Linux - Appliance installer

1. Make sure the installer has execute permissions.
2. Run the Appliance installer.
3. Accept the end user license agreement.
4. Decide if the application should be integrated with the system. If you chose this option, the application will be added to your applications menu and install icons.

Note: If you want to integrate OMNIKEY Workbench Tool 2 with your Linux operating system, install the ApplianceLauncher tool available from <https://www.linux-apps.com/p/1228228/>.

1.4.3 macOS - DMG installer

1. Run the DMG installer.
2. Accept the end user license agreement.
3. Drag the application icon onto the Applications folder icon to initiate the copying process. The app can be run from the dmg image without installation by double-clicking the application icon.
4. When the copying process finishes, the application can be run from the Launchpad.

1.5 Supported readers

The following OMNIKEY reader products can be configured using OMNIKEY Workbench Tool 2:

- OMNIKEY 1021
- OMNIKEY 3021
- OMNIKEY 3121
- OMNIKEY 5022
- OMNIKEY 5122
- OMNIKEY 5122 Dual
- OMNIKEY 5422
- OMNIKEY 6121
- Cherry Smart Terminal xx44
- D323 smart card reader
- Generic smart card reader (OEM device)

For the following OMNIKEY reader products, the general and smart card diagnosis can be displayed:

- Any AVR based reader
- OMNIKEY 5127 CK readers
- OMNIKEY 5427 CK readers

For the following OMNIKEY reader products, only the smart card diagnosis can be displayed:

- CardMan 3021
- CardMan 3121
- CardMan 3111
- CardMan 3621
- CardMan 3821
- CardMan 6121
- CardMan 4040
- CardMan 4321
- CardMan 5x21
- CardMan 6321
- CardMan Smart@Link
- CardMan Smart@Key
- Serial Smart Card Reader
- PC-Card Smart Card Reader
- USB CCID Smart Card Reader

The application supports firmware upload, mode switching, and card technology detection for the following OMNIKEY reader products:

- OMNIKEY 5127 CK Mini
- OMNIKEY 5127 CK Reader Core
- OMNIKEY 5427 CK Gen2

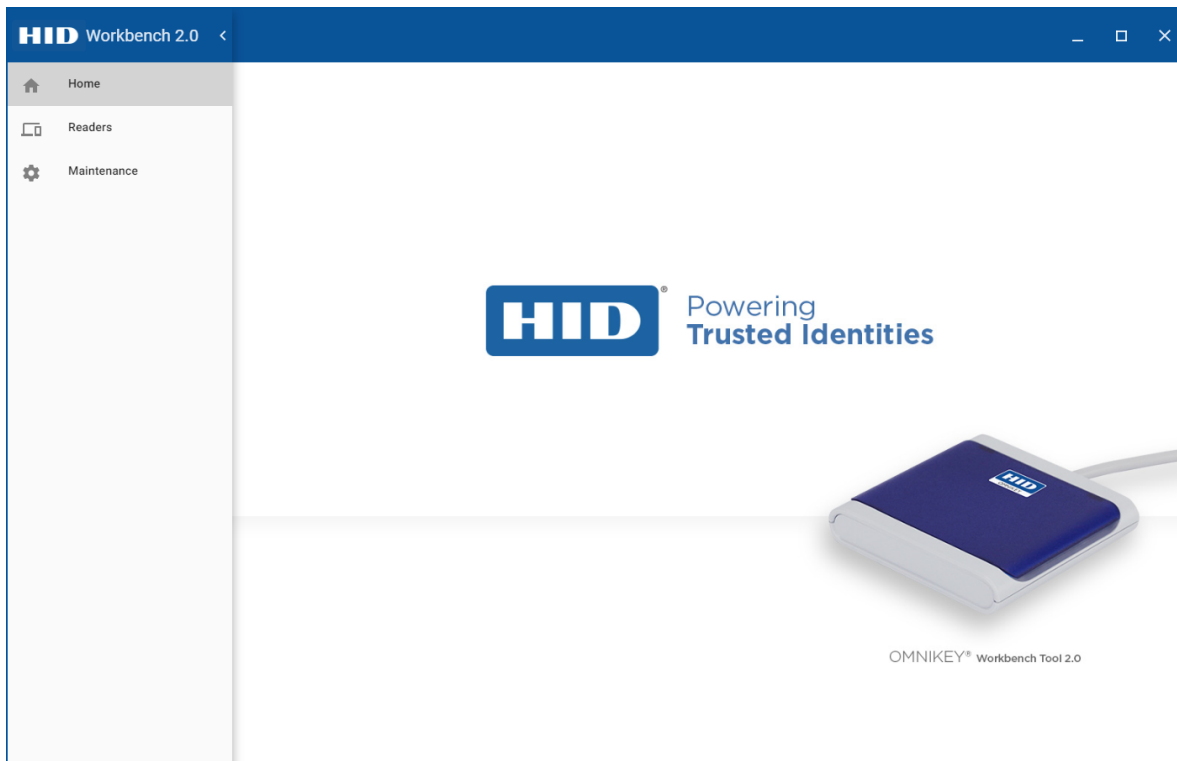
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Section 2

2 Interface

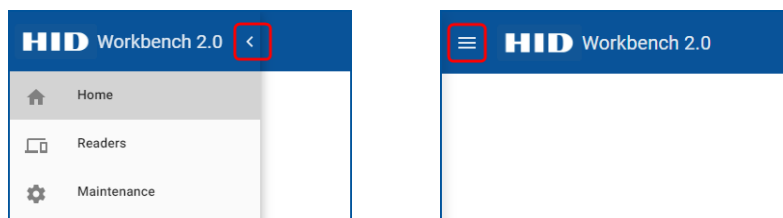
2.1 General overview

The main window consists of an application menu on the left and a content pane on the right. The application menu allows you to navigate the application.



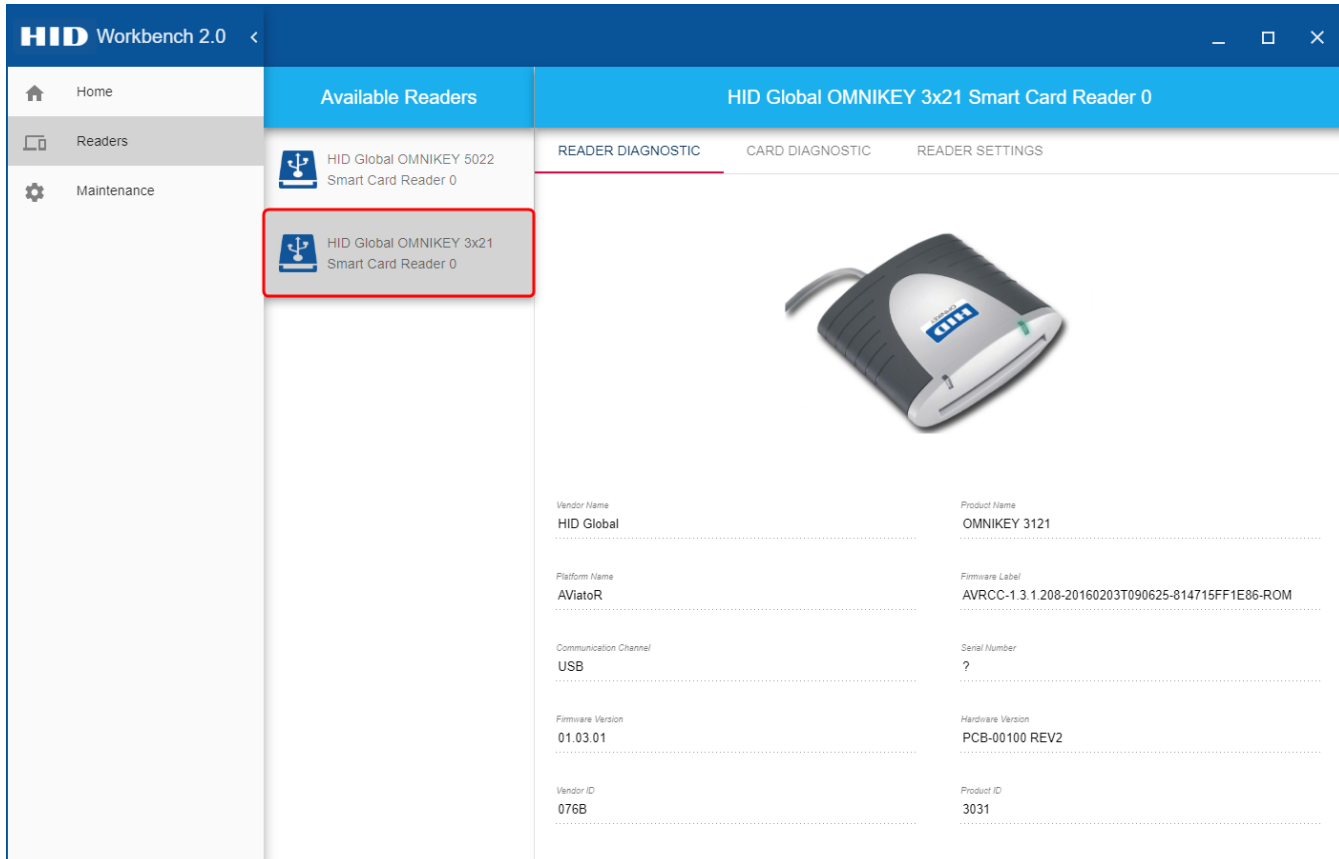
The application menu can be hidden by clicking on the left arrow in the top right corner.

When the application menu is hidden, an additional icon is displayed in the top left corner of the application window. Click the icon to unfold the application menu.



2.2 Available readers

The **Available Readers** list displays all HID readers connected to the PC. After selecting a reader from the list, you can see all the related configuration tabs.




The screenshot shows the HID Workbench 2.0 interface. On the left is a sidebar with 'Home', 'Readers', and 'Maintenance' options. The 'Readers' section is active, displaying a list of available readers. Two readers are listed: 'HID Global OMNIKEY 5022 Smart Card Reader 0' and 'HID Global OMNIKEY 3x21 Smart Card Reader 0'. The second reader is highlighted with a red border. The main area shows the configuration page for the selected reader, 'HID Global OMNIKEY 3x21 Smart Card Reader 0'. This page has three tabs: 'READER DIAGNOSTIC' (selected), 'CARD DIAGNOSTIC', and 'READER SETTINGS'. Below the tabs is an image of the reader device. At the bottom, there is a table of device information.

Vendor Name	HID Global	Product Name	OMNIKEY 3121
Platform Name	AViatoR	Firmware Label	AVRCC-1.3.1.208-20160203T090625-814715FF1E86-ROM
Communication Channel	USB	Serial Number	?
Firmware Version	01.03.01	Hardware Version	PCB-00100 REV2
Vendor ID	076B	Product ID	3031

2.3 READER DIAGNOSTIC tab

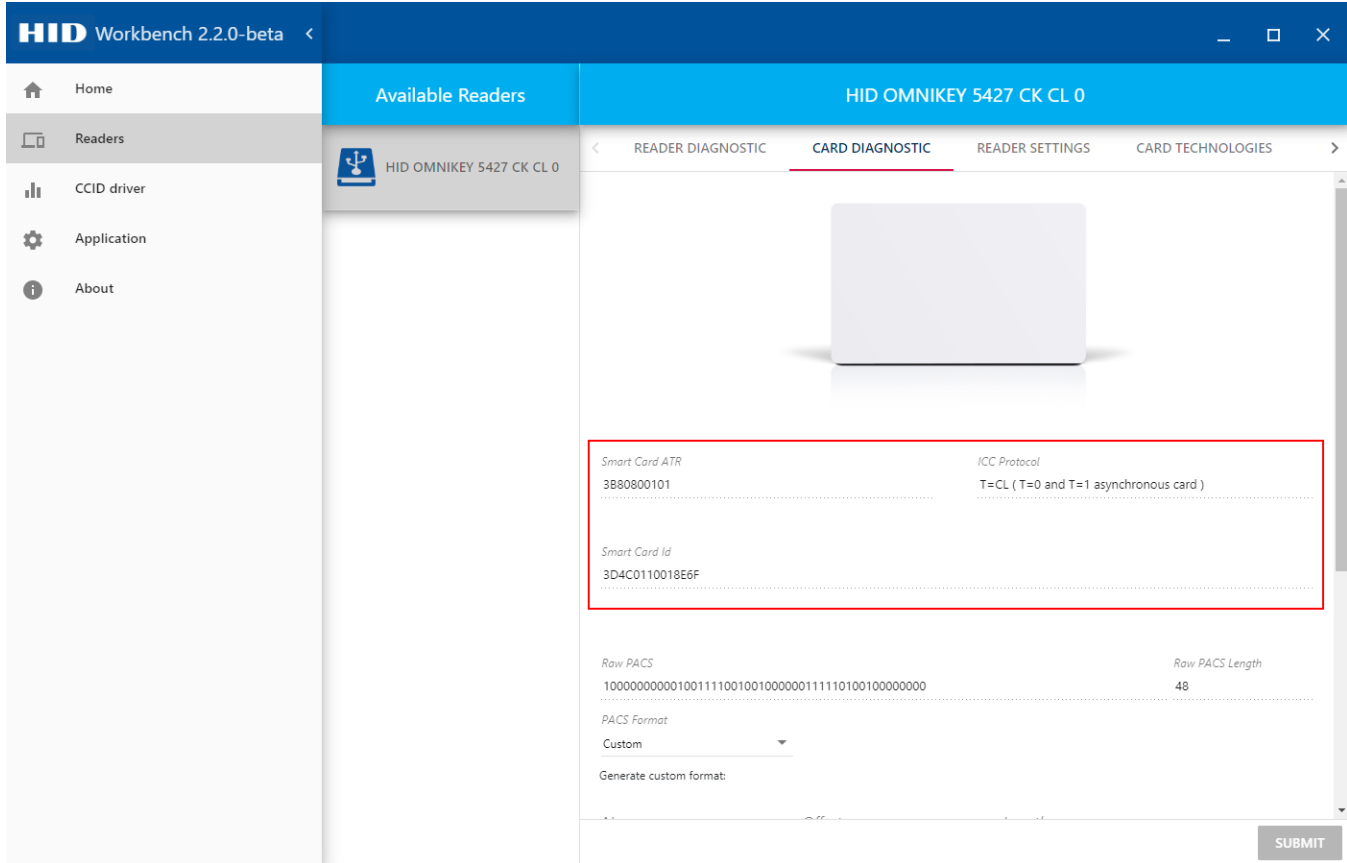
The **READER DIAGNOSTIC** tab contains basic information about a connected smart card reader. All the information in this tab is fixed and cannot be altered. A product image is displayed so you know which reader you are working with. This tab is available for all AVR based, OMNIKEY® 5127 CK, and OMNIKEY 5427 CK readers.



Vendor Name HID Global	Product Name OMNIKEY 5022
Platform Name AViator	Firmware Label OK5022-1.1.0.315-20171123T093856-61611489D942-FLASH
Communication Channel USB	Serial Number ?
Firmware Version 01.01.00	Hardware Version PCB-00044 REV2
Vendor ID 076B	Product ID 5022

2.4 CARD DIAGNOSTIC tab

The **CARD DIAGNOSTIC** tab contains information about the presented smart card, for example ATR, PACS bits, and card description.



The screenshot displays the HID Workbench 2.2.0-beta interface. On the left is a sidebar with navigation options: Home, Readers (selected), CCID driver, Application, and About. The main area is titled 'Available Readers' and shows 'HID OMNIKEY 5427 CK CL 0' as the selected reader. Below this, there are four tabs: READER DIAGNOSTIC, CARD DIAGNOSTIC (active), READER SETTINGS, and CARD TECHNOLOGIES. The CARD DIAGNOSTIC tab displays a 3D model of the reader and a table of diagnostic data. A red box highlights the 'Smart Card ATR' and 'Smart Card Id' fields. The 'Raw PACS' field shows a long binary string, and the 'Raw PACS Length' is 48. The 'PACS Format' is set to 'Custom'. A 'SUBMIT' button is located at the bottom right of the interface.

Smart Card ATR	ICC Protocol
3B80800101	T=CL (T=0 and T=1 asynchronous card)

Smart Card Id
3D4C0110018E6F

Raw PACS	Raw PACS Length
1000000000010011110010010000001111010010000000	48

PACS Format: Custom

Generate custom format:

SUBMIT

2.4.1 PACS decoding

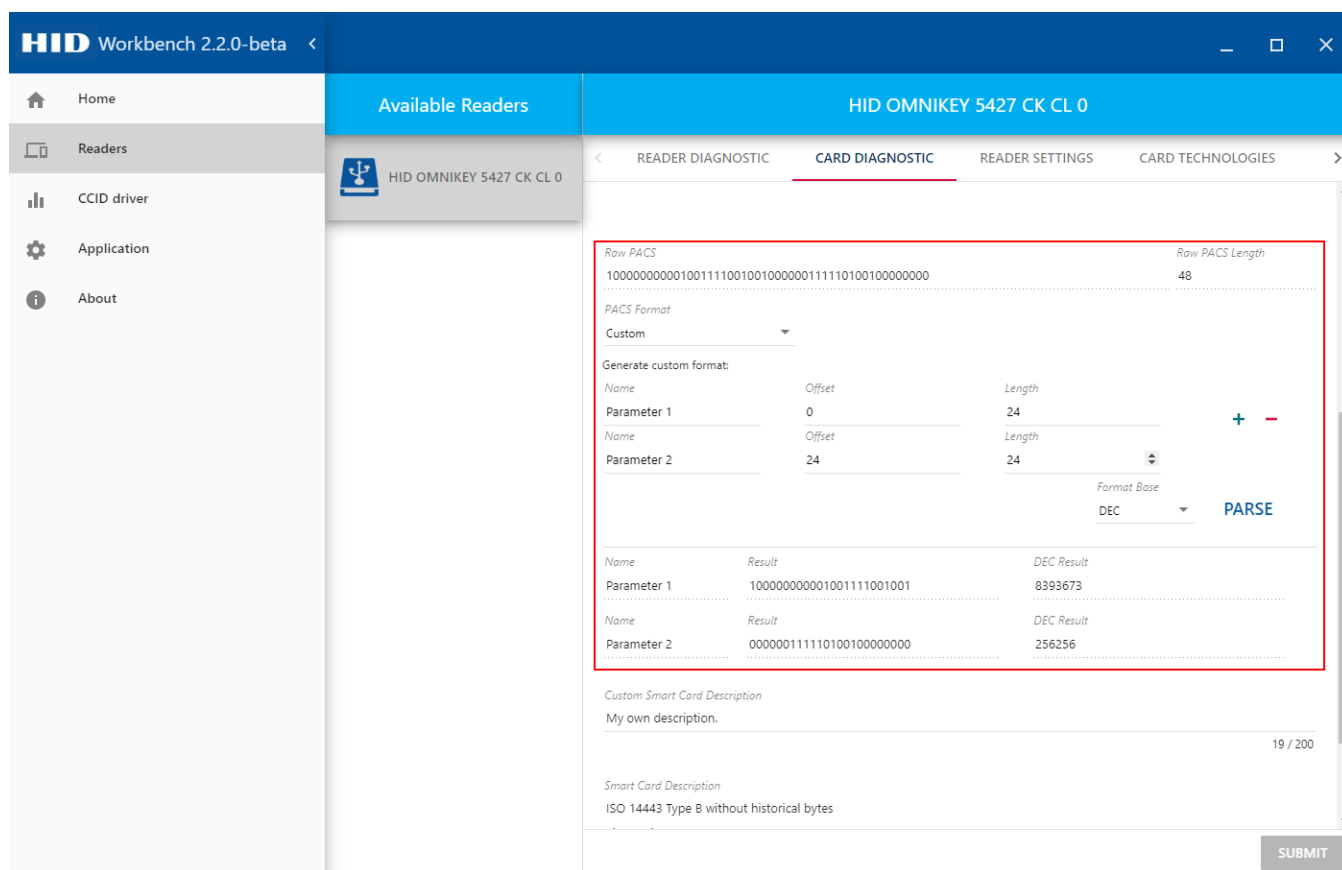
PACS decoding functionality is supported for the OMNIKEY 5127 CK Mini and OMNIKEY 5427 CK Gen 2 readers. If PACS data is available and has been successfully obtained from a card, its value will be displayed in the **Raw PACS** text box. To decode the data, select a coding format in the **PACS Format** area and click **PARSE**. The application allows you to select from popular predefined formats or define your own custom format.

Predefined formats

- Corporate 1000 (35 bits)
- Corporate 1000 (48 bits)
- H10301
- H10302
- H10304
- Indala (26 bits)

Custom format

To use your own PACS coding standard, select **Custom** in the **PACS Format** drop-down and define the required parameters. Each parameter must have a name, offset and length. In the parsing process, these values will be used to extract and decode corresponding chunks of the bit stream.



The screenshot shows the HID Workbench 2.2.0-beta interface. The left sidebar contains navigation links: Home, Readers, CCID driver, Application, and About. The main window is titled 'HID OMNIKEY 5427 CK CL 0' and has tabs for 'READER DIAGNOSTIC', 'CARD DIAGNOSTIC' (selected), 'READER SETTINGS', and 'CARD TECHNOLOGIES'. The 'CARD DIAGNOSTIC' tab displays the 'Raw PACS' section, which includes a text box for the raw PACS data (1000000000010011110010010000001111010010000000) and a 'Raw PACS Length' of 48. Below this is the 'PACS Format' dropdown menu, currently set to 'Custom'. The 'Generate custom format' section allows defining parameters with Name, Offset, and Length. Two parameters are defined: Parameter 1 (Offset 0, Length 24) and Parameter 2 (Offset 24, Length 24). The 'Format Base' is set to 'DEC'. A 'PARSE' button is visible. Below the configuration, the results are displayed in a table:

Name	Result	DEC Result
Parameter 1	100000000001001111001001	8393673
Parameter 2	000000111110100100000000	256256

At the bottom, there is a 'Custom Smart Card Description' section with a text box for 'My own description.' and a 'SUBMIT' button.

2.4.2 Card description

The description is based on the card's ATR, and comes from [Ludovic Rousseau's database](#). You can provide your own descriptions if the information from the database is inadequate or additional characterization is needed.

- To set or change the card description, edit the **Custom Smart Card Description** text box and click **SUBMIT**.

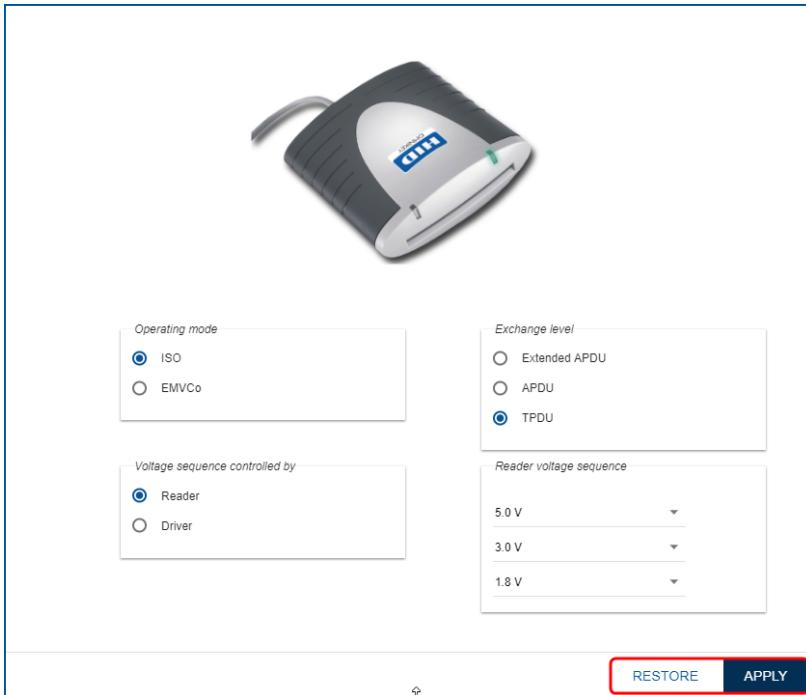
A custom description is matched with a card's ATR and is stored in a local database.

2.5 READER SETTINGS tab

Making changes in the **READER SETTINGS** tab does not immediately change the reader's settings.

- Click **APPLY** to confirm the changes.
- Click **RESTORE** to restore the reader to its factory settings.

Applying and restoring settings requires the USB to reconnect, which will cause the reader to briefly disappear from the list of available readers.



Note: For macOS X, direct data exchange between the computer and a reader is not supported. A smart card with card protocols that are supported by the reader must be present for OMNIKEY Workbench Tool 2 to communicate with the reader. If all card protocols supported by the reader are disabled, OMNIKEY Workbench Tool 2 will not be able to communicate with the reader.

2.6 Additional tabs

Every reader has a distinctive collection of settings tabs. Each tab contains a collection of options that can be configured. For example, the OMNIKEY 5022 reader has a **READER SETTINGS** and **CARD PROTOCOLS** tab, whilst the OMNIKEY 3121 reader has only a **READER SETTINGS** tab.

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Section 3

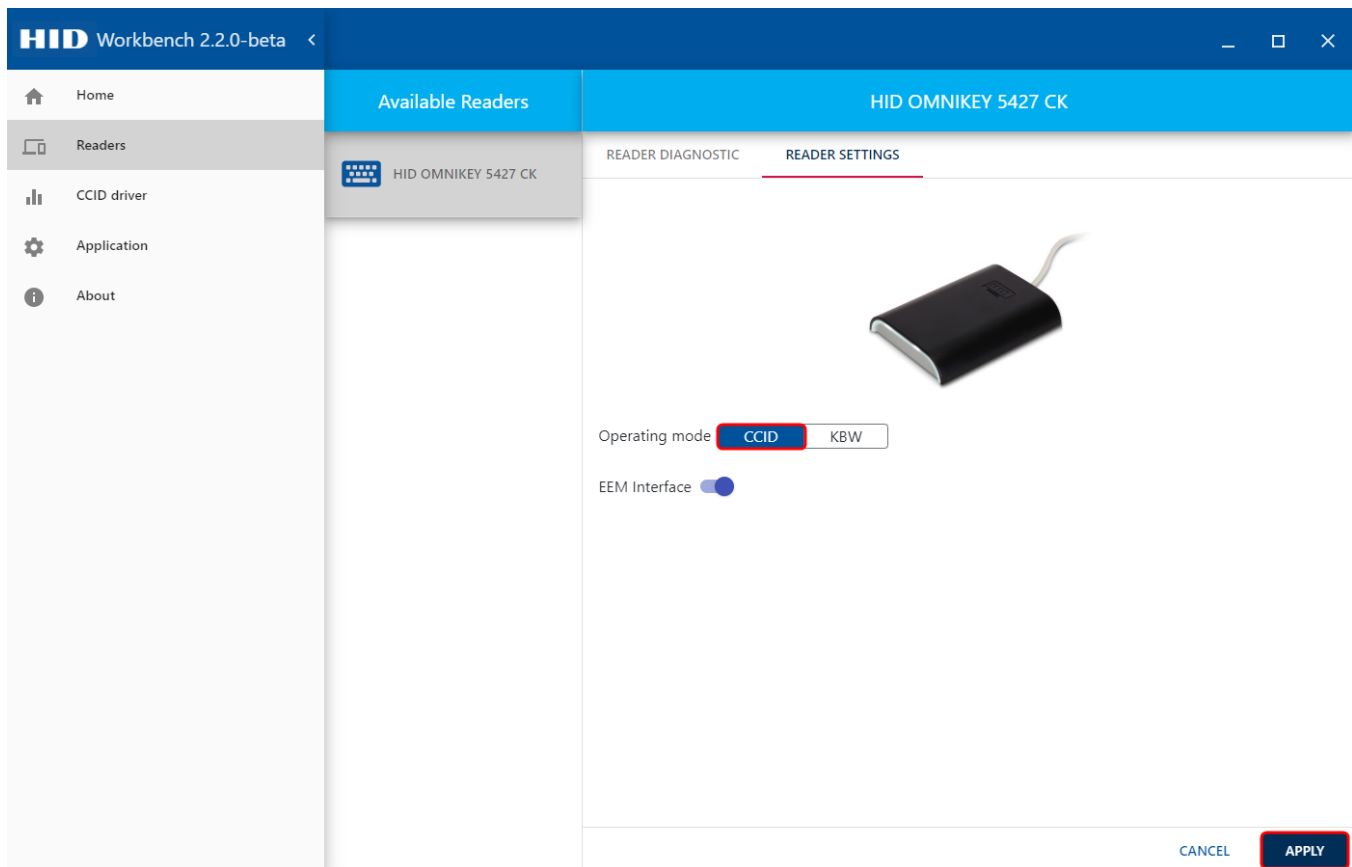
3 Device mode switching

OMNIKEY® 5127 CK and OMNIKEY 5427 CK readers can work in two modes: CCID and Keyboard Wedge. When a reader is in CCID mode, it behaves as a regular smart card reader. When the operating mode is set to Keyboard Wedge, the reader is seen by the operating system as a keyboard device and can write to standard input. OMNIKEY Workbench Tool 2 allows you to manually switch between modes.

3.1 Keyboard Wedge > CCID

In the **Available Readers** list, readers operating in Keyboard Wedge mode are displayed with a keyboard icon. Select an item in the list to view basic diagnostic information about the device in the **READER DIAGNOSTIC** tab.

- To switch the device mode to CCID, select the **READER SETTINGS** tab, select **CCID** operating mode, and click **APPLY**.



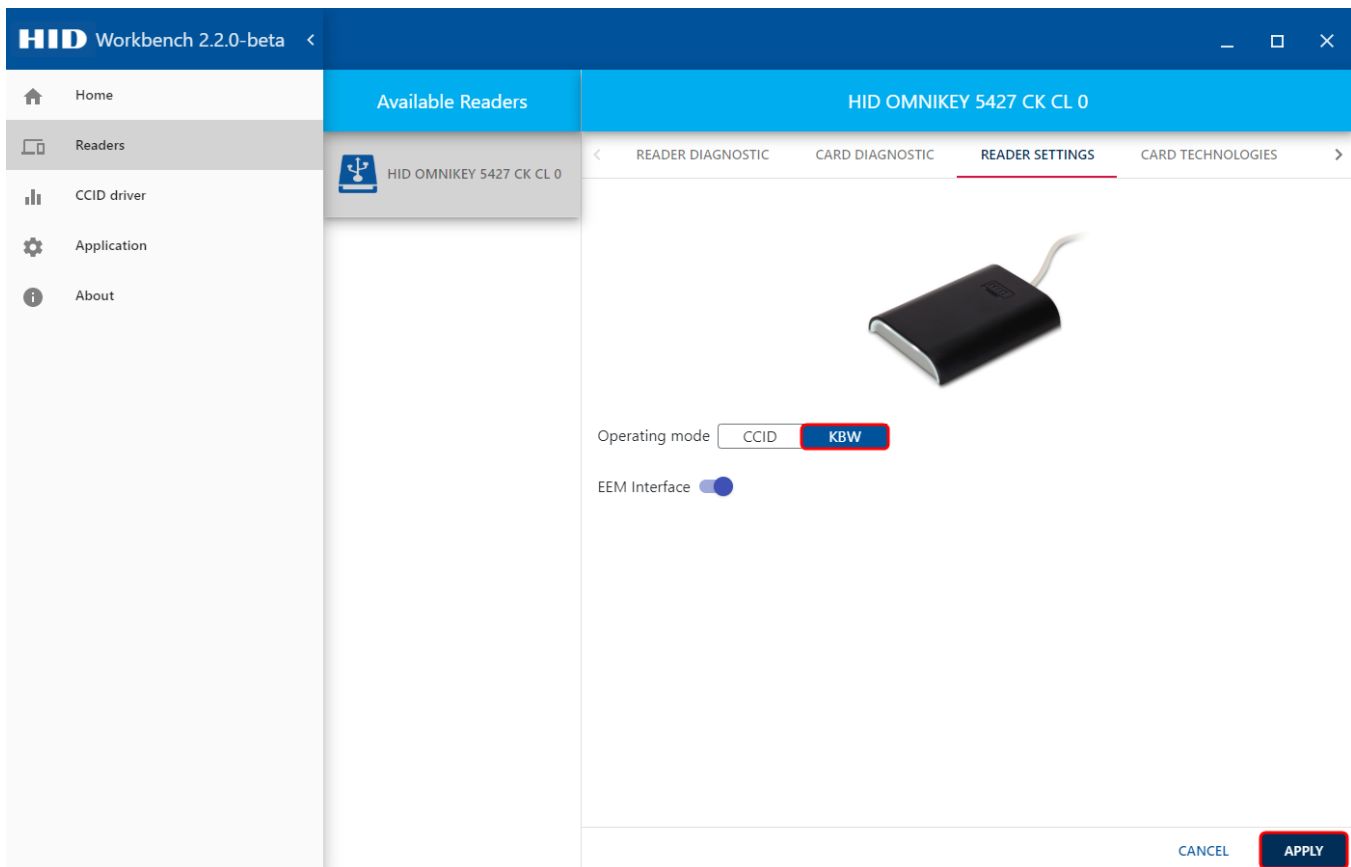
Note: On the Linux and macOS platforms, the libusb library (<https://github.com/libusb/libusb>) must be installed to allow the application to switch devices between KBW and CCID mode.

Note: On Windows, the switching operation can always be performed for OMNIKEY 5127 CK Mini and OMNIKEY 5427 CK Gen2 readers with SP2.0 or later. For older devices, the EEM interface must be enabled and available on the default address 192.168.63.99. On Linux, the application must also be run with administrator privileges. On macOS, only second generation (Gen2) OMNIKEY 5127CK and OMNIKEY 5427 CK readers can be switched, due to the lack of the EEM interface.

3.2 CCID > Keyboard Wedge

In the **Available Readers** list, readers operating in CCID mode are displayed with a USB icon. Select an item in the list to view basic diagnostic information about the device in the **READER DIAGNOSTIC** tab. Information about the presented smart card can be viewed in the **CARD DIAGNOSTIC** tab.

- To switch the device mode to Keyboard Wedge, select the **READER SETTINGS** tab, select **KBW** operating mode, and click **APPLY**.



Note: Switching from CCID to KBW mode will always succeed, but there might be a problem with switching from KBW to CCID mode, since older devices do not support feature reports. To ensure that you can always switch operating mode on Windows and Linux, make sure that the EEM interface operates on the default address 192.168.63.99 and is always enabled.

Availability of device mode transitions

OS	Hardware	Firmware	EEM enabled	Admin rights	KBW -> CCID	CCID -> KBW
Windows			Yes		Yes	Yes
	Gen1		No		No	Yes
	Gen2	SP2.0 <	No		No	Yes
	Gen2	SP2.0 ≥	No		Yes	Yes
Linux			Yes		Yes	Yes
	Gen1		No		No	Yes
	Gen2	SP2.0 <	No		No	Yes
	Gen2	SP2.0 ≥	No	No	No	Yes
	Gen2	SP2.0 ≥	No	Yes	Yes	Yes
macOS	Gen1		N/A		No	Yes
	Gen2	SP2.0 <	N/A		No	Yes
	Gen2	SP2.0 ≥	N/A		Yes	Yes

1. SP2.0 < represents firmware older than released in SP2.0.

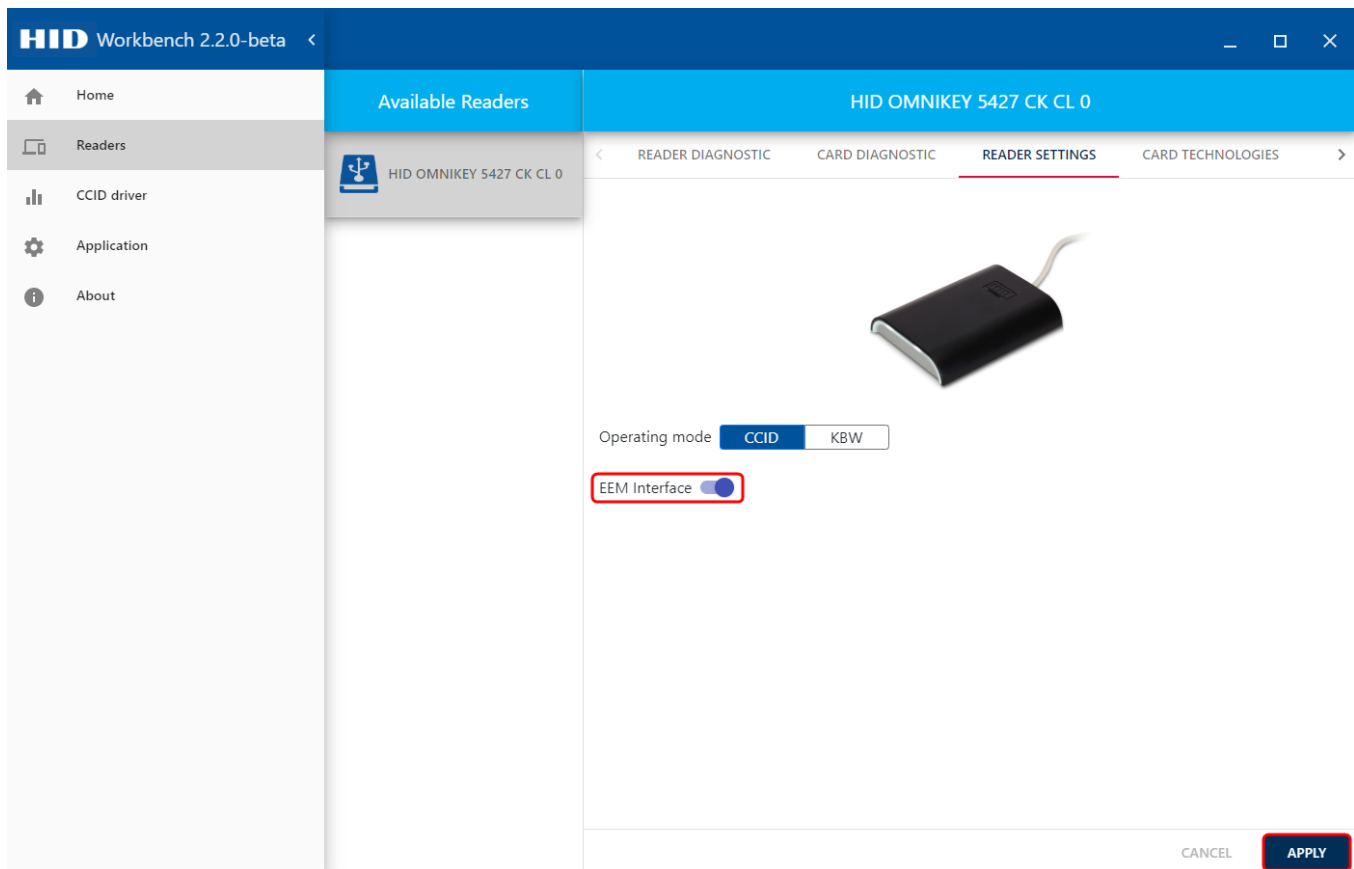
2. SP2.0 ≥ represents firmware released in SP2.0 or newer.

3. N/A indicates EEM interface is not supported on macOS.

3.3 EEM interface switching

OMNIKEY 5127 CK and OMNIKEY 5427 CK readers provide an additional Ethernet Emulation Module (EEM) communication interface. The EEM interface allows a USB-connected host to access TCP/IP services such as the built-in webserver. All CCID commands can be pushed to the reader over the EEM interface via HTTP. The EEM interface can always be enabled and can be used at the same time as any one of the remaining interfaces. The interface can be easily switched directly from the OMNIKEY Workbench Tool 2 application.

- To enable the EEM interface, select the **READER SETTINGS** tab, operate the **EEM Interface** switch, and click **APPLY**.



Note: The switching operation can always be performed when the device is in CCID mode. In KBW mode, the state of the EEM interface can be altered only for readers with firmware from Service Pack 2.0 or newer. On Linux, admin privileges are required.

Availability of EEM switching functionality

OS	Hardware	Firmware	Admin rights	KBW	CCID
Windows	Gen1			No	Yes
	Gen2	SP2.0 <		No	Yes
	Gen2	SP2.0 ≥		Yes	Yes
Linux	Gen1			No	Yes
	Gen2	SP2.0 <		No	Yes
	Gen2	SP2.0 ≥	No	No	Yes
	Gen2	SP2.0 ≥	Yes	Yes	Yes
macOS	Gen1			No	Yes
	Gen2	SP2.0 <		No	Yes
	Gen2	SP2.0 ≥		Yes	Yes

1. SP2.0 < represents firmware older than released in SP2.0.

2. SP2.0 ≥ represents firmware released in SP2.0 or newer.



Section 4

4 Firmware upload

OMNIKEY® Workbench Tool 2 supports upgrading and uploading of configuration files for OMNIKEY 5127 CK Mini and OMNIKEY 5427 CK Gen2 readers on Windows and Linux. It allows you to upload core firmware, SE processor firmware, and reader configuration in a single operation. The upload operation can be performed using WBO or CFG files. A WBO file can contain core firmware, SE processor firmware and additional configuration files in any composition. A CFG file is a snapshot of a reader configuration generated by the reader's web server. To ensure the best reader performance, you should always use the latest available WBO files, available from the HID Developer Center at <https://www.hidglobal.com/developer-center>.

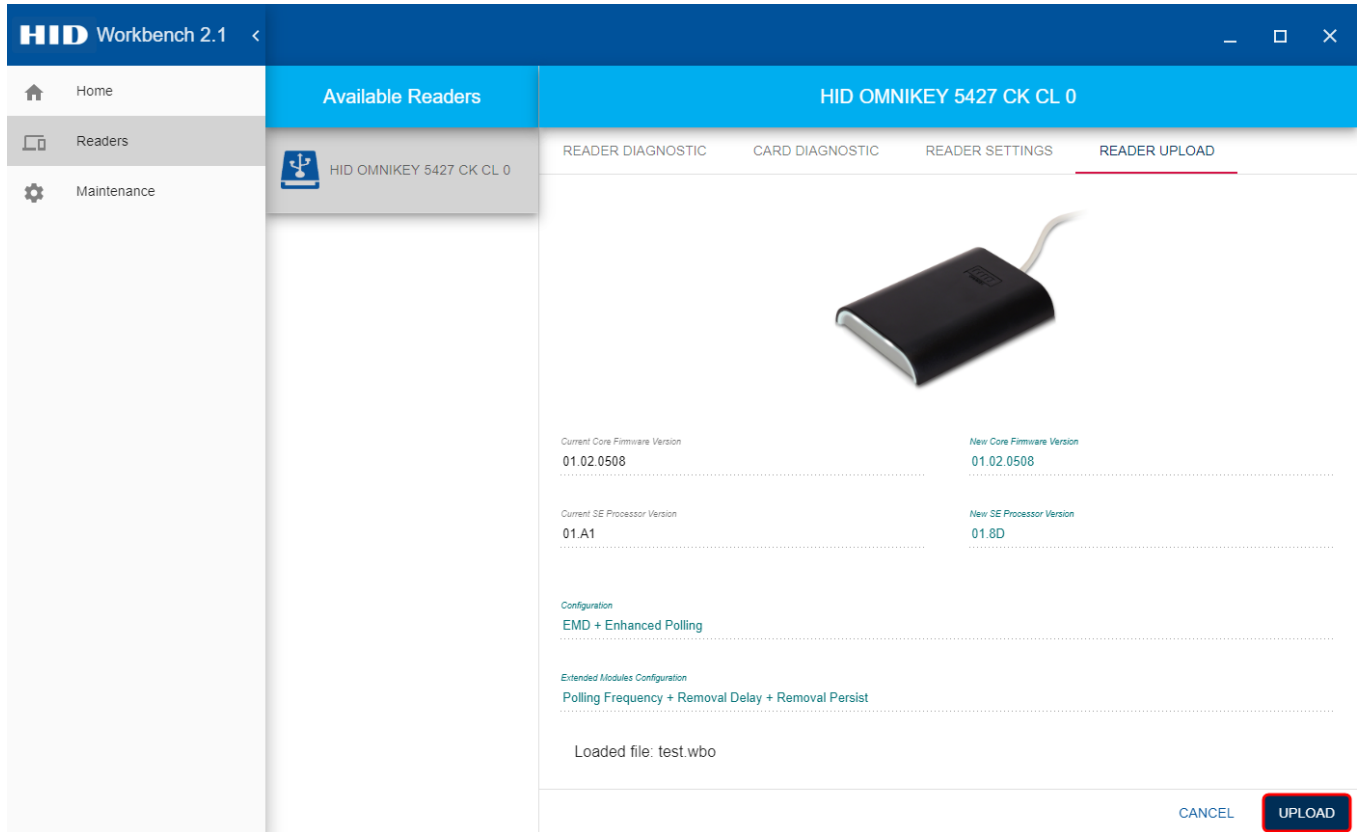
Note: Please be aware that an account is required to access the HID Developer Center. The license key for generating an account is included in the OMNIKEY 5x27CK Developer Toolkit (HID Global order number 3134ANL0000).

To upgrade a reader:

1. Select the **READER UPLOAD** tab.
2. Click **LOAD FILE** and select the required WBO or CFG file.

Note: After loading a WBO file, you can compare firmware versions that are currently installed on your reader with versions from the file and decide whether you want to proceed with the upgrade procedure.

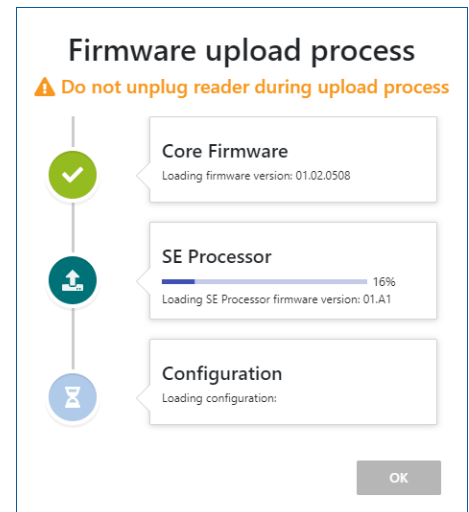
3. Click **UPLOAD**.



During the upload process you are notified about the current progress.

Caution: Ensure only one OMNIKEY 5127 CK Mini or OMNIKEY 5427 CK Gen2 reader is connected during the update operation.

Do not unplug the reader, close the application, or allow an interruption such as a reboot, shutdown or power failure, as this will seriously damage the reader. Although upload is possible using the Microsoft reader driver, HID strongly advises that you use the latest HID OMNIKEY CCID driver during the upload process.



A failure during the upload procedure might change the reader's configuration. After an unsuccessful operation, the SE processor interface might be left open and card protocol settings could be modified. If you experience such a problem, try reverting the reader to its default settings using the web server. If this does not correct the problem, please contact HID technical support for further assistance.

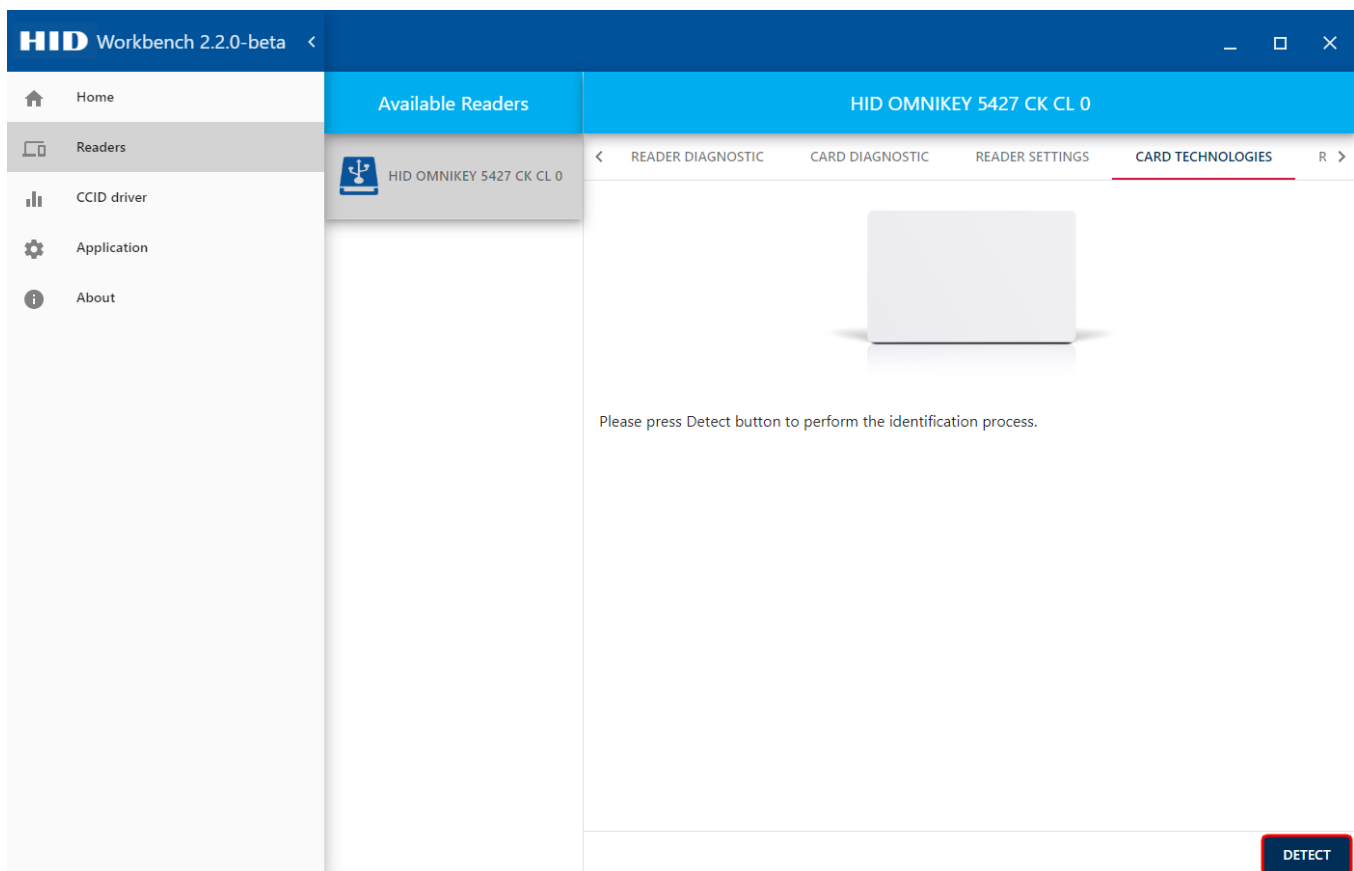
Section 5

5 Card technology detection

For OMNIKEY® 5127 CK and OMNIKEY 5427 CK readers, OMNIKEY Workbench Tool 2 provides card technology detection functionality. This feature allows you to scan a contactless smart card and identify all supported protocols embedded in it.

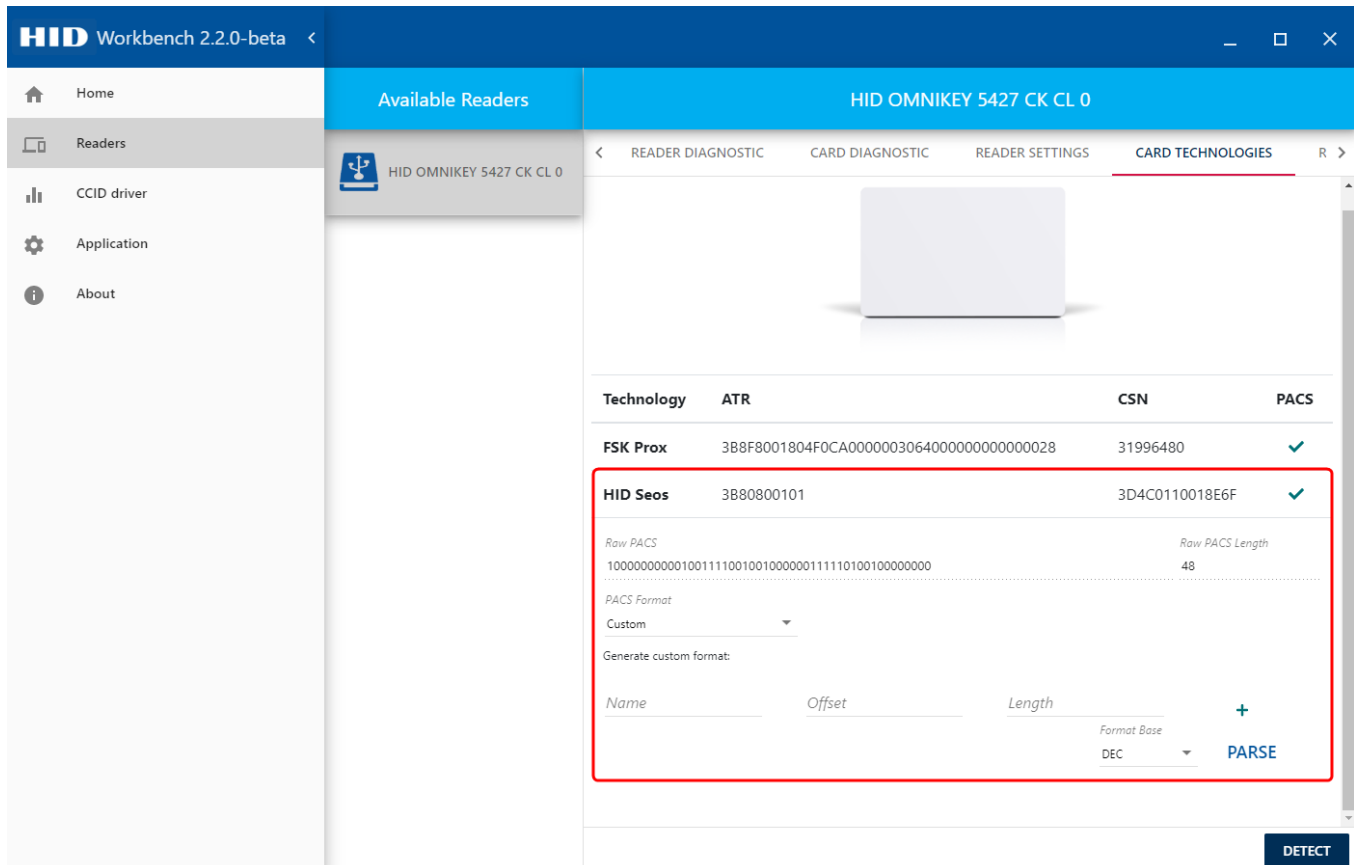
Note: If you use highly customized settings, it is recommended to store the reader configuration in a file before using this feature.

- Place a smart card on the reader, select the **CARD TECHNOLOGIES** tab, and click **DETECT**.



Note: The card technology detection feature is available only on Windows for readers that are handled by an HID driver.

The detection process takes up to 30 seconds, during which you are notified about the progress. When the process has finished, the results are presented in a table. Each row represents one detected technology and includes the card ATR and CSN values. If PACS data exists for a particular technology, you will see a green tick in the last column. Click a row to display additional data, with the option to decode the data (see [Section 2.4.1 PACS decoding](#)).



HID Workbench 2.2.0-beta

Available Readers: HID OMNIKEY 5427 CK CL 0

READER DIAGNOSTIC | CARD DIAGNOSTIC | READER SETTINGS | **CARD TECHNOLOGIES**

Technology	ATR	CSN	PACS
FSK Prox	3B8F8001804F0CA000000306400000000000028	31996480	✓
HID Seos	3B80800101	3D4C0110018E6F	✓

Raw PACS
100000000001001111001001000000111110100100000000
Raw PACS Length
48

PACS Format
Custom

Generate custom format:

Name	Offset	Length	Format Base
			DEC

+
PARSE

DETECT

Note: If the card technology detection process fails for any reason, a reader might be left in an incorrect state, where support for different card types and the polling order might be modified. In this case, restore the default settings from the EEM web server. If you use highly customized settings, it is recommended to store the reader configuration in a file before using the card technology detection feature, and restore the settings after the technology detection.

Section 6

6 HID CCID 2.0 driver settings

The **CCID driver** page allows you to quickly verify if a valid HID CCID driver is installed on your computer, and to modify its global settings. Driver configuration applies only to AVR based readers. The **Operating mode**, **Exchange level** and **Voltage sequence** options can be set to **Defined by reader**, which means there is no global preference for that parameter and the reader's default behavior will be used.

HID Workbench 0.1

Home
Readers
CCID driver
Application
About

HID OMNIKEY CCID driver information

Version 2.2.2.114	Name HIDOMNIKEYCCIDDriver
----------------------	------------------------------

Operating mode

- ☐ ISO
- ☐ EMVCo
- ☒ Defined by reader

Exchange level

- ☐ Extended APDU
- ☐ APDU
- ☐ TPDU
- ☒ Defined by reader

Voltage sequence

- ☐ Reader
- ☐ Driver
- ☒ Defined by reader

Stop tracking time

- ☐ Until contact card is removed
- ☐ Until timeout expires
- ☒ Undefined

DISABLED Disabled Disabled Disabled

RESTORE APPLY

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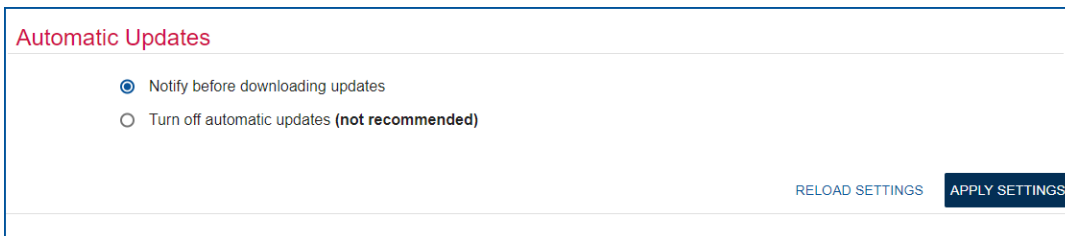
Section 7

7 Maintenance

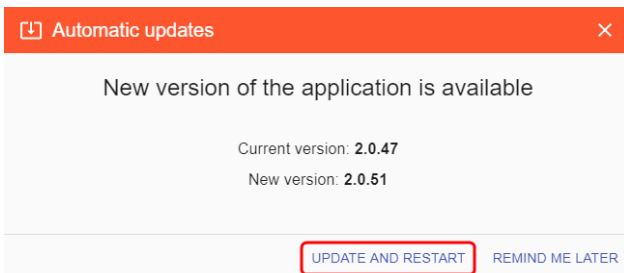
7.1 Automatic updates

On Windows, OMNIKEY® Workbench Tool 2 supports automatic download and installation of updates to minimize security risks and make sure you are always using the latest software.

By default, you are notified each time a new version of the application is available. You can decide if the package should be installed or not. Automatic updates can be disabled, although it is not recommended.



If automatic updates are turned on, the application will check at start-up if a new version is available. This requires an active internet connection. If an update is possible the automatic updates dialogue will appear. After clicking **UPDATE AND RESTART** a new version will be automatically installed.



Note: Currently, automatic updates are supported only on the Windows platform. If you are using Linux or macOS, please visit www.hidglobal.com and download the latest version manually.

7.2 Diagnostic logs

You can generate system log files on demand, by choosing the menu entry directly from the application. System logs contain a report about your operating system, installed drivers, and readers.

- To create a report, select the **Maintenance** page and click **GENERATE LOGS**.

Note: Either a smart card should be present, or the escape commands must be enabled for reader information data to be generated.

OMNIKEY Workbench Tool 2 continuously produces diagnostic logs which can be used to investigate problems that appear whilst using the application. Logs can be found at:

- Windows: %AppData%\HID Global\OMNIKEY Workbench Tool\logs\
■ Linux and macOS: /.config/HID Global/OMNIKEY Workbench Tool /logs/

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