

syn1588[®]

syn1588[®] PTP management software

PTPMMM GUI

User Guide

Version 1.10 - January 8th 2018

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0 Introduction

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0.1 Acknowledgements

The development of this software was partly founded by the European Commission in the 7th Framework Program under the ICT-224350 ^{flex} WARE – Flexible Wireless Automation in Real-Time Environments project.

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1 syn1588[®] PTPMMM GUI

1.1 Introduction

The syn1588[®] PTPMMM GUI is a graphical user interface for the “ptpmmm” utility. “ptpmmm” allows remote monitoring and configuration of IEEE 1588-2008 clocks in the network using standard IEEE 1588 management messages.

The syn1588[®] PTPMMM GUI doesn't generate network traffic on its own; it starts an instance of the command line tool “ptpmmm” as a separate process and forwards communication request to this process.

Please note the following limitation:

To be fully compliant to the IEEE 1588-2008, it is not possible to access the PTP node located on the same node, where the ptpmmm Management tool is been executed.

1.2 Installation

The syn1588[®] PTPMMM GUI doesn't require any special installation or setup. It is sufficient to extract the package into an arbitrary directory and launch the binary “ptpmmm_gui.exe” (Windows) or the binary “ptpmmm_gui” (Linux) respectively. After successfully starting the syn1588[®] PTPMMM GUI, the main window is shown.

1.3 Main Window

When invoking the syn1588[®] PTPMMM GUI the first time one is prompted to select the network interface of the host running the syn1588[®] PTPMMM GUI that shall be used for managing the PTP nodes on the network.

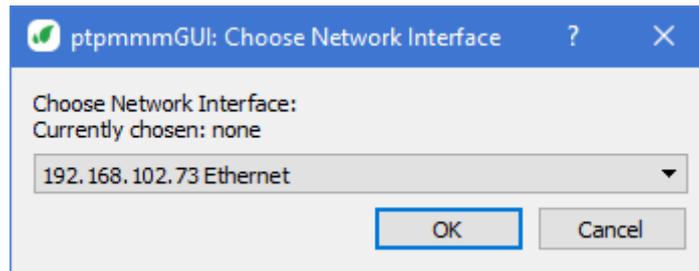


Figure 1: Select network interface

Basically, this defines the IP settings for the IEEE 1588 communication. The selected interface is stored in the settings.ini file. For all subsequent invocations of the syn1588[®] PTPMMM GUI the same network interface will be chosen. If one would like to change the network interface used one can do this via the menu “Command -> Change Network Interface”.

The main window provides a quick overview of all IEEE 1588-2008 clocks found in the network. A screen shot is shown in Figure 1. When the program is invoked for the very first time a dialog will appear showing all network interfaces of the machine. Please select the interface having access to one’s IEEE 1588-2008 clocks or syn1588[®] devices. This information is stored and will be used from now on.

By default, the information shown in the table is updated every three seconds. The update period can be changed by using the “Properties -> Set update period” menu. If one wants to stop the periodic updates completely, one just has to select “Commands -> Update periodically” or use the shortcut Ctrl + P. One can force an update of the table any time with “Commands -> Update clocks” or with Ctrl + U.

Please note that the update time should be carefully chosen due to the required IEEE 1588 communication. Following the IEEE 1588 standard, every IEEE 1588 management message has to be sent as a broadcast message. This creates enormous (unrelated) network traffic for all nodes on the network, if many nodes are simultaneously polled.

The columns shown in the table can be selected with the “Properties -> Select table columns” menu. One’s selections are saved in the settings.ini file when one closes the application and re-loaded when one starts the syn1588[®] PTPMMM GUI again.

In case one wants to directly interact with the underlying “ptpmmm” command line utility one can display its command line with “Commands -> Show command line”. However, as all output from “ptpmmm” is shown it is recommended to disable periodic updates for better traceability.

syn1588® PTP management software

If one enters a command into the line edit, one may select a clock in the table and click “Use Clock” to append the ID, port and domain number to the command. The command line textbox provides a history which one may browse using the up and down arrow keys.

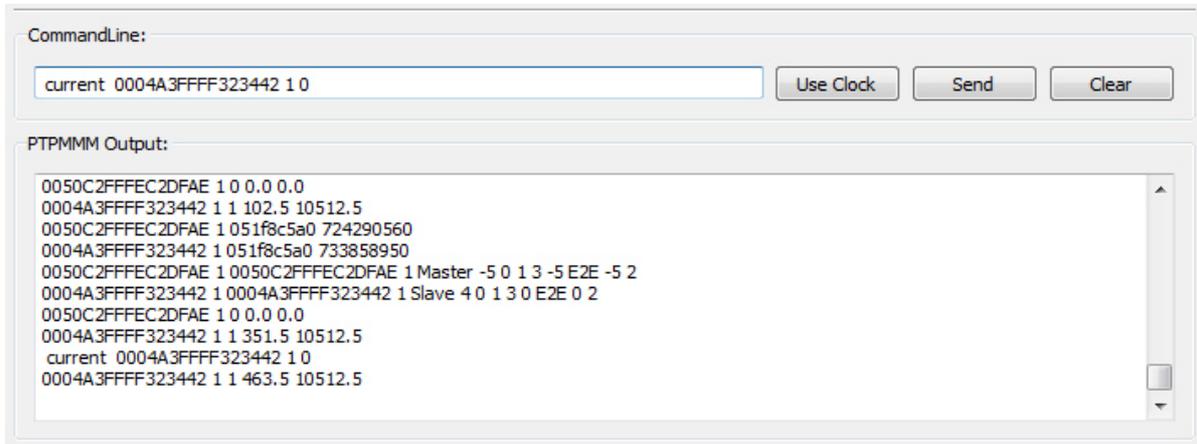


Figure 2: Command line

By using “Commands -> Start ptpmmm logging” one can save all the communication between syn1588® PTPMMM GUI and “ptpmmm” in a log file.

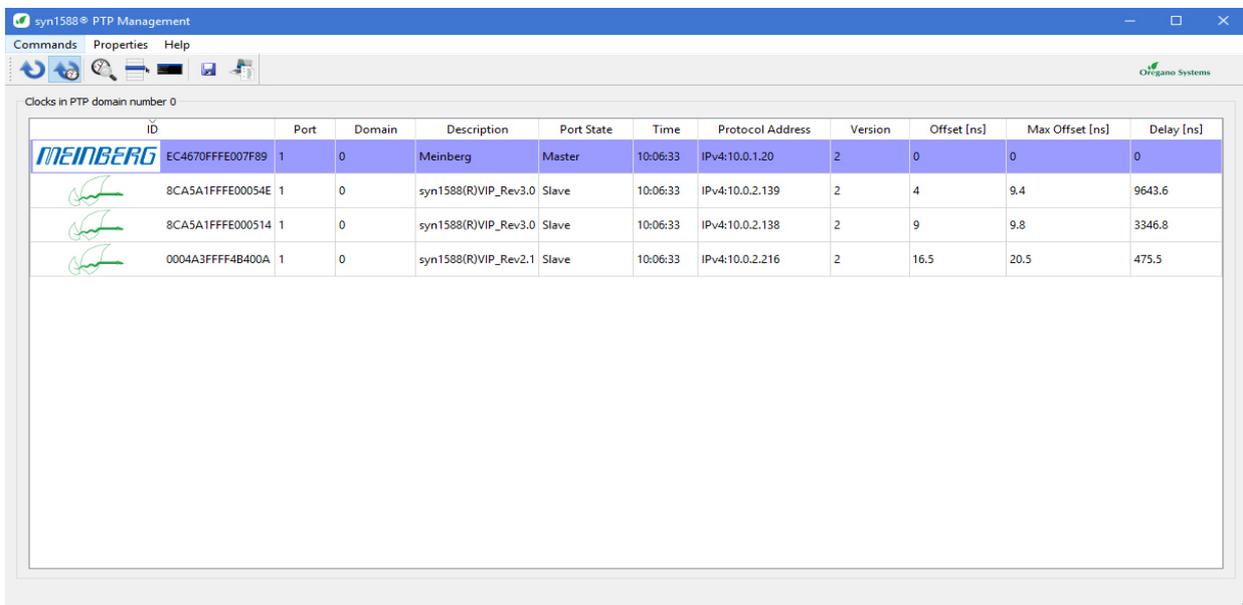


Figure 3: Main window

The main window provides an effective feature to trace the offset between a slave and its master clock. One can enable it by setting a maximum offset threshold with “Properties -> Set max offset threshold”. All clocks with a maximum offset below the threshold are marked

with a green background. If the offset reported by a clock exceeds the threshold, the background colour changes to red and the current maximum offset value is shown in the column “Max Offset”. One can reset the “Max Offset” field of all clocks with “Properties -> Reset max offset field”.

With “Commands -> save clock information” one can dump all datasets of all clocks into a CSV file. “Commands -> Create offset log file” allows one to log the offset of all clocks into a file which tab separating all values. This file can be directly opened with any appropriate spread sheet software (e.g. Microsoft’s Excel) for further analysis. After clicking the menu item, one is prompted for the file location and a measurement period. The offset values are measured and written into the file until one stops it by clicking “Commands -> Create offset log file” again.

To get more detailed information about a specific clock one can open the clock details window by double clicking on the table or by selecting the clock and choosing “Commands -> Show clock details”.

For all syn1588[®] clocks one can access the custom syn1588[®] registers by using the Register Window. One may open this Register Window by selecting a syn1588[®] clock in the table and choosing “Commands -> Show register window”.

1.4 Clock Window

The Clock Window feature is available for all IEEE 1588-2008 clocks that support IEEE 1588 management messages. It can be invoked from the syn1588® PTPMMM GUI Main Window either via the menu “Commands > Show clock details” or by right clicking on a clock and selecting “Show clock details”.

The Clock Window provides all the information available about a specific IEEE 1588-2008 clock. To keep things clear one can hide and show the six available datasets with the “Show menu”.

If one wants to see the details of another clock one doesn't have to close the clock window, just double click on the new clock in the main window. The information in the clock details window will be updated immediately.

Furthermore, one can access several information fields in the clock window and modify their respective content. If one does so, the label next to them gets highlighted in red. One has to commit one's changes by clicking the “Execute modification” button on the bottom of the window. If one wants to modify the domain or the slave only flag one has to enable them first by using “Commands -> Unlock critical user inputs”.

All other Items in the “Commands” menu correspond to special PTP management commands one can send to the given clock.

Clock details - 0004A3FFFF4B400A
— □ ×

Show Commands

General information

ID:	0004A3FFFF4B400A	Port:	1	
Description:	syn1588(R)VIP_Rev2.1	Domain:	0	
Physical protocol:	IEEE 802.3	Protocol address:	IPv4:10.0.2.216	
Physical address:	00:04:A3:4B:40:0A	Revision:	HW build 551; syn1588(R) Clock M 2.3.0; SW 1.2.238	
Manufacturer id:	FFFFFF	Profile id:	001B19000100	
Product description:	Oregano Systems; syn1588(R) VIP; 00:04:A3:4B:40:0A		Time:	04.08.2017 09:49:12

Current dataset

Steps: 1 Offset: 12 Delay: 474

Default dataset

Priority 2: 128 Priority 1: 128 Clk class: 248 Slave only:

Accuracy: 39 Number of ports: 256 Variance: 65535

Port dataset

Delay request interval: 4 Port state: Slave

Peer mean path delay: 0 Delay mechanism: E2E

Announce interval: 1 Peer delay interval: 0

Announce timeout interval: 3 Sync interval: 0

IEEE 1588 Version: 2

Parent dataset

Parent ID:	EC4670FFFE007F89	GM ID:	EC4670FFFE007F89
Parent Source port:	256	GM clk class:	6
Parent stat:	0	GM accuracy:	33
Parent variance:	65535	GM variance:	64308
Parent phase change:	-129	GM priority 1:	128
		GM priority 2:	128

Time properties dataset

UTC offset: 37 Time source: 0x2

UTC offset valid: PTP timescale:

Leap: 59 61 Traceable: Time Frequency

Execute modification
Discard modification

Figure 4: Clock window

1.5 Register Window

The Register Window feature is available for syn1588® clocks only. It may be invoked from the syn1588® PTPMMM GUI Main Window either via the menu “Commands > Show register window” or by right clicking on a clock and selecting “Show register window”.

In the menu of the Register Window “Show” one can select which sections of the Window which shall be visible. The availability of the sections depends on the syn1588® clock version; not all sections are available for all types of clocks.

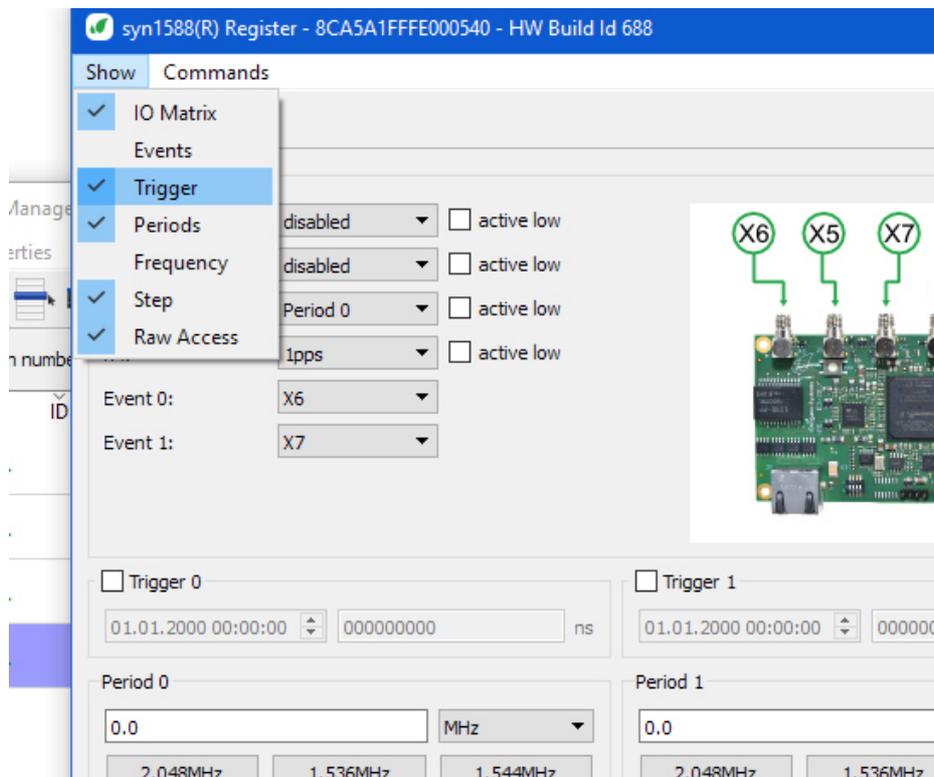


Figure 5: Register Window Menu: select sections

Via the Registers Window one can read and write all syn1588® registers of a clock. E.g. one can modify the IOMATRIX, TRIGGER, and the STEP registers of the clock.

One can query the event times by clicking “Commands -> Update”. Like in the Main Window one can enable a periodic update and set this period. Please note that EVENT0 is linked to a hardware FIFO, while EVENT1 is not. If the update is not performed frequently enough some events might not show up in the list. Please refer to the syn1588® User Guide for more information.

If one modifies a register or Event, Trigger, Period or Frequency input fields, the corresponding group box or input field gets highlighted in red and the buttons at the bottom of the window are enabled. One has to click “Execute Modification” to commit the changes to the syn1588®

device. Furthermore, the Register Window can be used to read and modify all configuration registers of a syn1588[®] clock in the raw register access table. However, care should be taken when doing so, as modifying the registers with wrong values might crash the syn1588[®] PTP Stack of the clock.

Starting with build 929 of the syn1588[®] PTPMMM GUI the Register Window adapts to the type and version of the syn1588[®] hardware clock selected. E.g. the syn1588[®] VIP Evaluation Board Revision 2.1 does not support an IOMATRIX function and uses a fixed IO assignment instead, as shown in the following figure.

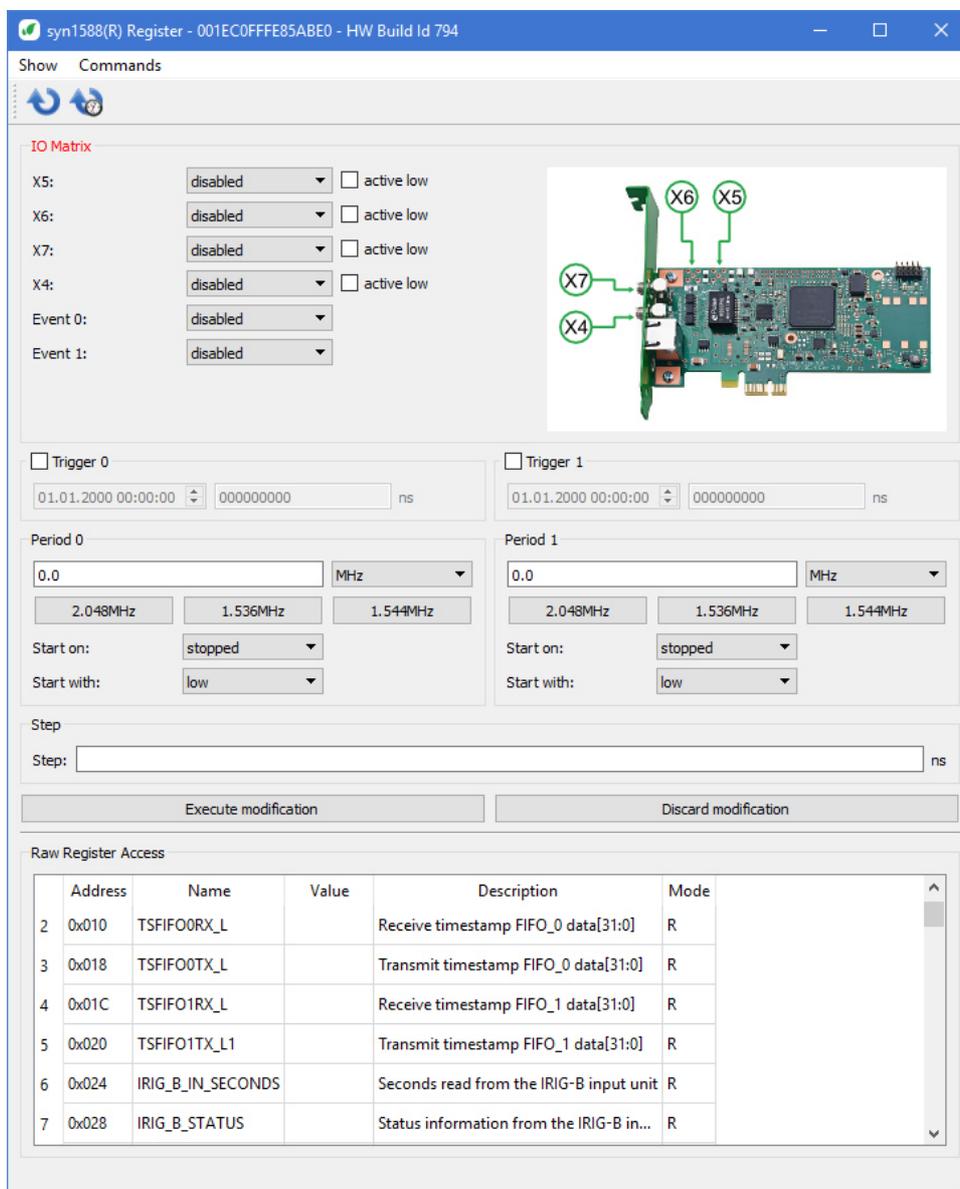


Figure 6: Register Window for syn1588[®] PCIe NIC

Starting with build 929 of the syn1588[®] PTPMMM GUI the Register Window adapts to the type and version of the syn1588[®] hardware clock selected. E.g. the syn1588[®] VIP Evaluation Board Revision 2.1 does not support an IOMATRIX function and uses a fixed IO assignment instead, as shown in the following figure. The pulldown lists for the SMA connectors are inactive.

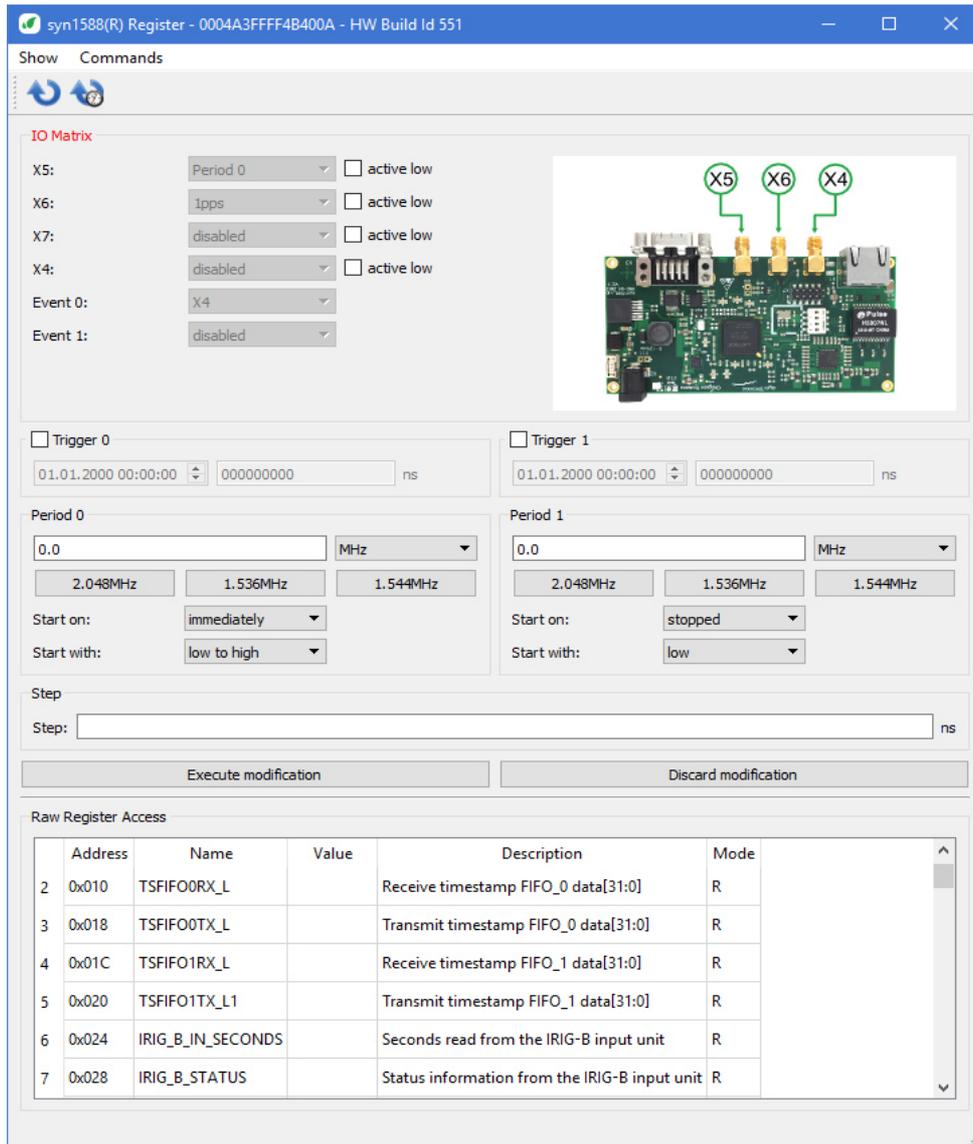


Figure 7: Register Window for syn1588[®] VIP Evaluation Board Revision 2.1

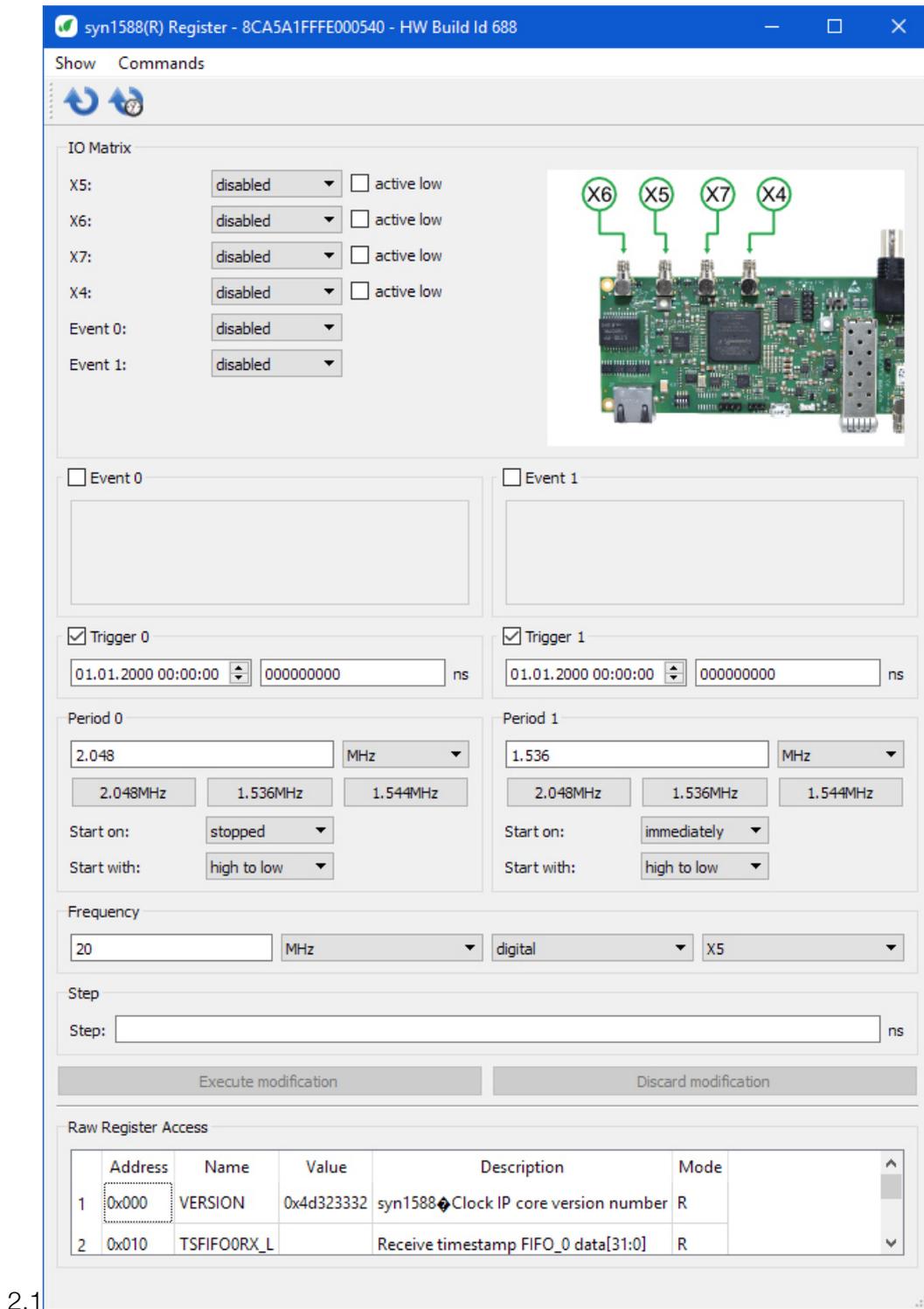


Figure 8: Register Window for syn1588® VIP Evaluation Board Revision 3

The following sub-chapters describe in detail the different sections of the Register Window.

1.5.1 I/O Matrix

In the IO Matrix section, one can see a pulldown list element for each SMA connector on the board (it depends on the type of card which connectors are available). In each pulldown list, one can choose the signal source for the output on the connector. If X4, X5, X6 or X7 are selected it means the signal will be looped through.

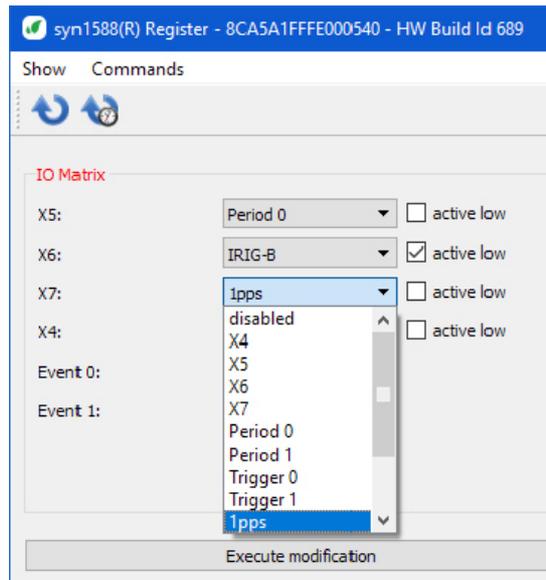


Figure 9: Register Window IO Matrix pulldown list

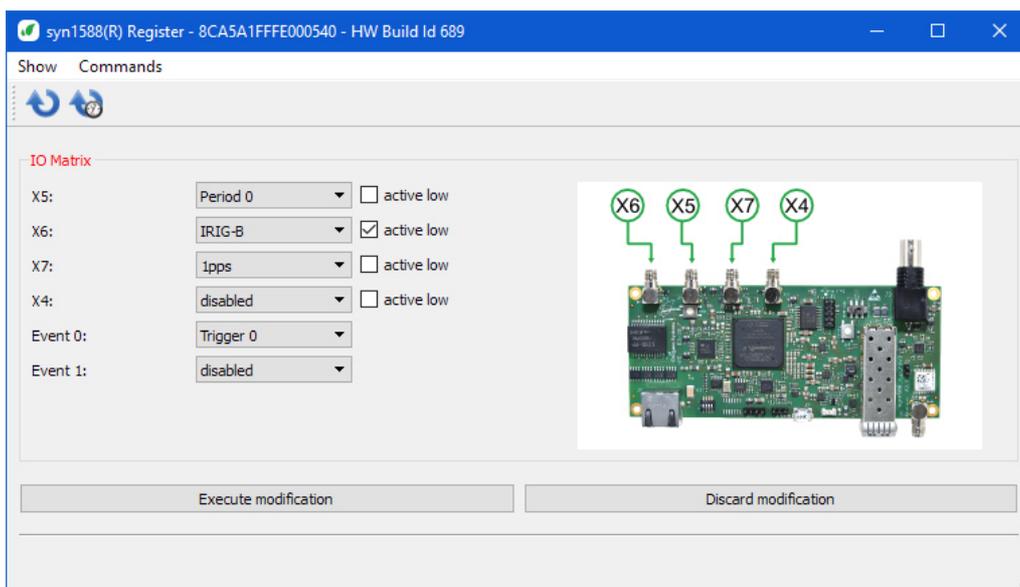


Figure 10: Register Window Section "IO Matrix"

1.5.2 Events

The Events section of the Register Window shows two message boxes: one for each event. These message boxes can be activated via a checkbox on top of them. Once the checkbox has been clicked and the modification has been executed, the events will be displayed in the message box.

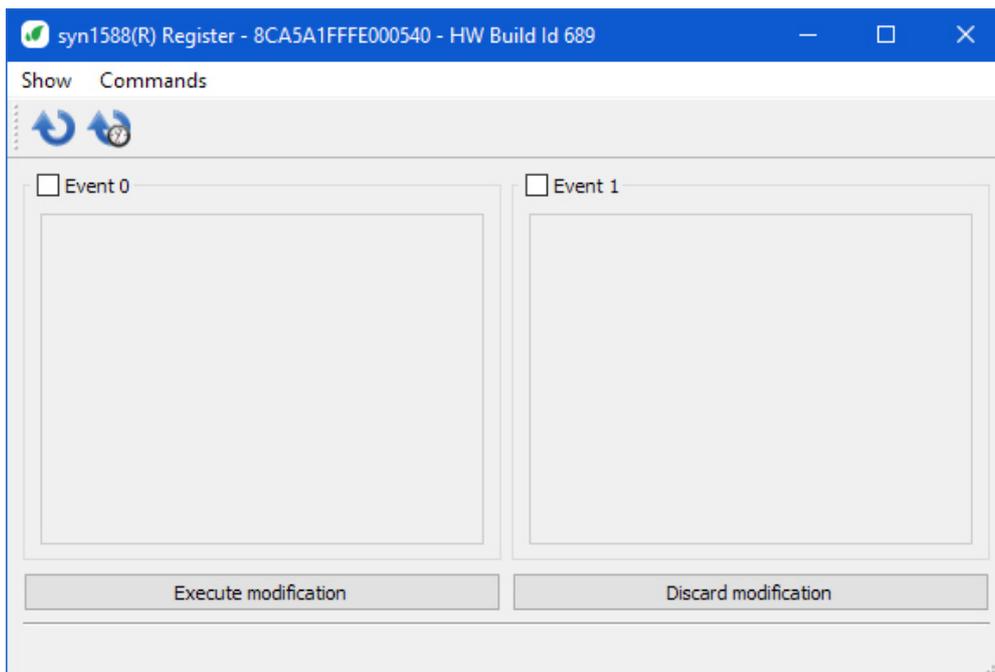


Figure 11: Register Window Section “Events”

1.5.3 Trigger

The values entered for Trigger0 and Trigger1 define the time when a trigger shall create.

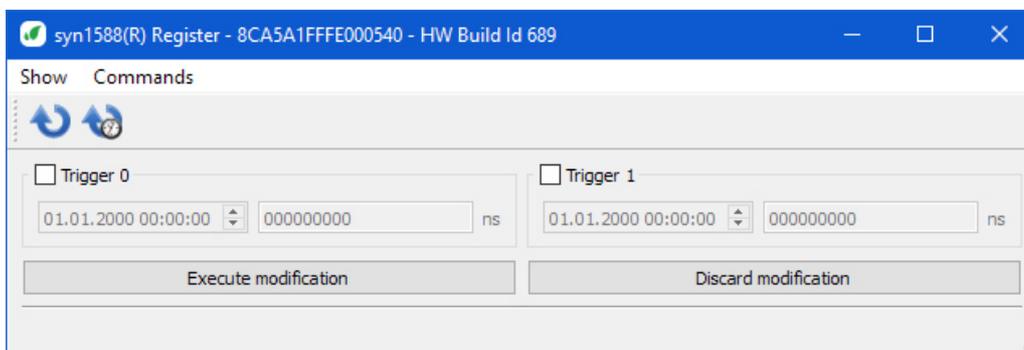


Figure 12: Register Window Section “Trigger”

1.5.4 Periods

This section allows to define the frequencies to be generated by the PERIOD function of a syn1588® clock. One has to first select the unit (mHz/Hz/kHz/MHz) prior entering the frequency value. One can even choose to enter period values instead of frequencies. The values entered for PERIOD0 and PERIOD1 are converted by syn1588® PTPMMM GUI prior being sent to the syn1588® clock.

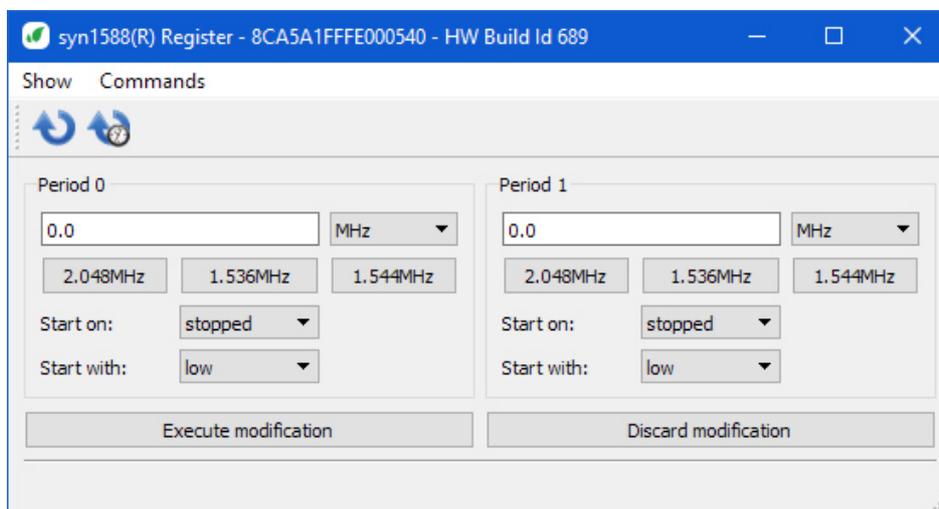


Figure 13: Register Window Section “Periods”

There are several buttons for pre-defined frequencies. Two pulldown lists allow selecting when a signal shall be started (immediately, or on trigger0 or trigger1) and how it shall start (initially low, low to high, high to low, or high).

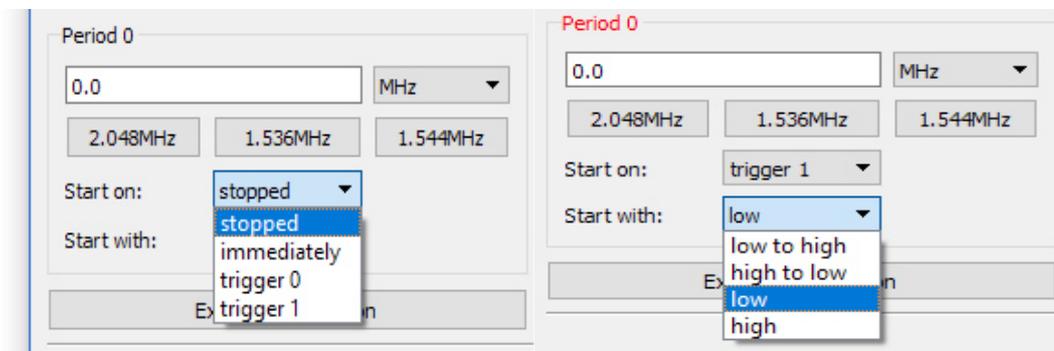


Figure 14: Register Window Section “Trigger” Start on and Start with

Once one presses the “Execute modification” button the syn1588® clock will be updated with the actual period time and configuration.

1.5.5 Frequency

This section will only be available for syn1588® PCIe NICs starting with board revision 2 and syn1588® VIP Evaluation Boards starting with board revision 3. The value entered for Frequency will be used to change the frequency generated on the specified SMA port (last parameter). One can choose if the signal is digitally generated or by using an external jitter cleaner PLL.

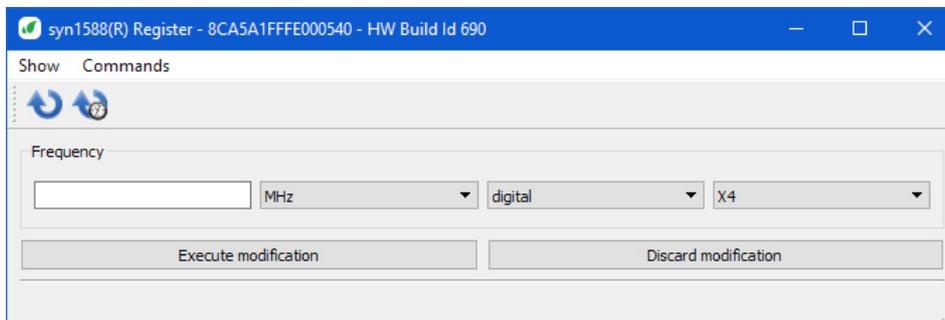


Figure 15: Register Window Section “Frequency”

Note, that using the FREQUENCY function and the PERIOD simultaneously is not allowed; an error message box will pop up.

After one executes a frequency command one has to wait approx. 30 seconds, till executing the next modification. A message box will pop up and warn about that.

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1.5.6 Step

In the Step section, one can enter the value for “Step” in nanoseconds.

Caution! Do not change this value while a syn1588[®] PTP Stack is running. Changing this value might corrupt your syn1588[®] clock!

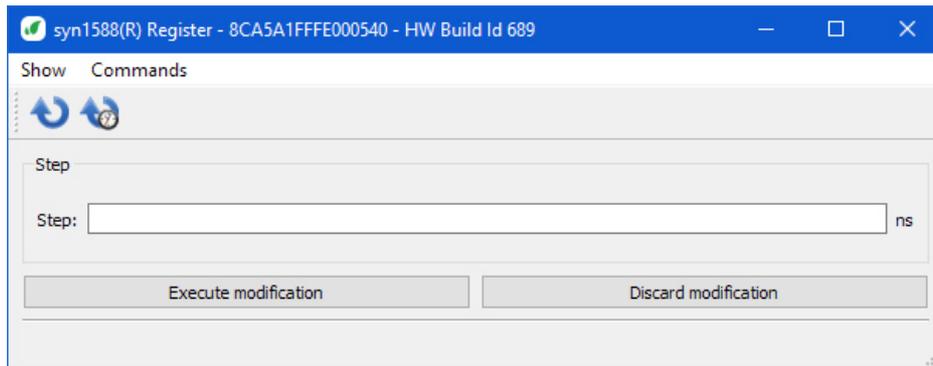
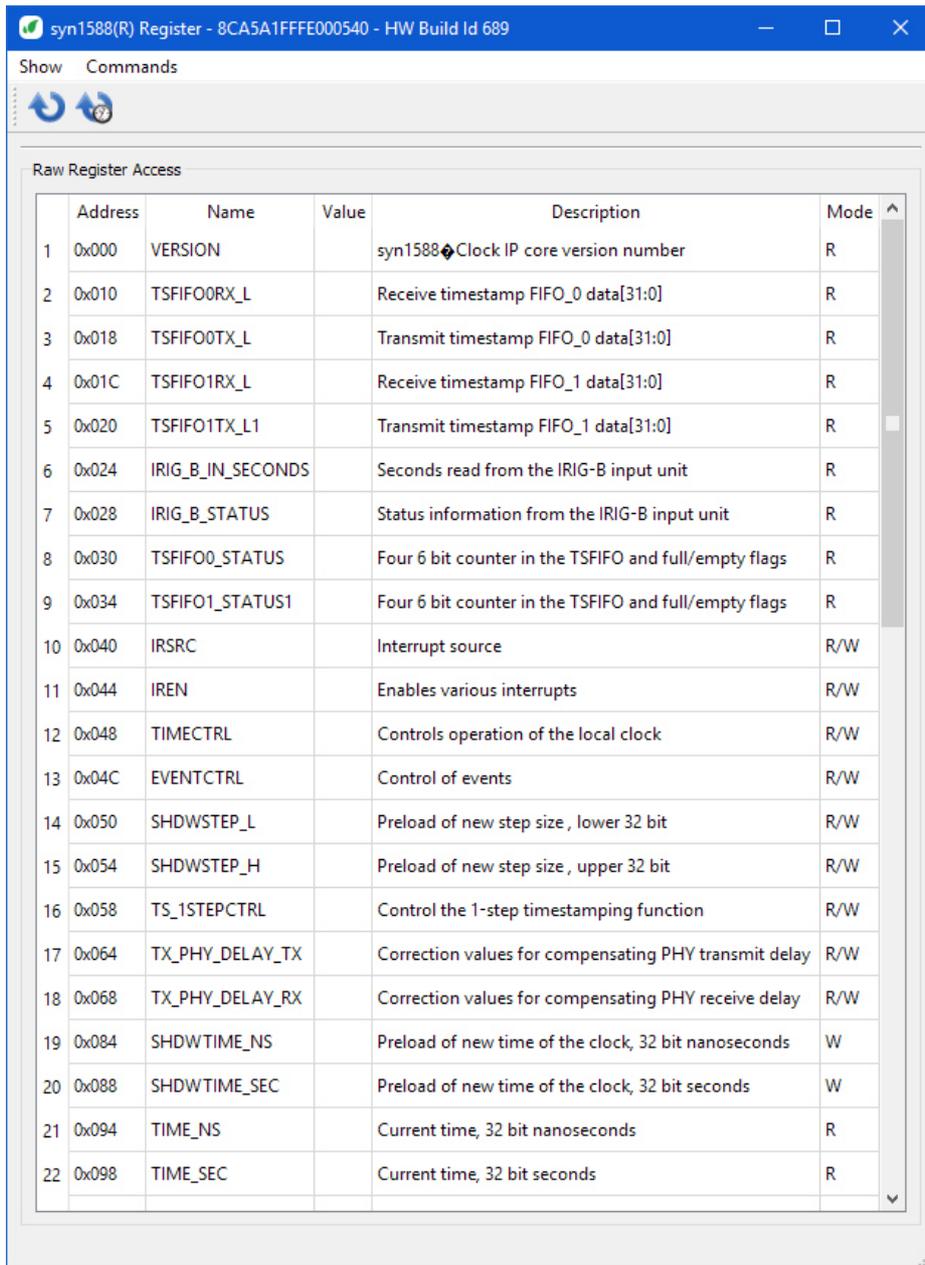


Figure 16: Register Window Section “Step”

1.5.7 Direct Register Access

One can directly read the content of any register by clicking on the corresponding field the column “Value”. Note that registers which have just the character “W” in their mode field can’t be read as they are write only registers. To write a register, double click on the value field, edit the value accordingly and hit enter. The value will be sent to the syn1588® clock immediately.



The screenshot shows a window titled "syn1588(R) Register - 8CA5A1FFFE000540 - HW Build Id 689". Below the title bar, there are "Show" and "Commands" buttons. The main content area is titled "Raw Register Access" and contains a table with the following columns: Address, Name, Value, Description, and Mode. The table lists 22 registers with their respective addresses, names, descriptions, and access modes (R for read, W for write, R/W for read/write).

	Address	Name	Value	Description	Mode
1	0x000	VERSION		syn1588® Clock IP core version number	R
2	0x010	TSFIFO0RX_L		Receive timestamp FIFO_0 data[31:0]	R
3	0x018	TSFIFO0TX_L		Transmit timestamp FIFO_0 data[31:0]	R
4	0x01C	TSFIFO1RX_L		Receive timestamp FIFO_1 data[31:0]	R
5	0x020	TSFIFO1TX_L1		Transmit timestamp FIFO_1 data[31:0]	R
6	0x024	IRIG_B_IN_SECONDS		Seconds read from the IRIG-B input unit	R
7	0x028	IRIG_B_STATUS		Status information from the IRIG-B input unit	R
8	0x030	TSFIFO0_STATUS		Four 6 bit counter in the TSFIFO and full/empty flags	R
9	0x034	TSFIFO1_STATUS1		Four 6 bit counter in the TSFIFO and full/empty flags	R
10	0x040	IRSRC		Interrupt source	R/W
11	0x044	IREN		Enables various interrupts	R/W
12	0x048	TIMECTRL		Controls operation of the local clock	R/W
13	0x04C	EVENTCTRL		Control of events	R/W
14	0x050	SHDWSTEP_L		Preload of new step size , lower 32 bit	R/W
15	0x054	SHDWSTEP_H		Preload of new step size , upper 32 bit	R/W
16	0x058	TS_1STEPCTRL		Control the 1-step timestamping function	R/W
17	0x064	TX_PHY_DELAY_TX		Correction values for compensating PHY transmit delay	R/W
18	0x068	TX_PHY_DELAY_RX		Correction values for compensating PHY receive delay	R/W
19	0x084	SHDWTIME_NS		Preload of new time of the clock, 32 bit nanoseconds	W
20	0x088	SHDWTIME_SEC		Preload of new time of the clock, 32 bit seconds	W
21	0x094	TIME_NS		Current time, 32 bit nanoseconds	R
22	0x098	TIME_SEC		Current time, 32 bit seconds	R

Figure 17: Register Window Section “Direct Register Access”

1.6 syn1588® VIP Parameter Update

The syn1588® VIP Parameter Update Window is available for syn1588® VIP clocks only. It may be invoked from the syn1588® PTPMMM GUI Main Window either via the menu “Commands -> Update syn1588 clock parameter” or by right-clicking on it. Selecting an improper clock will issue a warning. The syn1588® PTPMMM GUI is used to remotely read (GET) and write (SET) the parameters of a syn1588® VIP device. Additionally, the parameters may be written to the non-volatile memory of the syn1588® VIP (SAVE). A “Set to Factory Default” function is available as well. This parameter update feature is available for the syn1588® VIP since build version 526 (December 2011).

The syn1588® VIP Parameter Update Window offers all parameters of a syn1588® VIP node sorted in six tabs according on their function:

- syn1588® PTP Stack
- Clock Servo
- Application
- Network
- Settings
- vSync (Board Revision 3 and newer)

The procedure of changing the parameters is quite simple. First GET all parameters from the selected clock. This function is automatically performed when invoking the syn1588® VIP Parameter Update Window and can be later on invoked by pressing the “GET Parameters” button. Now the parameters may be modified.

After performing all changes, issue the SET parameter command by pressing the “Set Parameters” button. Wait until the SET command is completed. This is flagged by a dialog box that will be opened after successfully setting all parameters. Note that some parameters will be accepted immediately while others require a reboot of the clock. Please also note that setting parameters is a volatile action. If one would like to have the new parameters updated permanently, one must press the “Save Parameters” button. Now the parameters will be written into the non-volatile memory of the clock.

One may reset the values of all parameters to their factory defaults by pressing the “Set to Default” button and performing a reboot of the clock. With the “Settings”-tab one may export all parameters of a given node into a file as well as import previously saved parameters.

Please note that the update of the clock window (the main window) in the background will be temporarily slowed down or even stopped, while action in the syn1588® VIP Parameter Update Window are performed.

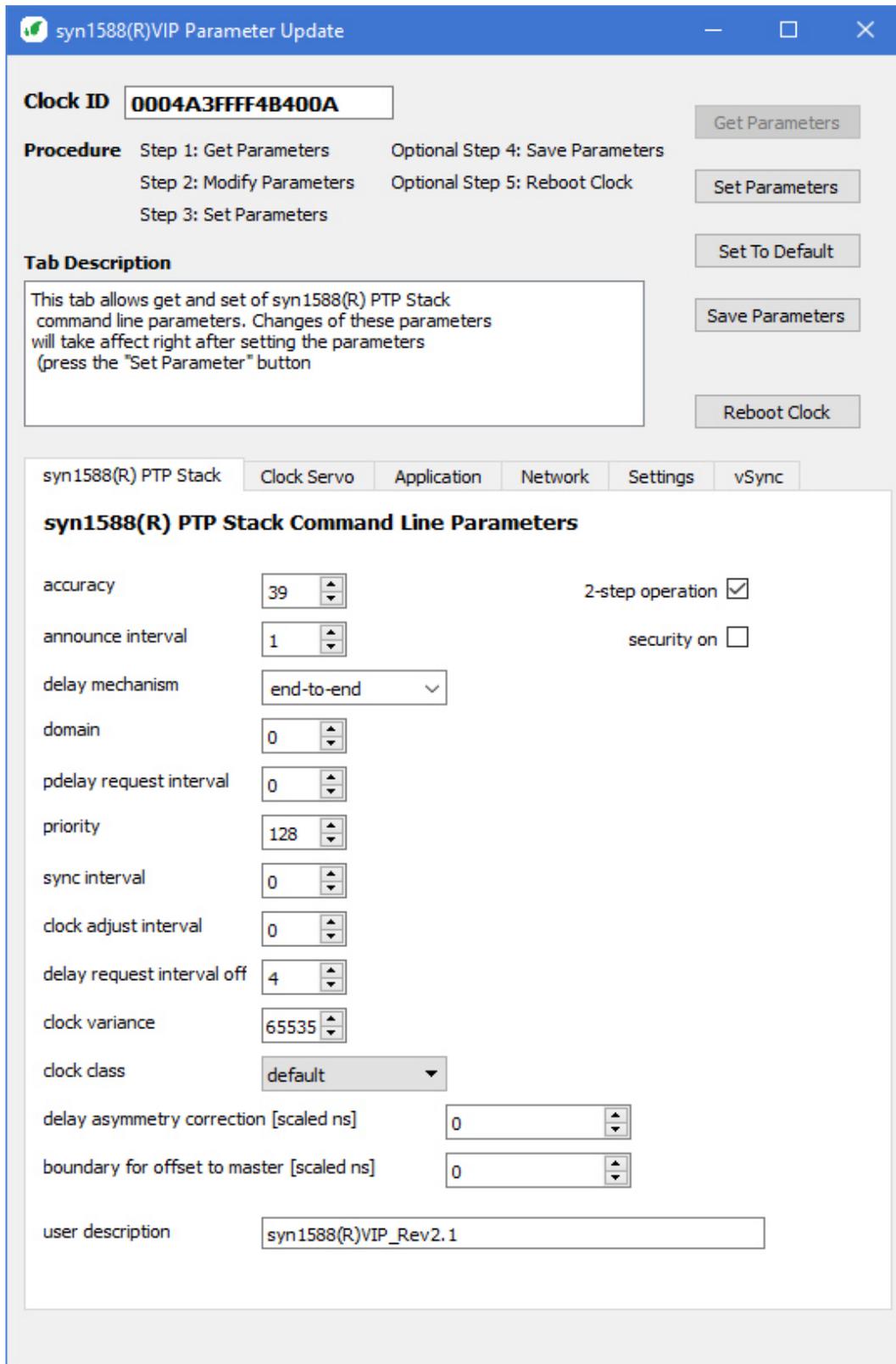


Figure 18: syn1588® VIP parameter window: syn1588® PTP Stack tab

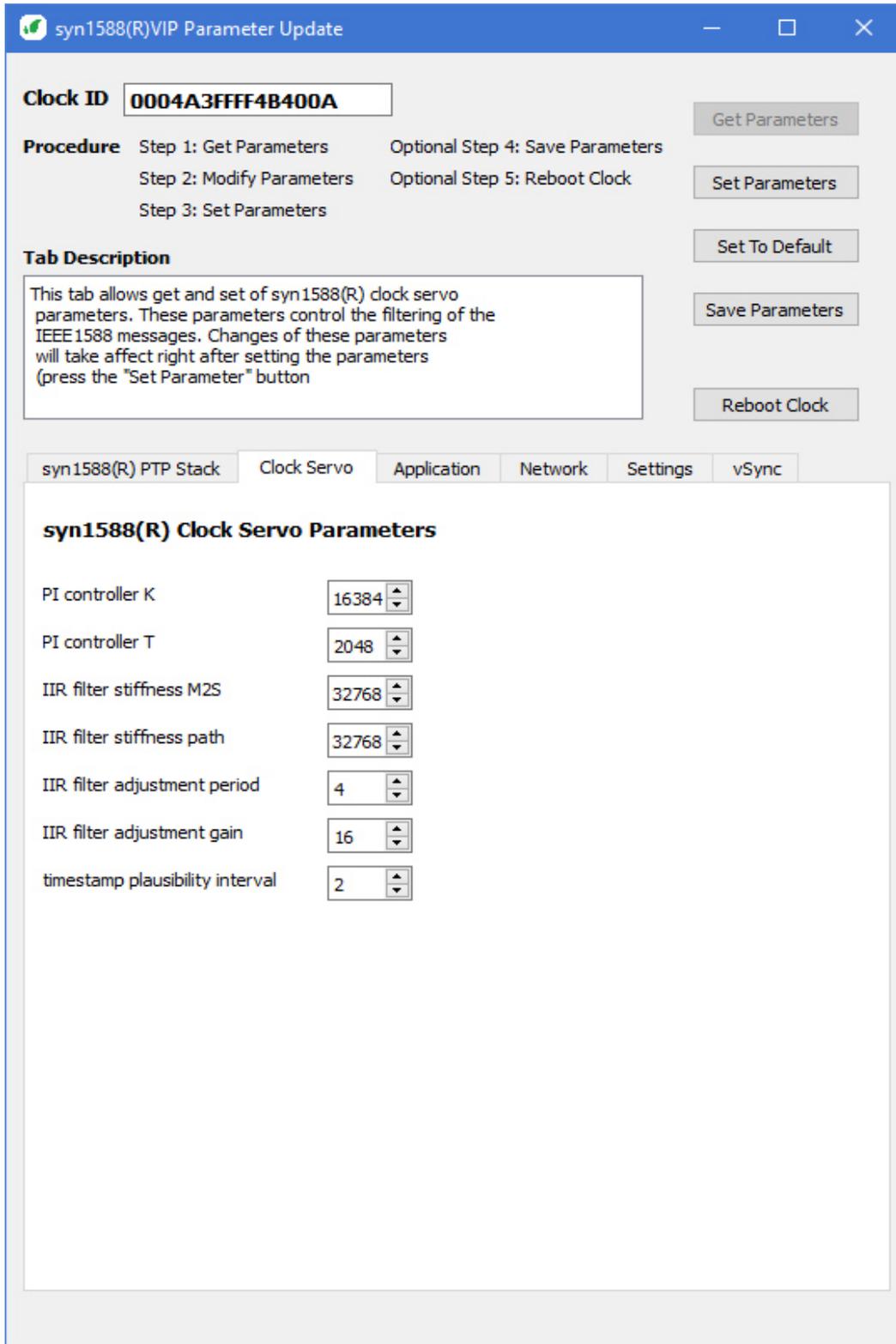


Figure 19: syn1588® VIP parameter window: Clock servo tab

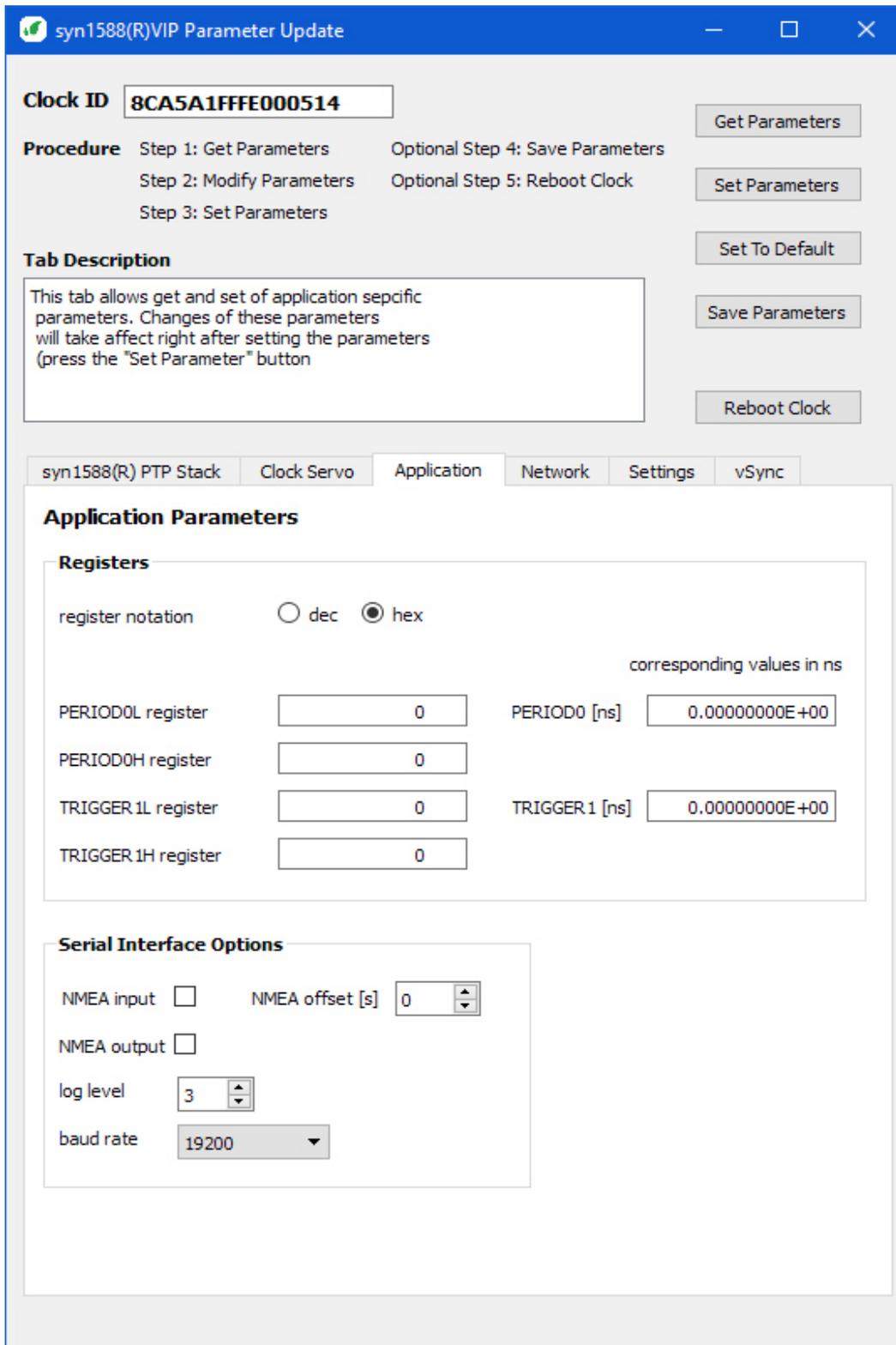


Figure 20: syn1588® VIP parameter window: Application tab

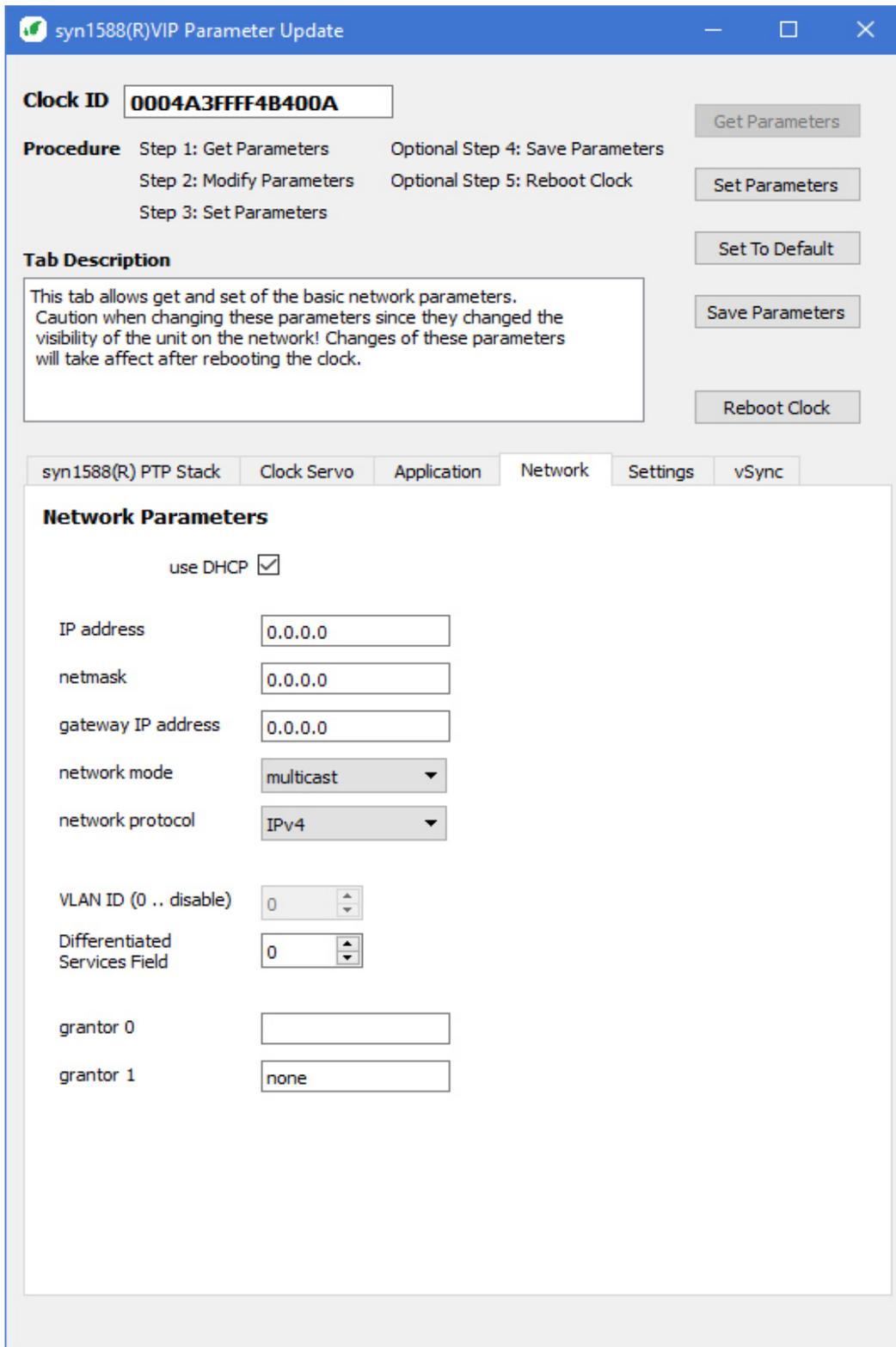


Figure 21: syn1588® VIP parameter window: Network tab

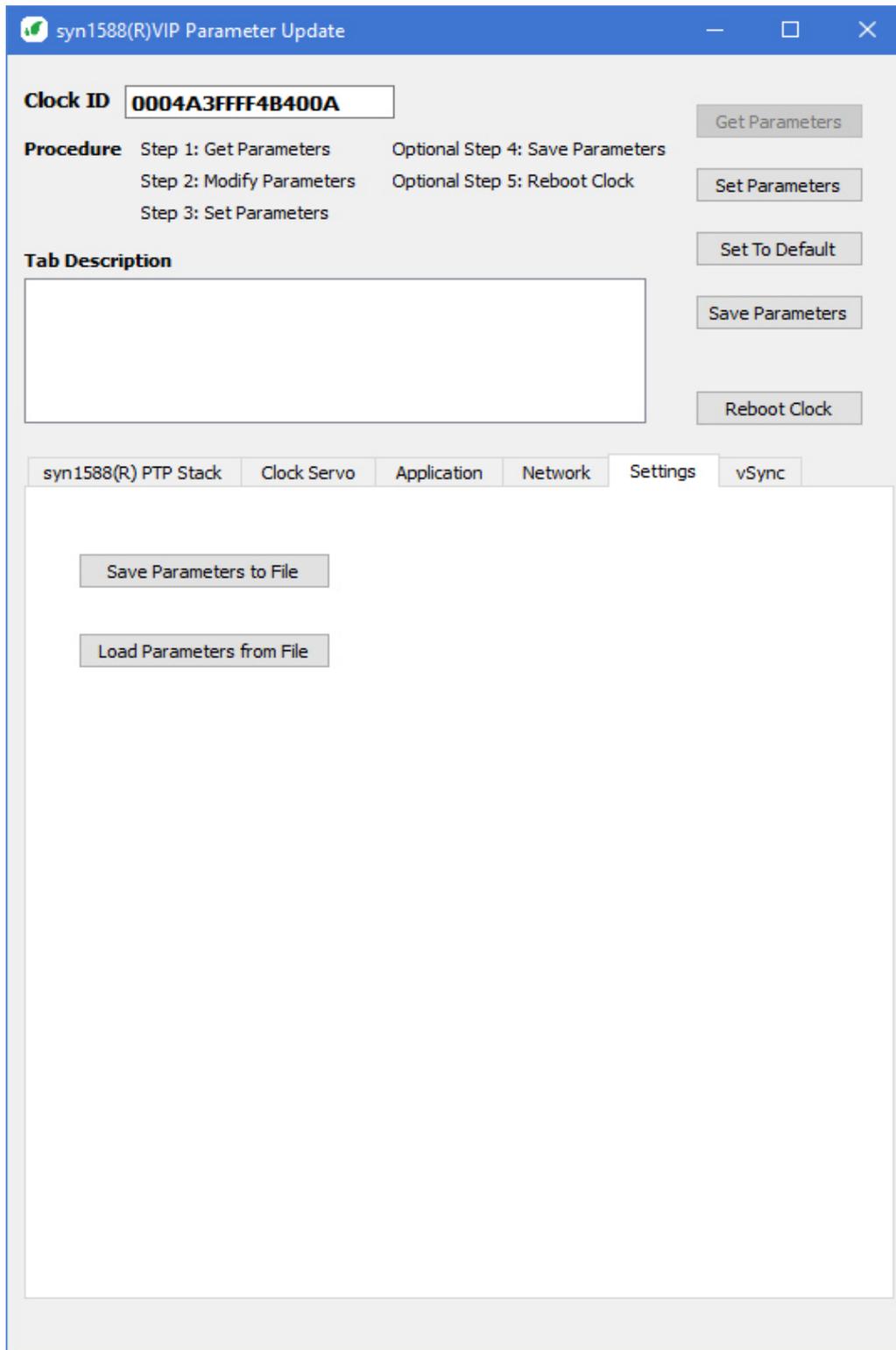


Figure 22: syn1588® VIP parameter window: Settings tab

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The vSync tab adapts to the syn1588[®] VIP Evaluation Board Revision detected. The vSync capabilities require board revision 3 or newer. For older board revisions, this tab is visible but no data can be entered or will be displayed.

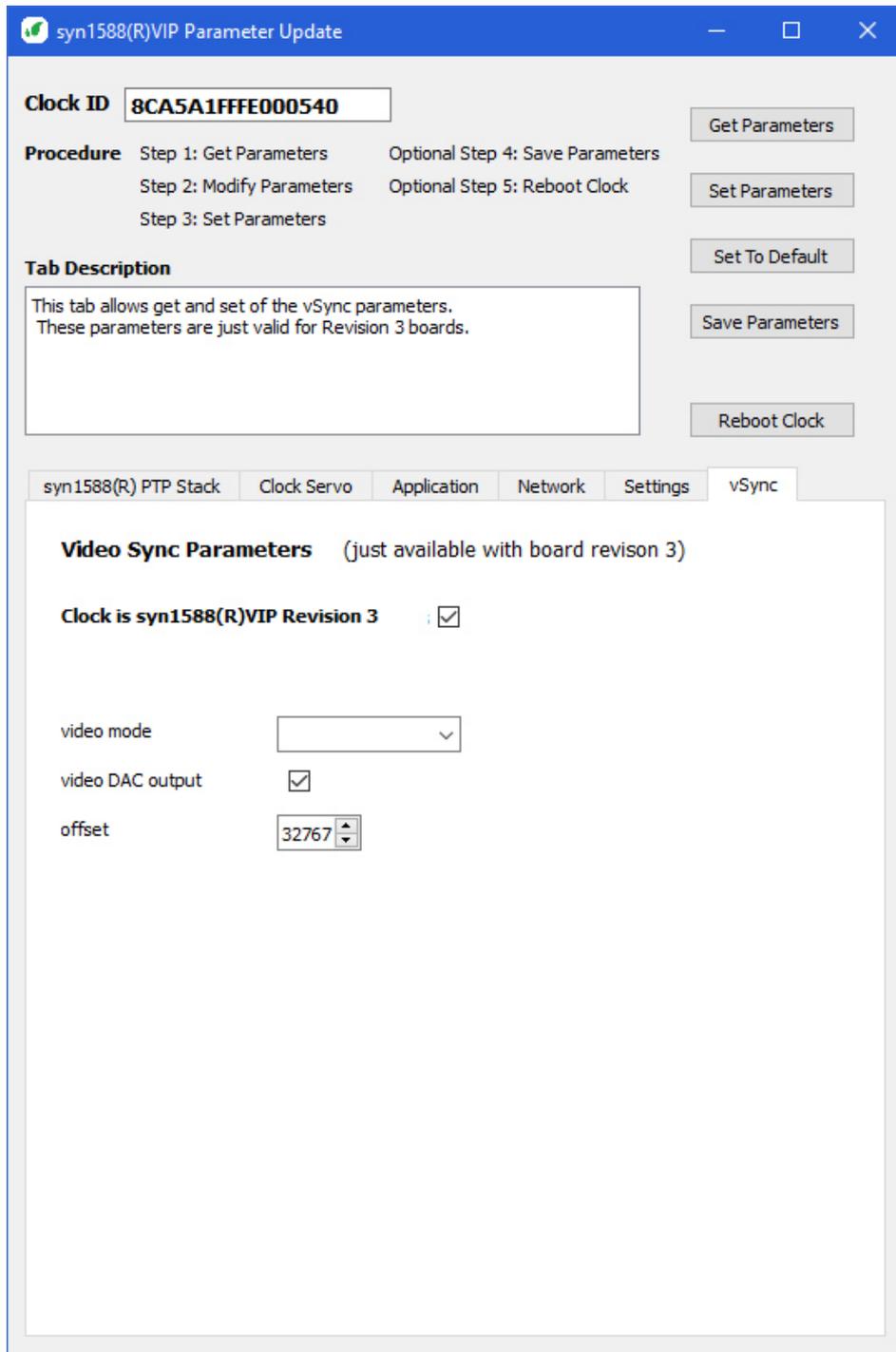


Figure 23: syn1588[®] VIP parameter window: vSync tab

1.7 syn1588® VIP Firmware Update

The syn1588® VIP Firmware Update Window is available for syn1588® VIP clocks only. It may be invoked from the syn1588® PTPMMM GUI Main Window either via the menu “Commands -> Update syn1588® VIP firmware” or by right click on a clock and select “Update syn1588® VIP firmware”. Selecting an improper clock will issue a warning.

Please note that the update of the clock window (the main window) in the background will be temporarily slowed down or even stopped, while action in the syn1588® VIP Parameter Update Window are performed.

The syn1588® PTPMMM GUI may be used to update the firmware of syn1588® VIP Evaluation Boards remotely. This firmware update feature is available for the syn1588® VIP since build version 511 (September 2011).

The firmware update process is a simple process:

- Start the syn1588® PTPMMM GUI
- Select the IEEE 1588 clock to be updated remotely. Note that currently only syn1588® VIP nodes can be updated.
- Select the menu command “Commands > Update syn1588® VIP firmware”
- A file dialog box opens asking for the BIT-file for board revision 2.1 and RPD-file for board revision 3 syn1588® VIP. That is the firmware file one has received from Oregano Systems’ support. Press the “Open” button after selecting the correct file.

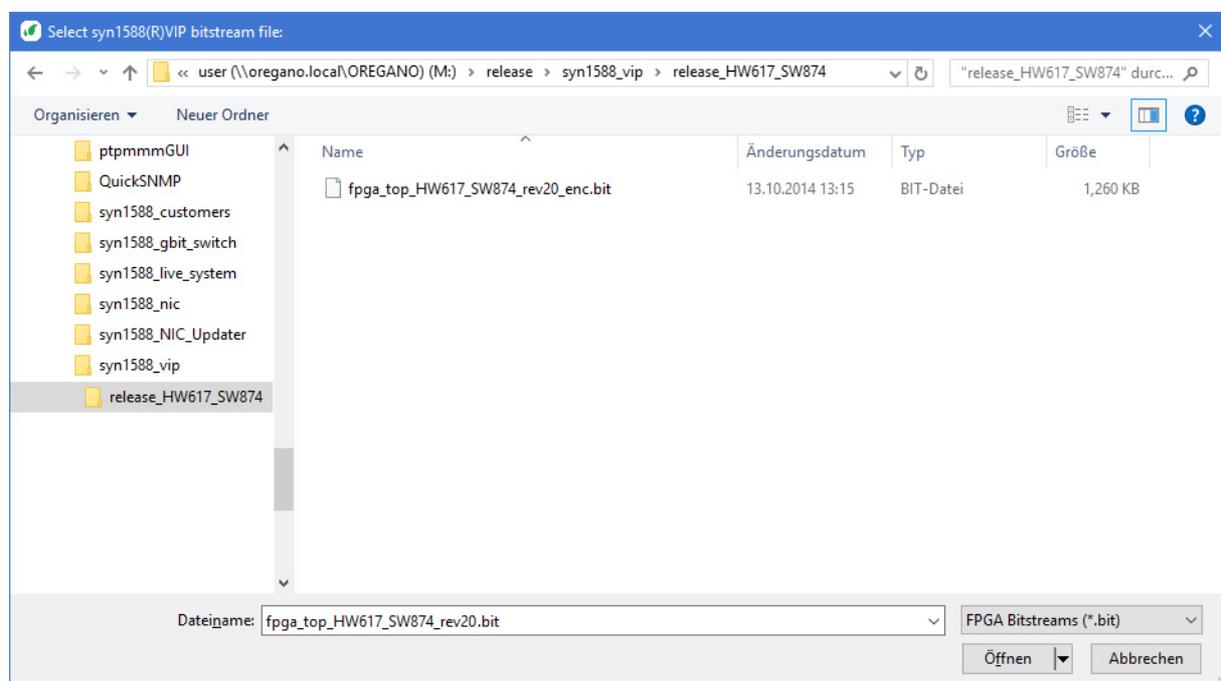


Figure 24: syn1588® VIP firmware update process: selecting the firmware file

- Another dialog box will open prompting for confirmation whether one really wants to update the selected node. Please carefully double check the CLOCKID of the selected IEEE 1588 clock.

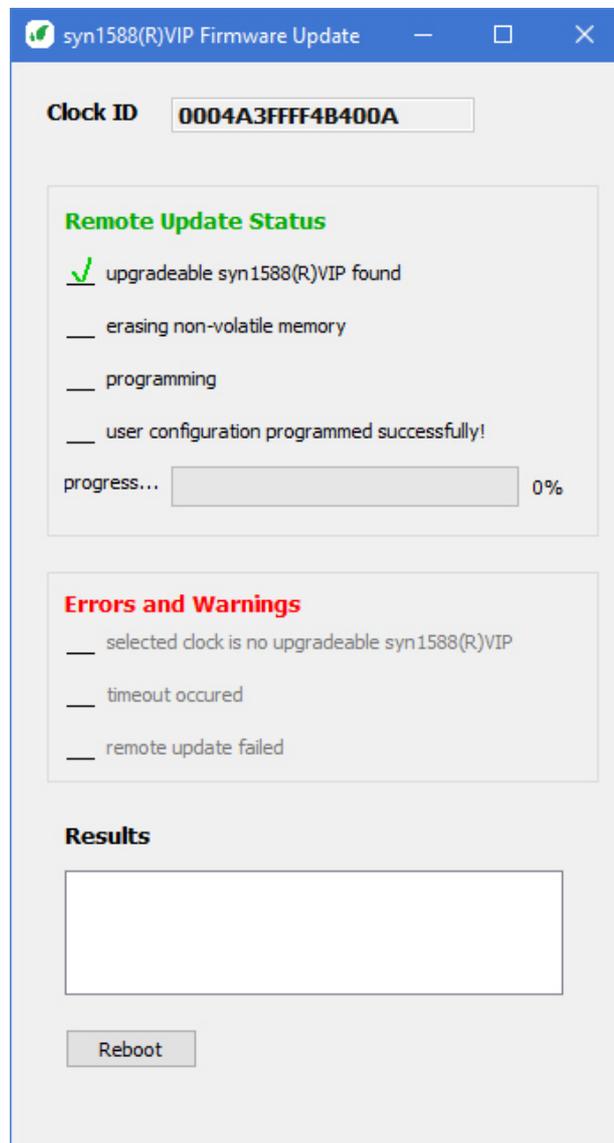


Figure 25: syn1588® VIP Firmware Update Window

- Now the firmware update process starts. The remote firmware update requires approx. 100 s for completion for board revision 2.1 devices. The firmware update process of board revision 3 devices may take up to 15 minutes. The duration depends on the size of the bit stream file, the network speed (i.e. 100 Mbit or 1000 Mbit) and the network load. Please avoid running multiple instances of IEEE 1588 management software while performing the firmware update.
- The Results sub-window give information about the final status of the firmware update

syn1588[®] PTP management software

- If the firmware update process failed (e.g. due to network interruption) please be aware that the non-volatile memory holding the firmware may be left in a corrupted state. Please re-run the remote update process immediately.
- After successful termination of the firmware upgrade push the reboot button

1.8 Network Layer 2 Mode

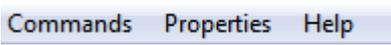
It is possible to enable network layer 2 modes in the main menu using “Properties -> Enable Network Layer 2 Mode”. This mode is available only for Linux! It is useful, for example, if one wants to examine PTP nodes operating in either of the two power profiles. PTP is directly encapsulated in a network layer 2 Ethernet header (without an IP-Header like IPv4). A notification appears whenever this mode is activated. The appearance of the syn1588[®] PTPMMM GUI remains the same.

1.9 Limitations

- Fault Log
syn1588[®] PTPMMM GUI doesn't support the PTP management command log, so it is not possible to read the fault log of a clock.

2 Features Overview

Main Window

MainToolBar 	Main Menu 	Shortcut
	Commands → Update clocks	Ctrl + U
	Commands → Update periodically	Ctrl + P
	Commands → Show clock details	Ctrl + D
	Commands → Show register window	Ctrl + R
	Commands → Show command line	Ctrl + L
	Commands → Save clock information	Ctrl + S
	Commands → Create offset log file	

Main Menu - Commands

Command	Explanation	Shortcut
Update clocks	Instantly updates the clock table	Ctrl + U
Show clock details	Display the clock details of the selected clock	Ctrl + D
Show register window	Display the register window of the selected clock	Ctrl + R
Show command line	Display underlying command line tool	Ctrl + L
Update periodically	Activate or deactivate periodical updates of the clock table	Ctrl + P
Update syn1588® clock parameter	This feature only works for syn1588® VIP clocks. It opens a new window to read and write parameters of syn1588® VIP devices.	
Update syn1588® VIP firmware	This feature only works for syn1588® VIP clocks. It is used to update syn1588® VIP devices remotely.	
Save clock information	Dump all datasets of all clocks into a CSV file	Ctrl + S
Create offset log file	Log offset of all clocks into a tab separated values file.	
Start syn1588® PTPMMM GUI logging	Save all the communication between syn1588® PTPMMM GUI and syn1588® PTPMMM GUI in a log-file	
Change Network Interface	Select the network interface. Prompted the very first time one starts the application.	
Close application	Exits the syn1588® PTPMMM GUI	Ctrl + E

Main Menu - Properties

Command	Explanation	Shortcut
Select table columns	It is possible to select and hide the columns in the clock table through selecting or deselecting the checkbox in the "Select Columns" - window	
Set update period	To change the update period of the clocks in the table enter an update interval in seconds. Values from 1 to 5000 seconds are possible. By default the information shown in the table is updated every three seconds.	
Set Max Offset Threshold	One can enable the monitoring of the offset between a slave and its master clock by setting a maximum offset threshold	
Reset Max Offset Field	Reset the Max Offset field of all clocks to zero	
Set IEEE 1588 Clock Domain	A dialog field will appear and prompt to enter a domain. It is possible to enter a domain value from 0 to 255.	
Enable network layer 2 mode	This feature is only available for Linux	

Main Menu - Help

Command	Explanation	Shortcut
About	Get more information about the version and build of the syn1588® PTPMMM GUI	
Open User Guide	Open this document, to get a detailed description of the software's features.	

3 Frequently Asked Questions

3.1 Which operating systems are supported?

The syn1588[®] PTPMMM GUI is available for Windows and Linux OS.

3.2 I can't find my clock in clock list?

Please note that structurally the syn1588[®] PTPMMM GUI cannot display IEEE 1588-2008 clock information of the same node. If one's computer acts as an IEEE 1588-2008 node please invoke the syn1588[®] PTPMMM GUI on a different computer.

Please also check the IP settings of both the nodes in the network as well as on the host executing the syn1588[®] PTPMMM GUI. The IEEE 1588-2008 clocks have to be visible in terms of IP communication to this host.

The syn1588[®] PTPMMM GUI uses the management messages defined in the IEEE 1588-2008 standard. If one's IEEE 1588-2008 nodes do not support this communication they will not show up.

3.3 I can't find IEEE 1588-2002 nodes on the network?

The syn1588[®] PTPMMM GUI as well as its GUI fully support IEEE 1588-2008 standard. The old IEEE 1588-2002 version of the IEEE 1588 standard is not supported.

Please also check if the right interface has been selected. The selected interface should be in the same broadcast domain as the IEEE 1588-2008 clocks targeted.

Use "Commands - > Change Network Interface" to change the network interface.

3.4 There are no clocks found on the network?

On some systems, a firewall is active and blocks incoming IEEE 1588 PTP traffic. The firewall either needs to be deactivated or a forwarding rule for UDP port 319 and UDP port 320 needs to be configured.