# ExaNIC **X2/X4**
ULTRA LOW LATENCY NETWORK INTERFACE CARD

## ULTRA LOW LATENCY NETWORK INTERFACE CARD

**The ExaNIC is a 10Gbps PCI Express network card interface card specifically optimized for low latency environments.**

While initially conceived and built for use in latency-sensitive financial applications such as high frequency trading, the ExaNIC has appeal that extends to any environment where latency is key.

## INDUSTRY-LEADING LATENCY

**Designed from the ground up to minimize latency, the ExaNIC delivers record-breaking performance numbers.**

On our Intel Sandy Bridge test system, latency from application to network to application is under a microsecond for small packets, which is significantly better than competing network cards on the same hardware. UDP and TCP latencies are as low as 1.1 microseconds for small payloads.

## EASY TO USE

**In addition to a standard Linux driver, a transparent TCP and UDP acceleration library is included, as well as a library for low-level access.**

A transparent socket acceleration library allows applications to benefit from the low latency of kernel bypass, in most cases without modifications to the applications. For the most latency-sensitive applications, a library called 'libexanic' allows direct low-level access to the ExaNIC hardware and includes simple functions for sending and receiving Ethernet frames. With the optional firmware development kit, it is even possible to extend the ExaNIC firmware and add your own logic to the onboard FPGA.

## ADVANCED CAPTURE AND TIMESTAMPING

**Flow steering delivers packets to the right application's receive buffer, while flow hashing distributes packets across multiple CPU cores for demanding capture applications. Built-in timestamping functionality records each frame's arrival time to a granularity of 6.2ns**

These timestamps are available through the API and through a capture utility which can write tcpdump-compatible capture files. Additionally, the ExaNIC has a Pulse-Per-Second (PPS) input which can be used to synchronize the ExaNIC clock with a PPS source such as a GPS receiver, allowing users to meaningfully compare captured timestamps across multiple servers and geographic locations.

## BUILT–IN BRIDGING AND PORT MIRRORING

**The ExaNIC includes integrated support for bridging, which can further reduce latency by hundreds of nanoseconds, as well as port mirroring, which enhances network visibility.**

Normally sharing an upstream connection between multiple servers would necessitate introducing a switch. The bridging feature allows the most latency critical server to be directly connected to the upstream connection. Packets not destined for the local server can be bridged to a second port, transparently and with low latency. This port could be connected to a backup server or to a downstream switch.

The ExaNIC also has a port mirroring feature which allows incoming and/or outgoing packets to be replicated to a monitor port - for logging, audit, debugging or latency analysis - with no performance overhead and without requiring physical reconfiguration of the network.

An external power input can be used to guarantee that the bridging and port mirroring features continue to operate even if host power is lost.

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ExaNIC X2


ExaNIC X4

## PERFORMANCE

Typical latency, raw frames: (See Note 1)
- 60 bytes: 950ns
- 300 bytes: 1.2μs

Typical latency, UDP: (See Note 2)
- 12 bytes: 1.1μs
- 300 bytes: 1.4μs

Typical latency, TCP: (See Note 2)
- 12 bytes: 1.1μs
- 300 bytes: 1.4μs

## GENERAL

Form factor:
- X2: Half-height PCI Express card
- X4: Full-height PCI Express card

Ports:
- X2: 2 SFP+, PPS and power
- X4: 4 SFP+, PPS and power

Data rates:
- 10 Gigabit Ethernet, 1 Gigabit Ethernet

Supported media:
- Fiber (10GBASE-SR, 10GBASE-LR, 1000BASE-SX), Copper (10GBASE-T, 1000BASE-T), SFP+ Direct Attach

Host interface:
- PCIe x8 Gen 2.0 @ 5.0 GT/s per lane

Operating system:
- Linux (all distributions)

## TIMESTAMPING

Timestamp resolution:
- 6.2ns

Timestamp availability:
- all received frames, most recent transmitted frame

Time synchronization:
- Host, PTP, optional PPS

PPS input:
- RS-422, RS-232, TTL

## OTHER FEATURES

Bridging:
- Optional forwarding between ports 1 and 2, latency <170ns

Port mirroring:
- Ports 1-3 transmit/receive individually selectable for mirroring to port 4 (X4 only)

Flow steering:
- 128 IP rules per port
- 64 MAC rules per port

Backup power input:
- 12V DC

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### Notes

1. Latencies are median latencies for raw frames via the libexanic library, on a 2.9Ghz Intel Sandy Bridge processor.
2. Latencies are median latencies for the sockperf benchmark using the ExaSock socket acceleration library. More information about benchmarking methodology is available on request.

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