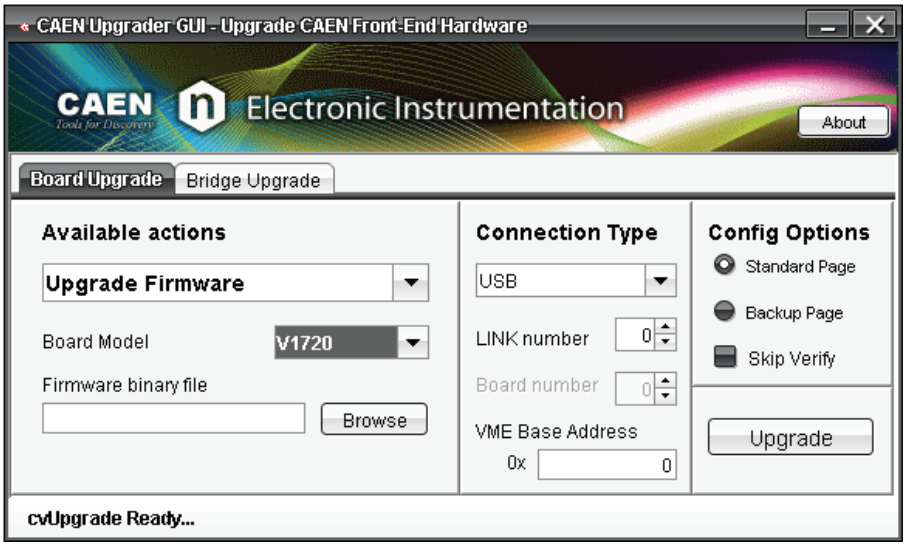
CAEN
Tools for Discovery

Electronic Instrumentation



GD2512

CAENUpgrader QuickStart Guide

Rev. 0 - 10 June 2011

Purpose of this Guide

This QuickStart Guide contains the basic information and examples that will let you use CAENUpgrader in few steps.

Change Document Record

Date	Revision	Changes
18 May 2011	00	Initial release.

Symbols, abbreviated terms and notation

DPP	Digital Pulse Processing
SBC	Single Board Computer

Reference Documents

[RD1] User Manual UM1935 - CAENComm User & Reference Manual

[RD2] Application Note AN2472 - CONET1 to CONET2 migration

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1 Introduction

This CAENUpgrader Quick Start Guide contains the basic information and guidelines for letting you use CAENUpgrader in few steps.

CAENUpgrader is a software composed of command line tools together with a Java Graphical User Interface (for Windows and Linux OS). It reunites all the functions included in cvUpgrade, CAENBridgeUpgrade and PLLConfig programs. In few easy steps you will be able to perform the following main functions on your board:

- upload different firmware versions
- manage the PLL configuration upgrade
- get board information
- manage the firmware license

and on your bridge:

- upload different firmware versions
- get the current firmware version

Here below the table of the supported boards and bridges:

Boards	Bridges
CAEN Digitizers (VME, VME64X, NIM, Desktop)	VME/VME64X-USB2.0 Bridges (V1718, VX1718)
VME /VME64X TDC family	VME/VME64X-PCI CONET Bridges (V2718, VX2718)
General Purpose VME Board (V1495)	PCI CONET Controller (A2818)
VME Power Supply Units (V65xx)	PCI Express CONET2 Controller (A3818)
TPC Readout System (SY2791)	A2719 Internal Controller for V2718

Tab. 1.1: List of the supported CAEN boards and Bridges

Note: If you have a VME64X board or bridge, any action supported in CAENUpgrader has to be performed referring to the correspondent VME model.

System requirements & installation setup

OS	OS version	CAEN Libraries required	Third-party software required
Windows	2000/XP/Vista/7	CAENComm (1.02 or later) CAENVMELib (2.22 or later)	Java Java[1] Runtime Environment 6 or later. You can download from http://www.java.com
Linux	kernel Rel. 2.4/2.6	CAENComm (1.02 or later) CAENVMELib (2.22 or later)	

[1] *Java is a registered trademark of Oracle, Inc.*

Tab. 1.2: Host PC requirements

First of all, be sure to have all the third-party software listed in the **Tab. 1.2** installed.

- Go to CAENUpgrader web page.
- Download the CAENUpgrader **FULL INSTALLATION** package related to your OS.
- Unzip the downloaded package.

Note: the **FULL INSTALLATION** package contains the CAENUpgrader tool and the required CAEN Libraries (last release), as in Tab. 1.2.

- Install the required libraries (contained in the folders “required”). Because of CAENComm is based on CAENVMElib, it is necessary to install CAENVMELib on your PC before installing the CAENComm.
- For Windows users: launch the CAENUpgrader Setup executable file and follow the installer instructions.
- For Linux users: follow the installation instructions within the README file you will find inside the package.

2 Board Connection

CAENComm library (see [RD1]) allows CAENUpgrader to access the target board via USB or via CAEN proprietary CONET optical link, using the following channels of communication:

- PC => USB => CAEN Front-end Modules with USB 2.0 interface:
  - CAEN Waveform digitizers with USB interface (NIM/Desktop form factors)
- PC => PCI (A2818) or PICe (A3818) => CONET => CAEN Modules with Optical link:
  - Waveform digitizers (VME, NIM/Desktop form factors)
  - SY2791 TPC Readout System
- PC => USB => V1718 => VME => CAEN Slave VME Modules:
  - CAEN VME waveform digitizer, CAEN VME TDCs V1190, V1290, General Purpose V1495, Power Supply Units V65xx
- PC => PCI (A2818) or PICe (A3818) => CONET => V2718 => VME => CAEN Slave VME Modules:
  - CAEN VME waveform digitizer, CAEN VME TDCs V1190, V1290, General Purpose V1495, Power Supply Units V65xx

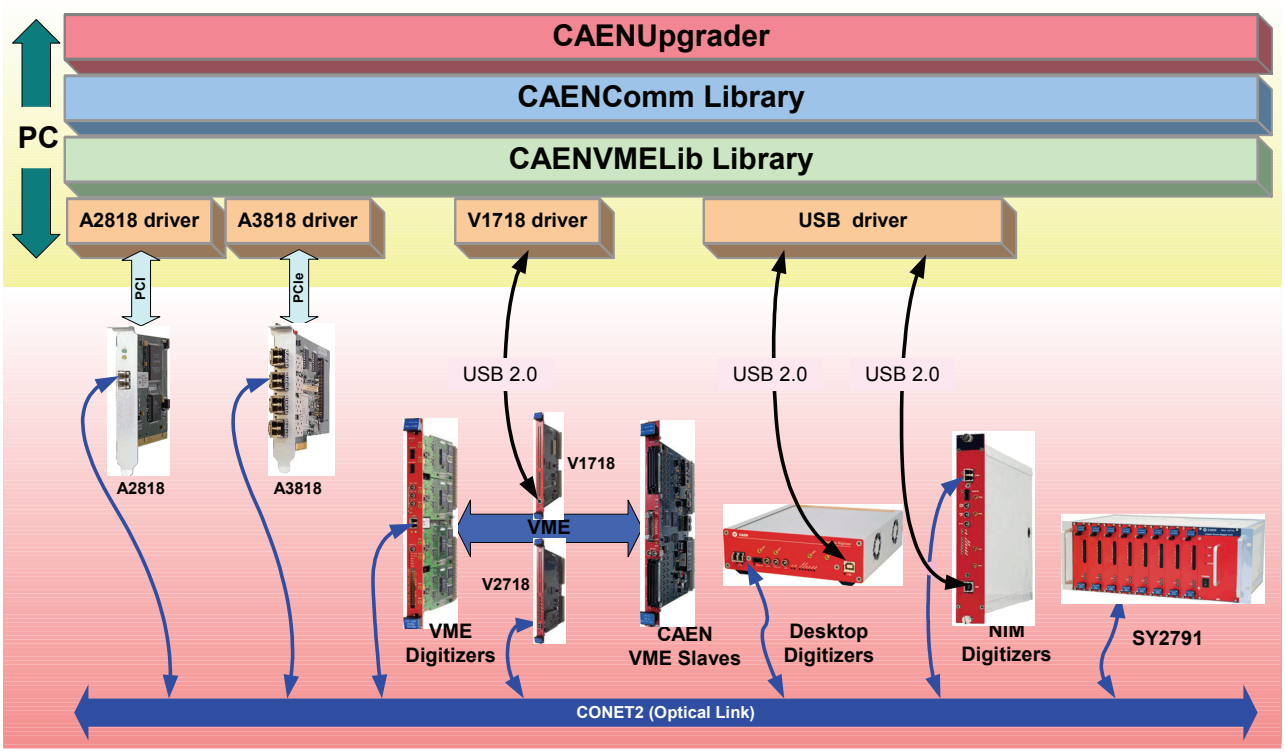


Fig. 2.1:PC-to-CAEN Board connection options

Note: In case of optical master and slave connection, be sure that they both are provided with the same CONET protocol version, in order to avoid system failures. CAEN makes two versions available, CONET1 and the new CONET2, which is not compatible with CONET1. Please refer to [RD2] reference and to the User Manual of your optical board or bridge for more detailed information.

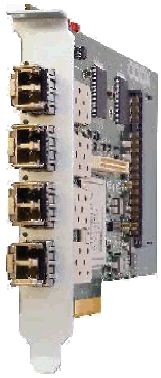
Direct Link to the Module via USB

Desktop and NIM versions can be directly handled via USB as well, just connecting the digitizer to the host PC via the USB cable. The USB driver compliant to the architecture of your PC processor can be downloaded at the Digitizer web page.

Direct Link to the Module via Optical Link

Every CAEN Digitizer can be controlled directly via Optical Link; for this purpose a CAEN PCI or PCIe Controller (Mod. A2818 and A3818) is required, as shown in **Fig. 2.1**. See the web pages of A2818/A3818 for more info.

In this case, the slave unit must be connected to the featured master controller via the optical fibre cable (see the Ordering Options of the controller).

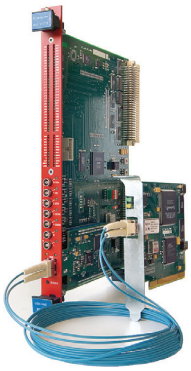
A2818 PCI Controller with Optical link (requiring just a host PC with a free PCI slot)	**A3818** PCIe Controller with Optical Link (requiring just a host PC with a free PCI slot)
	

Tab. 2.1:CAEN Optical Bridges

Link through a VME Bridges

VME Digitizer Boards can be controlled via VMEbus through a VME bridge (see **Fig. 2.1**).

Two CAEN bridges are available:

V1718 / VX1718 with USB interface (requiring just a host PC with a free USB port)	**V2718 / VX2718** with Optical Link (requiring Mod. A3818 or A2818 controller)
	

Tab. 2.2:CAEN VME Bridges

Note: If you want to use a VME bridge from another manufacturer or a SBC you have to provide a CAENComm-like library. Please refer to the Application Notes AN2472 [RD2].

3 Getting Started

This Section is intended to let you dial with the main features of CAENUpgrader step by step. For this purpose, **CAENUpgrader software** in **Windows** environment, the **DT5724 desktop digitizer board** with **USB** connection, the **V1731** and **VX1724 VME digitizer boards** have been selected as examples.

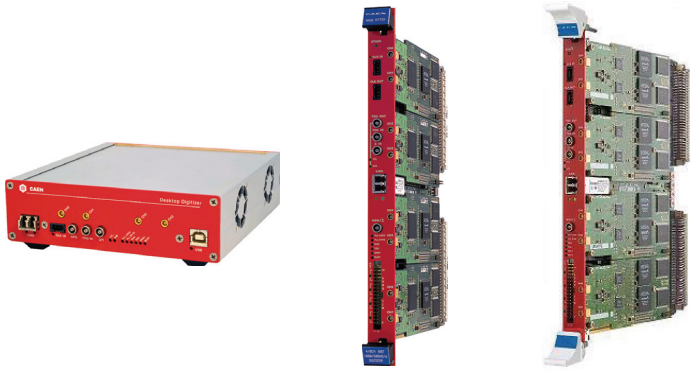


Fig. 3.1:CAEN DT5724,V1731 and VX1724 digitizers.

Next paragraphs highlight the main functions provided by CAENUpgrader after you have performed two basic actions:

- turn on the digitizer and connect it to the PC.
- launch the **CAENUpraderGUI.jar** file.

You will see a two-tab GUI interface with the only "**Available actions**" control box active, both for "**Board Upgrade**" and for "**Bridge Upgrade**" tab. This is the philosophy CAENUpgrader has been built on: different options will appear according to the action chosen in order not to confuse the user.

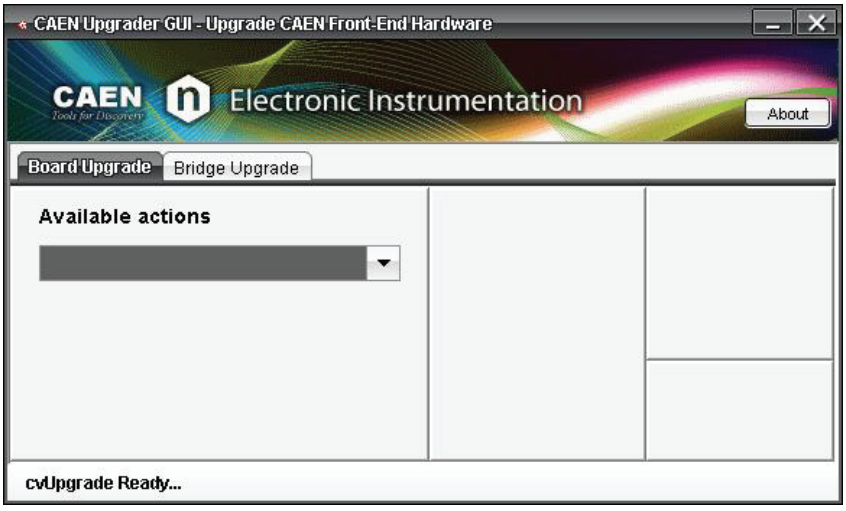


Fig. 3.2:CAENUpgrader's GUI main window

CAENUpgrader GUI Functions Overview

GET INFORMATION (only for boards)

This function allows a file to be generated on your computer containing all the main information related to your board that can be needed when a request for firmware license is performed by the user (see the proper section on this guide).

From the "**Board Upgrade" tab**, perform the following steps:

- Select the "**Get Information**" option in the "**Available actions**" scroll menu: the "**Board's Model"** box will appear right below.
- Select your board model in the "**Board's Model"** scroll menu; in our example we selected a **DT5724**.

This last action makes new commands appear. Let's focus on them from left to right:

- Browse your hard disk by the **"Browse"** button and set the "**Board Info output folder",** which means where to save the board info file on your computer. For the sake of simplicity, in this example we save it in the desktop folder.
- **"Connection Type**" control box will let you select the type of connection you are using (in our example, USB).
- **"LINK number"** allows for choosing between different boards/bridges linked to your computer, if you are using more than one connection link. In our example we leave this field set to **0**, which is the default value when there is only one link available.

It can be noticed that other two commands, "**Board number"** and "**VME BASE Address"** appear as shaded and not selectable, as they are not needed when using the DT5724 board through the USB connection. A detailed description of the connection parameters is given in the Appendix at the end of this guide.

- By clicking on the "**GetInfo**" button, a message will appear telling you that the board information file has been created. Follow the path you chose before and you will find a .dat file, in our example called "**BoardInfo-DT5724-xx.dat**", where xx is the serial number of the board.

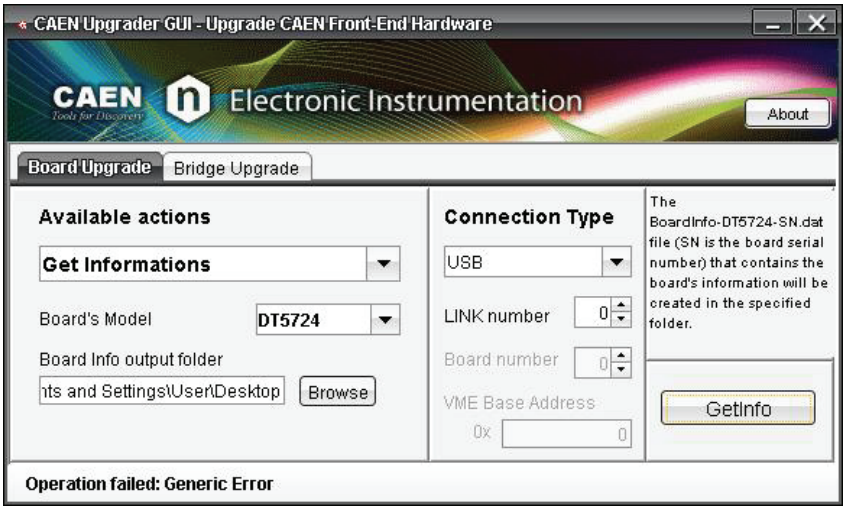


Fig. 3.3:CAENUpgrader's "Get Information" box

This example has shown you how CAENUpgrader works concerning the "**Get Board Information**" function. Next section will show you how to upgrade the firmware on your board or bridge.

FIRMWARE UPGRADE (for boards and bridges)

CAENUpgrader can manage the firmware upload on every CAEN board and bridge that may need it. For firmware has to be intended the standard firmware (related to boards and bridges) and CAEN's Digital Pulse Processing (DPP) firmware, specifically dedicated to different applications and running only on Digitizer boards. The programming file for a module can be downloaded at the module's web page. In particular, the DPP firmware is downloadable in a "trial" version, functionally fully opened, but the Digitizer can run the DPP algorithms for a limited time of 30 minutes, then a power cycle of the board is required for another 30-minute use.

CAEN makes two different programming file types available with **.rbf** and **.cfa** extensions.

The **.rbf** file is a programming file used for standard firmware and for DPP firmware.

The new **.cfa** file, now available only for digitizers, is a sort of archive format file aggregating all the standard firmware files compatible with the same family of digitizers. This means, taking the x724 family as an example, that a single **.cfa** file is needed in order to upgrade the standard firmware either on a V1724 (VME), or on a DT5724 (Desktop), or on a N6724 (NIM) digitizer. The **.cfa** file features also heuristics, so that CAENUpgrader will inform the user when he is trying to upload a firmware not compatible with the target digitizer.

Let's see how to upgrade the standard firmware on the example board DT5724 using a **.rbf** file (the differences in using a **.cfa** file are shown in parenthesis):

- Select "**Upgrade Firmware**" in the "**Available actions**" scroll menu of CAENUpgrader's "**Board Upgrade**" tab and insert your board model in the appearing "**Board's Model"** box. This action will make other commands be visible.

- Click on the “”**Browse**” button, select the “***.rbf**” option in the ‘File type’ scroll menu of the ‘Browse’ window (“***.cfa**” is set by default) and seek on your hard disk the programming file previously downloaded. In the example, we used a **.rbf** file for a DT5724 board, which is the standard firmware version CONET2 compliant (in case of **.cfa** option, the file for the x724 digitizer family has to be used).

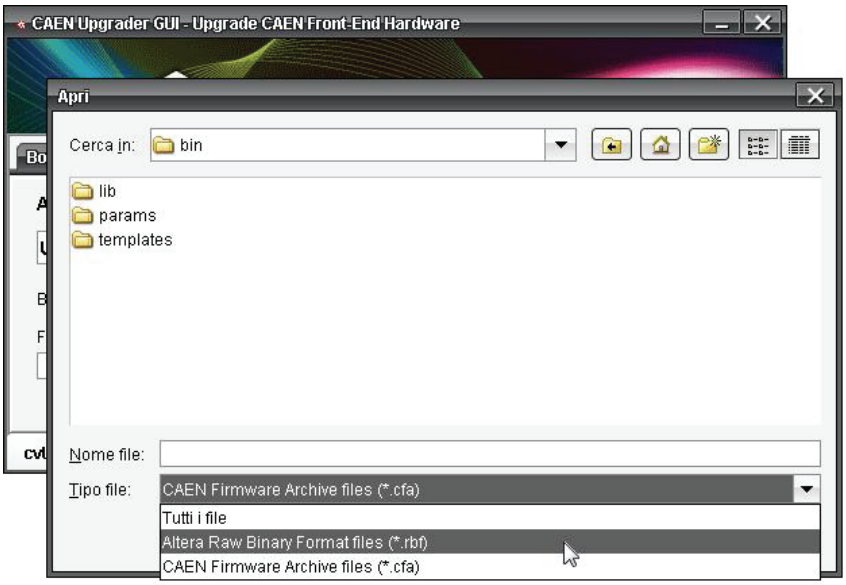


Fig. 3.4: Firmware file type selection in the ‘Browse’ window

- Select the **.rbf** file you have downloaded. In our example it is called: “**dt5724_n6724_rev_3.1_0.11.rbf**” (“**x724_standard_3.1_0.11.cfa**” in case of **.cfa** file).
- A pop-up window will warn you that CAENUpgrader can’t check if the **.rbf** file you are using matches your target module. Press “**OK**” to continue.

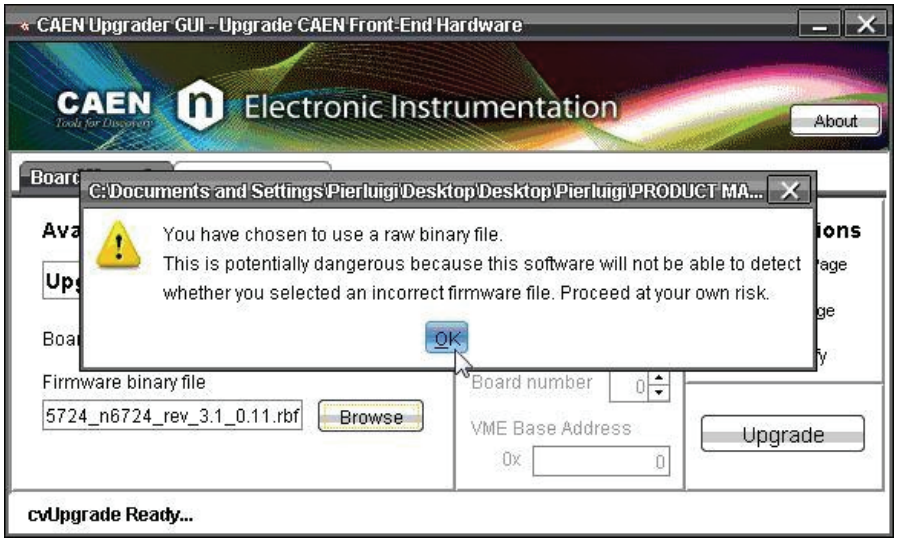


Fig. 3.5: Warning message uploading a .rbf file.

- Set the connection type to USB.
- The “**Config Option**” menu at the top right of the GUI let you choose in which page of the board's memory the firmware will be saved. By selecting ‘**Standard Page**”, the firmware will be saved in the section of the board memory that is loaded by default at the digitizer start-up. In our example this option has been chosen.

Note: It is strongly recommended to upgrade the firmware selecting always the ‘**Standard Page**” option. If any failure occurs during the upgrade, please contact support.nuclear@caen.it

- Click on the “**Upgrade**” button to upgrade the firmware. After few seconds a pop-up window with a successful upgrade message will appear (if you’re uploading a **.cfa** file, in case of mismatch between the firmware and the target board, the software will show an error message).
- Power cycle the board to load and use the new firmware.

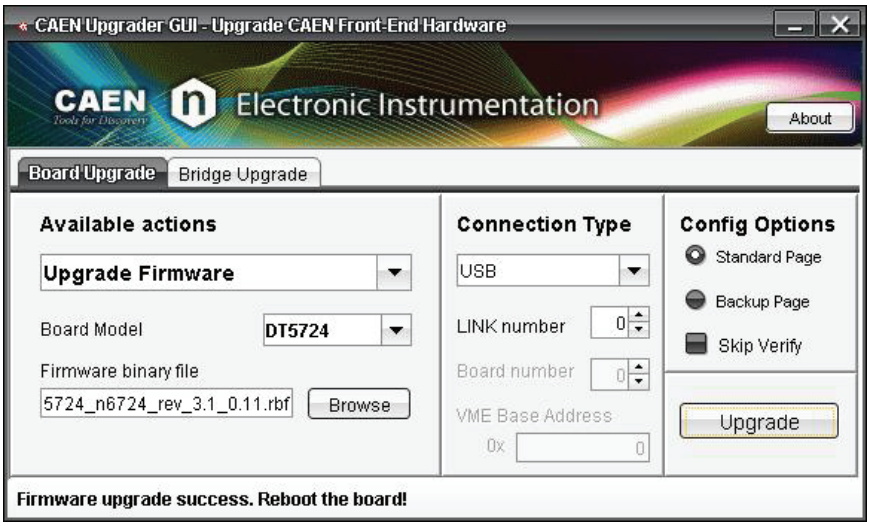


Fig. 3.6:CAENUpgrader's "Upgrade Firmware" box for CAEN boards

In particular, the procedure above described can be referred to also for the V1718 bridge (by selecting in this case the "**Upgrade Firmware**" action in the "**Available actions**" scroll menu of the "**Bridge Upgrade**" tab). Regarding other bridges like the A2818 and the V2718 (and so for its piggy back A2719), an example of firmware upgrade using CAENUpgrader is reported in [RD2].

VERIFY FIRMWARE UPGRADE (only for boards)

This function verifies that the firmware has been correctly loaded on your board:

- Select the "**Verify Board firmware"** option from the "**Available actions**" scroll box in the "**Board Upgrade**" tab
- Insert DT5724 as Board's Model.
- Browse through the "**Browse**" botton for the binary file you have just loaded and click on the **"Verify"** button. The "**verification passed!**" message will appear.

STORE PRODUCT UNLOCK CODE (only for bards)

CAEN Company makes different Digital Pulse Processing firmware be available for those CAEN digitizers which support them. These DPPs are freely downloadable in a "trial" version, complete in terms of functionalities but operating only for 30 minutes per board power cycle.

If you want to unlock the firmware, you need to buy a license by sending to CAEN a formal purchase request specifying the product code of the DPP you want to buy (findable at the DPP web page).

Here follow a step-by-step example of the procedure you need to perform in order to have your DPP firmware unlocked for example on a **V1724** digitizer (supporting DPP TF):

- Once you bought a License, a License_ID code will be specifically generated by CAEN and sent you through an e-mail. This code is directly associated to the DPP product code you indicated in your request.
- If you haven't the DPP firmware already uploaded on your board, in the e-mail you will found how to download the trial version. Then, refer to the **Upgrade Firmware** section of this guide for loading it on your board. On the contrary, jump to the step below.
- The e-mail will address you by an active link to the 'Web License' page on CAEN website.

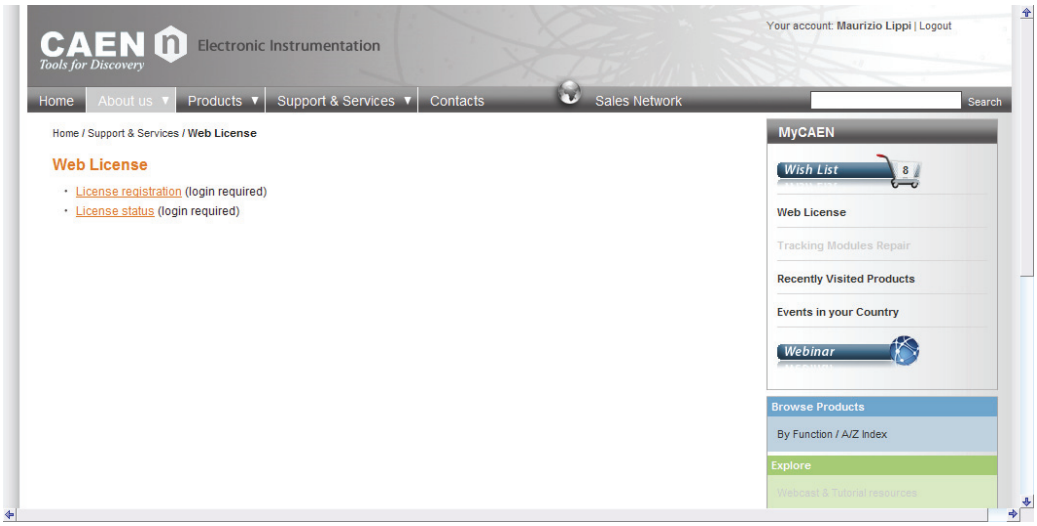


Fig. 3.7:'Web License' page on CAEN website

- Click on the 'License registration' link (**login required**) and select the module in your posses in three simple steps.

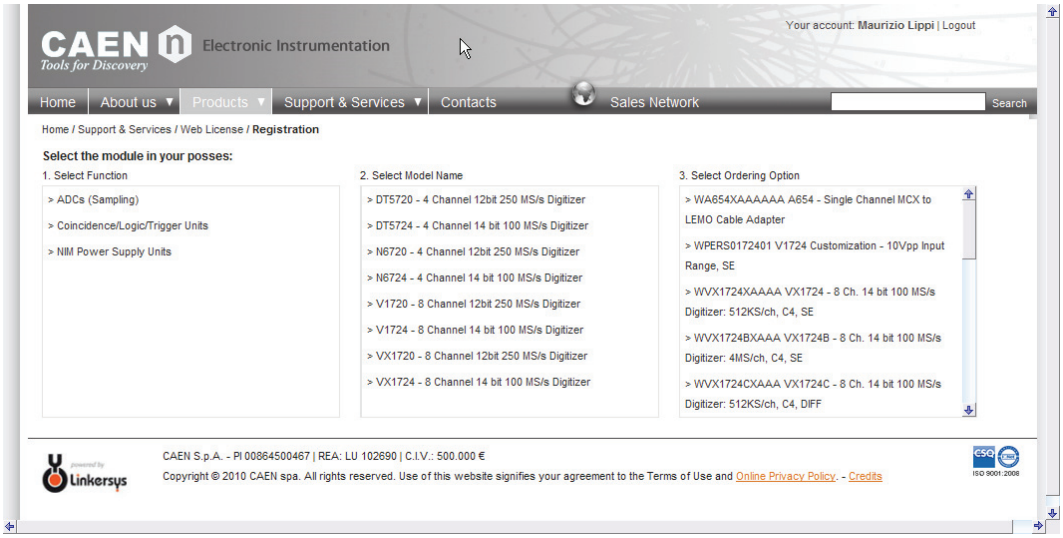


Fig. 3.8: Module detailed selection

- Submit the Activation Request after you've filled in the appearing Registration form with the given License_ID and the module Serial Number.

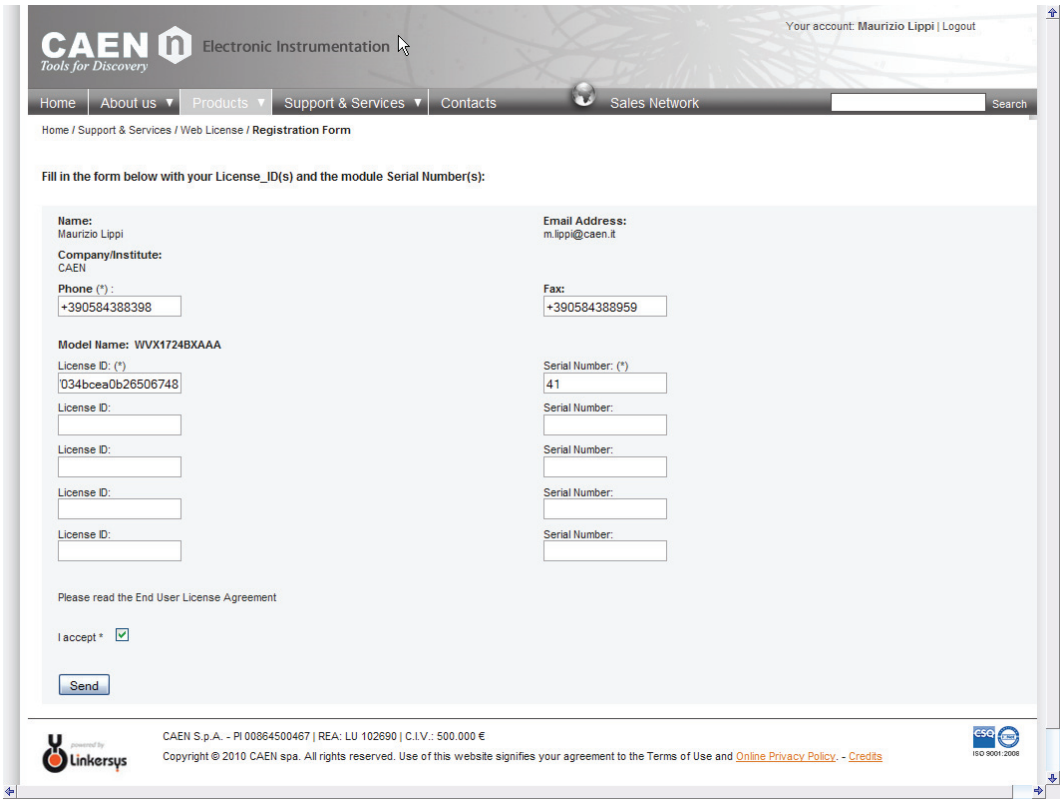


Fig. 3.9: Registration form

- From this moment you can monitor the status of your license in the 'License Status' webpage (**login required**).

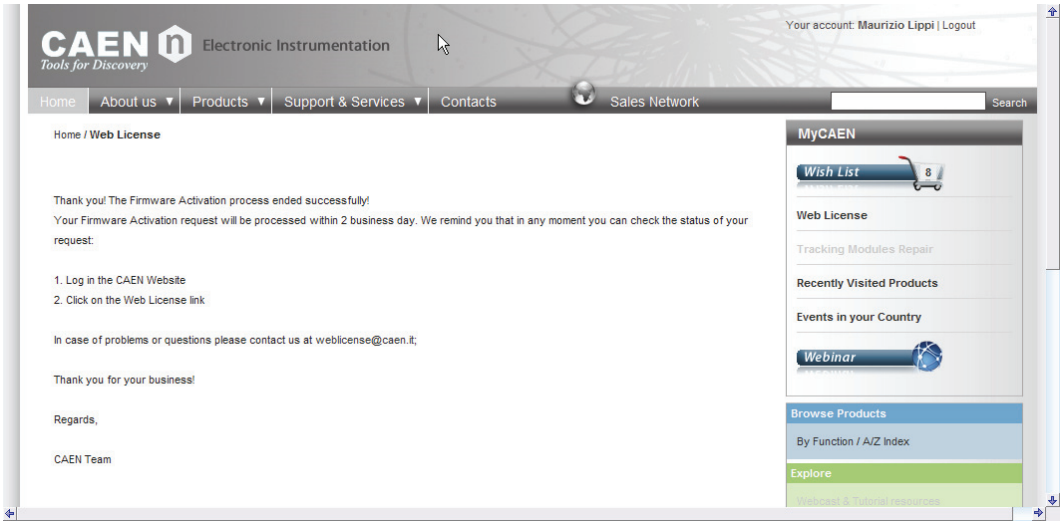


Fig. 3.10: Registration request's confirmation page

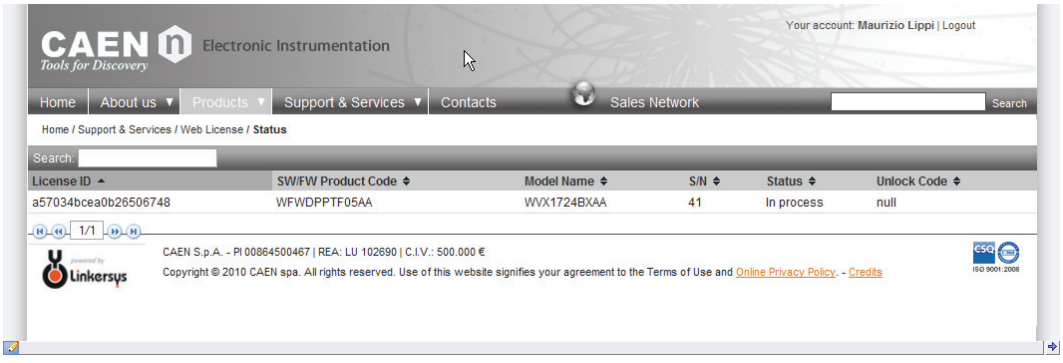


Fig. 3.11:'License Status' Web Page

- As soon as your request is processed, CAEN releases the Product_Unlock_Code. Its availability will be notified by email and on the website in the 'License Status' page.

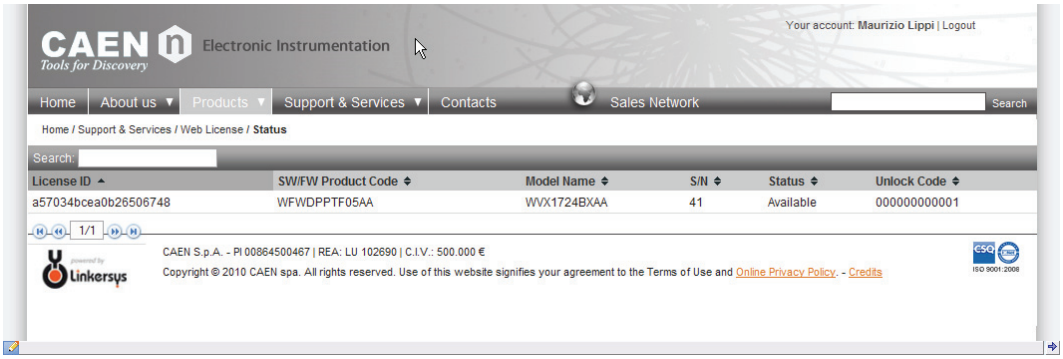


Fig. 3.12:Product Unlock Code availability at 'License Status' Web Page

Once the PUC is available, you can use it with CAENUpgrader to unlock the firmware on your module:

- Select the "**Store Product Unlock Code**" action in the "**Available actions**" scroll menu of CAENUpgrader's "**Board Upgrade**" tab.
- Insert your board model.
- Type the PUC, copied from the 'License status' webpage, in the "**Product Unlock Code value"** box.
- Select the proper connection type and click on the "**Store PUC**" button to unlock the firmware. A message will notify you about the outcome of the action.

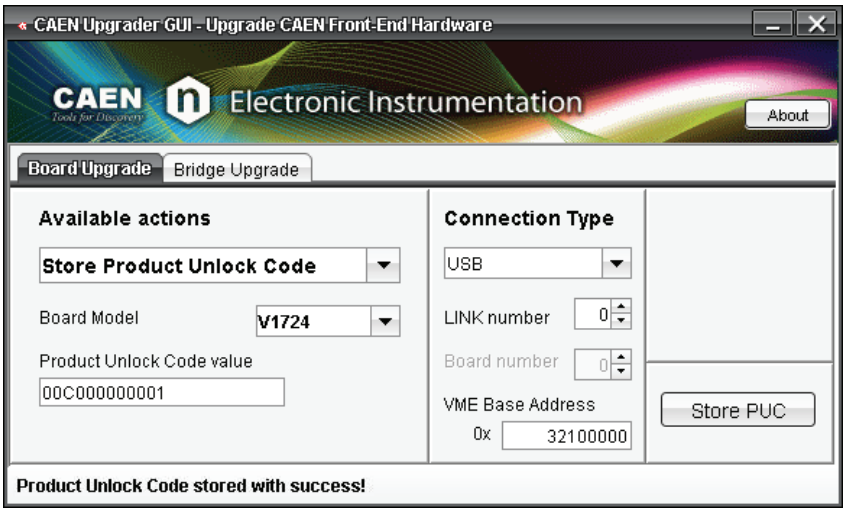


Fig. 3.13:CAENUpgrader's "Store Product Unlock Code" box

After a power cycle your firmware will be ready to use with no time restriction.

GET PRODUCT UNLOCK CODE (only for boards)

If you need to retrieve the Product Unlock Code of the DPP firmware on your board, you can do that by the "**Get Product Unlock Code**" action in the "**Board Upgrade**" tab. Set your board model and the proper connection type and click on the "**Get PUC**" button. The PUC will be displayed under the "**Board's Model**" box.

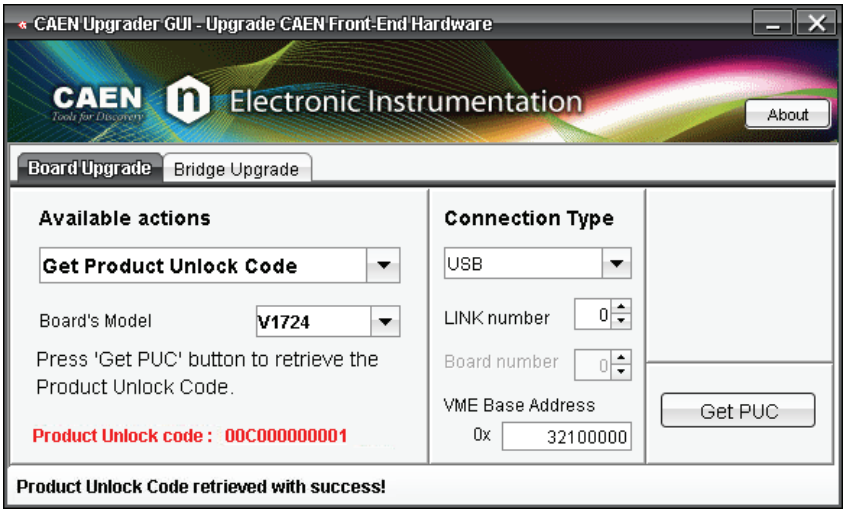


Fig. 3.14:CAENUpgrader's "Get Product Unlock Code" box

DELETE PRODUCT UNLOCK CODE (only for boards)

This command will delete the unlock code from your board, getting the uploaded DPP firmware back tot he 'trial' version. Select "**Delete Product Unlock Code**" action in the "**Board Upgrade**" tab. Set the proper connection type and click on the "**DeletePUC**" button.

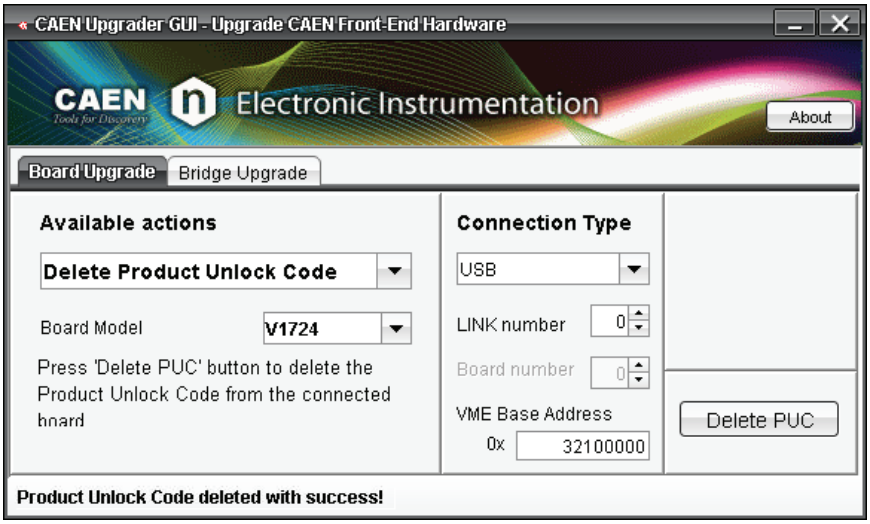


Fig. 3.15:CAENUpgrader's "Delete Product Unlock Code" box

UPGRADE PLL (only for VME digitizers)

CAENUpgrader's "**Upgrade PLL"** action allows you to upgrade the PLL configuration on CAEN Digitizers with customized settings.

- Select the "**Upgrade PLL**" action in the "**Available actions**" scroll menu of CAENUpgrader's "**Board Upgrade**" tab.
- Insert your VME board model in the "**Board's Model**" box. In the example we chose the V1731 board. New commands will appear.
- You can generate the PLL configuration file (a .rbf file) by the PLL settings window opening up once you click on the "**New**" button (active only for supported board models).

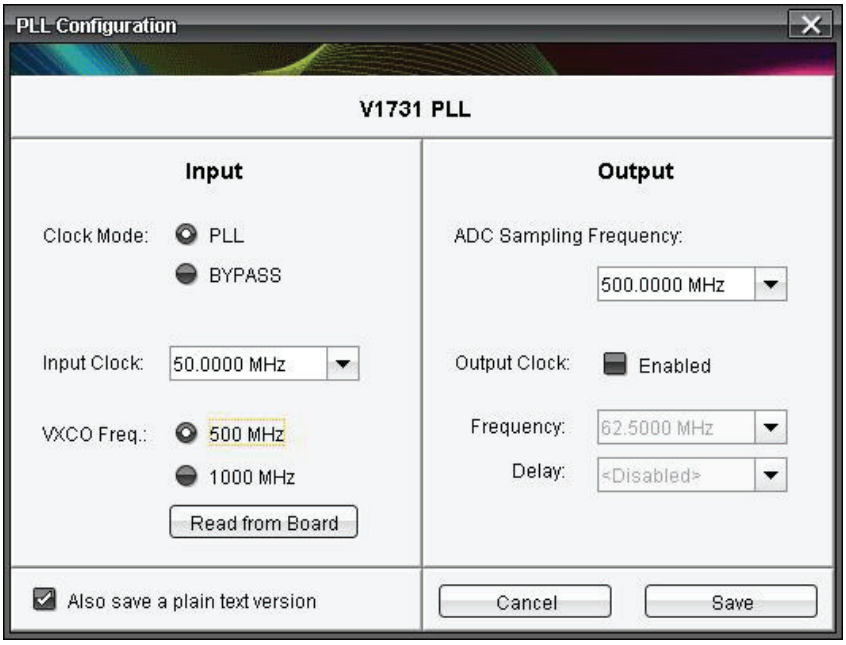


Fig. 3.16:CAENUpgrader's PLL settings window

- Once the PLL configuration has been set according to your purposes, you can save the configuration file on your computer by clicking on the "**Save**" button. Automatically the PLL settings window disappears and the file is loaded in the "**PLL upgrade file**" box.
- Select the connection type: as in the example the V1731 board is connected to the computer through the CAEN USB V1718 bridge, the USB connection has to be set; type in the apposite box the VME Base Address of the target VME digitizer.

Note: Please refer to the User Manual of your digitizer for detailed information about the VME Base Address.

- Click on the "Upgrade" button to upload the new configuration on your board.
- Power cycle the board to make the changes be effective.

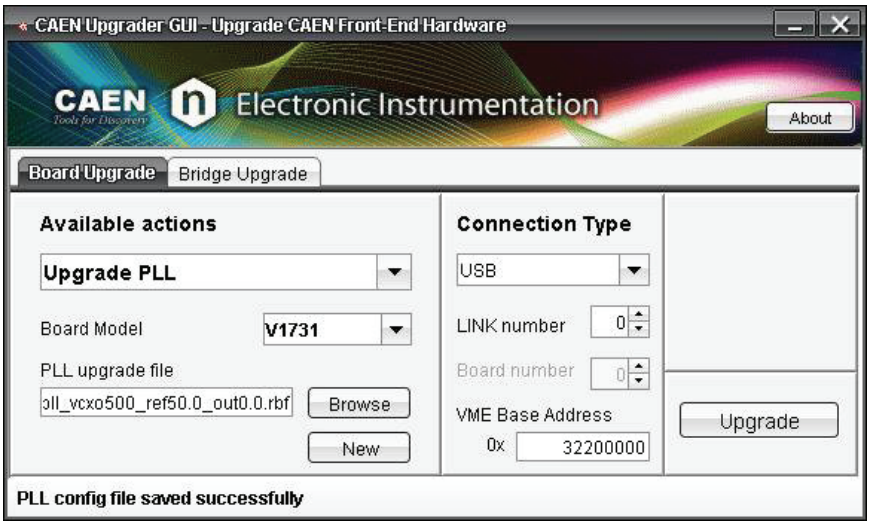


Fig. 3.17:CAENUpgrader's Upgrade PLL box

Troubleshooting

CAENUpgrader records any operation and its outcomes, chronologically starting from the program opening, in a log file (.txt). The file is readable at any moment when the program is open or after the program has been closed. File location depends on the OS version installed on your computer. The file is reset any time the program is reopened.

By clicking on the "**About**" button, at the top right of CAENupgrader GUI, a small window appears with the basic information about the program (SW version, developers, info & support contact) and the log file path.

Note: If the Operative System supports it, the Log path will be clickable.

If you're experiencing any problem you're not able to manage, due to errors occurring during the use of CAENUpgrader functions, you can contact CAEN support (support.computing@caen.it) attaching the session log file.

Fig. 3.18:CAENUpgrader's About window

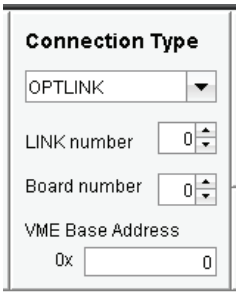
4 Appendix A

Connection Settings Description

CAENUpgrader's GUI provides the **"Connection Type"** box for setting the connection parameters needed to perform any software action on your target board or bridge.

These parameters are:

- Connection Type
- LINK number
- Board number
- VME Base Address



Connection Type: specifies the connection used for the target module. For target bridges, this parameter is fixed automatically once the module's model has been selected.

LINK number: allows for choosing between different targets if you have more than one connection link available on the host computer. The value of this parameter refers to the PCI slot or to the USB port and depends on the host's motherboard. The first slot occupied by a PCI/PCIe bridge or the first USB cabled has LINK number = **0**, whatever is the slot or the port.

Note: If more than one motherboard's slot is occupied, the user has to set the LINK number value by trial and error. The same in case of multiple USB ports used.

Board number: refers to the position of the target board or bridge in a CONET network. A CONET network consists in up to eight (8) nodes connected in a Daisy Chain, through the optical link, to a single Optical Controller (like the A2818).

VME Base Address: is an identification code to target a VME module. This code is fixed by the four rotary switches on the module itself (refer to the module's User Manual).

The following example is intended to show the setting of the connection parameters in three practical cases.

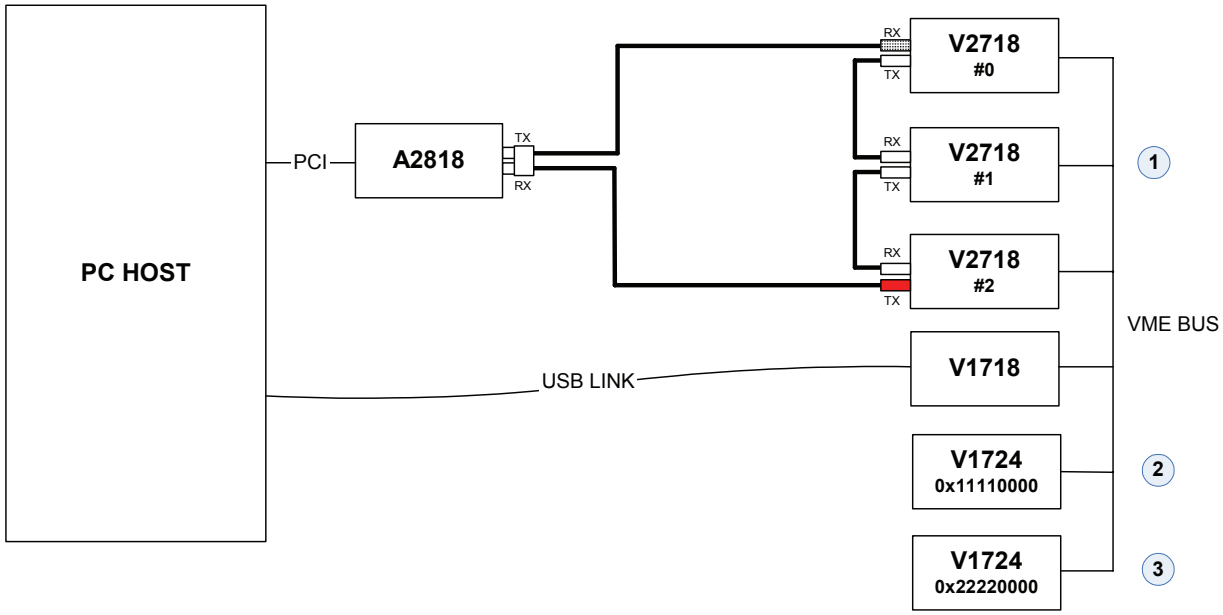
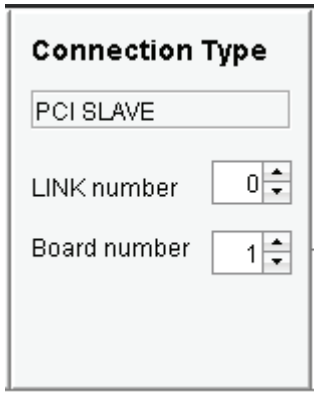
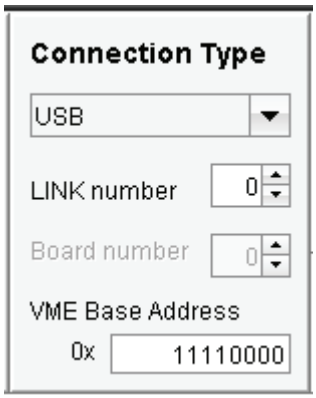


Fig. 4.1: Hardware System: PC with USB port, hosting a A2818; V2718 bridges in Daisy Chain, V1718 bridge and V1724 VME digitizers

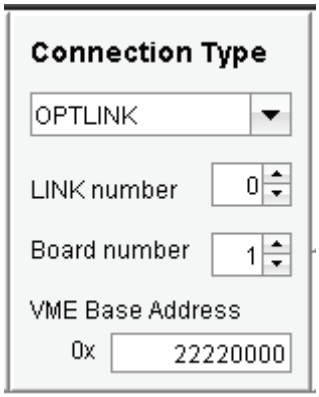
1. Target the second V2718 bridge in the CONET network through the Optical Link:

CONNECTION TYPE	LINK number	Board number	VME Base Address	
PCI SLAVE	**0**	**1**	**NOT REQUIRED**	

2. Target a VME Digitizer (V1724) through the USB link by means of a V1718 bridge:

CONNECTION TYPE	LINK number	Board number	VME Base Address	
USB	**0**	**NOT REQUIRED**	**0x11110000**	

3. Target the a VME Digitizer (V1724) through the Optical Link using the second V2718 bridge:

CONNECTION TYPE	LINK number	Board number	VME Base Address	
OPTLINK	**0**	**1**	**0x22220000**	

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