



syn1588<sup>®</sup>

# syn1588<sup>®</sup> PCIe NIC - Revision 2.3

Brief Data Sheet

Version 3.1 – January 2023

## Features

- 100/1000 Mbit Ethernet network interface card
- PCI Express card (half height)
  - PCI Express Revision 2.0 (5 Gbit/s lane speed)
- compliant to IEEE1588-2002/2008/2019
- Master and Slave capable PTP Node (with syn1588<sup>®</sup> PTP Stack)
- IEEE1588 hardware timestamping
- Patented on-the-fly timestamping (1-step mode)
- Clock accuracy up to  $\pm 4$  ns
- syn1588<sup>®</sup> PTP Stack binary run-time license included (Linux & Windows)
- Up to 4 programmable I/O signals available on SMA jacks
- Connectivity to an external GPS receiver via the 1PPS input and RS232 port of the host PC
- Drivers for Linux & Windows
- User configuration, remotely upgradeable
- Timestamping of arbitrary packets via user configurable packet filter engines

## Options

- Oscillator option: OCXO
- External clock input driving the syn1588<sup>®</sup> clock signal



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The syn1588<sup>®</sup> PCIe NIC is a standard 100/1000 Mbit PCI Express Ethernet network interface card with enhancements to provide highly accurate clock synchronization via the IEEE1588 standard. The syn1588<sup>®</sup> PCIe NIC provides all real-time functions required for an IEEE1588 node to operate both in master and slave mode.

The revision 2.3 of the syn1588<sup>®</sup> PCIe NIC had been designed to adjust to the excessive lead times of electronic components; e.g. there is just a SFP version. New local oscillators, both TCXO and OCXO, had been chosen to allow even higher accuracies..

The syn1588<sup>®</sup> PCIe NIC comes with the network driver and a run-time license of the syn1588<sup>®</sup> PTP Stack. The latter performs all IEEE1588 tasks like master/slave selection via the best master clock algorithm. Both driver and stack are available for Linux and Windows.

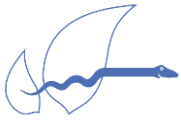
Furthermore, the syn1588<sup>®</sup> PCIe NIC may operate either in 2-step or 1-step PTP mode using Oregon Systems' patented on-the-fly time stamping technique for the latter mode.

The syn1588<sup>®</sup> PCIe NIC is capable of handling up to four high accuracy digital IO signals directly linked to the high accuracy clock within the FPGA device. The direction and functions of these I/O signals may be selected by the user via a remote configuration interface. The options for these signals are:

- **1PPS output** A rising edge is generated once every second.
- **1PPS input** Used to link to an external GPS timing receiver that supplies absolute time reference for grand master applications.
- **EVENT input** A signal transition of an external signal (e.g. a sensor value reaching a threshold) will be time stamped using the high accuracy clock.
- **TRIGGER output** A single event (change of signal state) at a programmable time derived from the high accuracy clock.
- **PERIOD output** An arbitrary, user selectable frequency derived from and phase locked to the high accuracy clock with a resolution of 0.0001 Hz may be generated
- **IRIG-B output** Optionally an IRIG-B000 output signal is generated instead of the 1PPS signal.

The syn1588<sup>®</sup> PCIe NIC offers two additional user configurable packet filter engines allowing to generate highly accurate time stamps upon receiving or transmitting of an arbitrary class of Ethernet messages.

The default oscillator is a high-quality TCXO. An on-board high performance analog PLL allows generation of synchronized, high quality single ended clock frequencies up to 156.25 MHz. The card can be ordered with standard copper SFP transceiver modules or with fiber short range or long range modules.



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Technical Specifications	
Standards	IEEE802.3-2008 IEEE802.1Q Virtual Bridged Local Area Networks IEEE1588-2002, IEEE1588-2008, IEEE1588-2019 Precision Time Protocol PCI Express interface & signaling V1.1a and V 2.0
Installable PCI slot	PCI Express 1/2/4/8/16 lane slot
Supported functions	Programmable hardware timestamp IEEE1588 compatible high precision hardware clock Up to 4 programmable SMA I/Os
Storage temperature	-40°C to 85°C
Operating temperature	0°C to 50°C
Humidity	5% to 80% non-condensing
Dimension	135 x 66,4 mm, half height PCI card with bracket
Driver support	Linux kernel version 2.6.32 to 5.15 Microsoft Windows Server 2008 (32/64 bit) <sup>1</sup> Microsoft Windows Server 2012 (32/64 bit) <sup>1</sup> Microsoft Windows Server 2016 Microsoft Windows 7 (32/64 bit) <sup>1</sup> Microsoft Windows 10 (32/64 bit) <sup>1</sup> Microsoft Windows 11 (64 bit) <sup>1</sup>

Note (1) there is no support for signed drivers for these OS versions. One has to disable secure boot to use the driver on these OS versions. Windows 7 users might need to install KB3033929.



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