Exablaze
High Precision Timestamping

"Now in Picoseconds"

Exablaze is the leading provider of application-intelligent networking I/O software and hardware that accelerate, monitor and secure network data. Their products are utilized in many of the most demanding scale-out compute environments in the world.

Why is High Precision Timing Critical?

Performance of the market-leading low-latency NICs and switches has moved ahead of current time-keeping technology. While Ethernet Layer-2 switching latency has been achieved at under 100 nanoseconds, until now users couldn't measure or verify these levels, and buyers of low-latency networking hardware couldn't measure performance accurately, without highly specialized equipment.

With the ExaNIC X10-HPT, users can generate latency histograms with much finer accuracy than ever before. Exablaze's new High Precision Timing technology has improved the accuracy of measuring the time between events by more than an order of magnitude over existing technologies: from single digit nanoseconds to 250 picoseconds. That's the time it takes for a light signal to travel 5 centimetres (2 inches) through an optical fibre.

The ExaNIC X10-HPT allows Exablaze to measure and verify the performance statistics of our own range of products, and allows customers to verify the performance of all the devices in their critical network infrastructure.

Where is High Precision Timing Critical?

The key areas range from High Frequency Trading (HFT) and High Performance Computing (HPC) to enterprise security, large data centres, telcos and defence operations. The US Securities and Exchange Commission (SEC) is now demanding more accurate time stamping from High Frequency Traders, and asking them 'what happened in that millionth of a second or another' says Kris Peterson, CTO of AlgoSpan. The European Securities and Markets Authority (ESMA) is about to introduce its stringent new MiFID II regulations that specify synchronization of high-frequency trading systems to within 100μs of UTC with 1-μs precision granularity

Precision time stamps are essential for data centres processing data for many clients, in case of events that require forensic analysis. Precision time stamps are also crucial for vendors and users of HPC systems, for accurate performance analysis across the vast array of networked components. Precise timestamps are also mandatory for in-depth audits of critical security events, where log file accuracy and time-synchronization accuracy across systems are essential for forensic investigation.

Synchronising Time Across the World

Correlating events or resolving data conflicts in today's networks has become a huge challenge, given their complexity and the physical distances involved. The GPS time server has long offered a reliable way to synchronize networks, in conjunction with precision timing data from GPS satellites. Exablaze can now synchronize absolute time via GPS, provide nanosecond resolution time stamping, and produce event-based differential timing with 250 picosecond resolution.

Exablaze already makes low-latency NIC cards such as the ExaNIC X10 that also serve as Precision Time Protocol (PTP) Grandmasters. Onboard GNSS receivers (GPS & GLONASS) ensure tight synchronisation of the onboard oscillator to UTC time from anywhere on the globe. During holdover (when GPS time is lost temporarily), an onboard OCXO oscillator or an optional CSAC atomic clock serves as a time reference for the PTP network.

The ExaNIC X10-HPT supports the same driver stack as the ExaNIC X10 and can simultaneously be utilised as a standard low latency network card. This breakthrough means that High Precision Timing and Ultra Low Latency performance can finally work hand in hand.
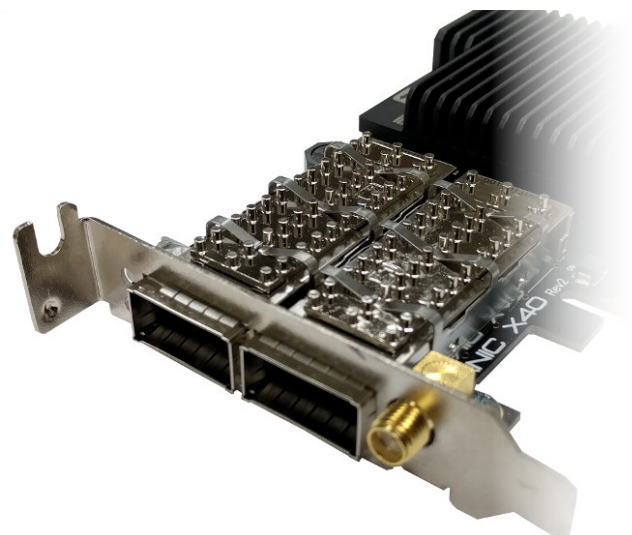
EXABLAZE

Exablaze
Network Interface Cards

Exablaze offer innovative, comprehensive 10G & 40G low-latency Ethernet solutions for a wide range of applications and industries including financial services, high-performance computing, entperprise security, cloud networking and virtualization.

Exablaze Server I/O Adaptors

Model	40GbE	10GbE	# of Port(s)	PCIe x Performance	Connector	Highest Clock Speed	Time-stamping	IEEE 1588 Support (PTP)	Oscillator	PPS Bracket
ExaNIC x10		✔	2@10GbE	8.0GT/s (Gen3)	SFP+		6.2ns	Hardware Assisted	TCXO Option	3.3v SMA In/Out
ExaNIC x10 GM		✔	2@10GbE	8.0GT/s (Gen3)	SFP+	✔	4.0ns	Hardware Assisted	OCXO	3.3v SMA In/Out
ExaNIC x40	✔	✔	8@10GbE 2@40GbE	8.0GT/s (Gen3)	QSFP+	✔	6.2ns	Hardware Assisted	TCXO Option	3.3v SMA In/Out
ExaNIC x10 HPT		✔	2@10GbE	8.0GT/s (Gen3)	QSFP+	✔	0.25ns	Hardware Assisted	OCXO	3.3v SMA In/Out

Port-2-Port Latencies

Model	FPGA FDK	60 Byte Raw-Median TX Buffer	60 Byte Raw-Median	300 Byte Raw-Median	14 Byte UDP-Median	300 Byte UDP-Median	12 Byte Raw-Median	300 Byte Raw-Median
ExaNIC x10	70ns	710ns	780ns	1.0µs	880ns	1.2µs	930ns	1.2µs
ExaNIC x10 GM	-	710ns	780ns	1.0µs	880ns	1.2µs	930ns	1.2µs
ExaNIC x40	70ns	730ns	800ns	1.02µs	900ns	1.22µs	950ns	1.22µs
ExaNIC x10 HPT	70ns	710ns	780ns	1.0µs	880ns	1.2µs	930ns	1.2µs

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