

## Product Brief

### NetEffect® Server Cluster Adapter

Network Connectivity

# NetEffect® Server Cluster Adapters

## Low-latency 10 Gigabit Ethernet adapters for high-performance apps

Intel®'s NetEffect Server Cluster Adapters provide accelerated 10 Gigabit Ethernet processing to benefit some of the most demanding and latency-sensitive applications, including high performance computing (HPC) clustering and financial market data systems. The product line is optimized for scalability to take advantage of the multi-core environments typically used with these high performance computing applications.

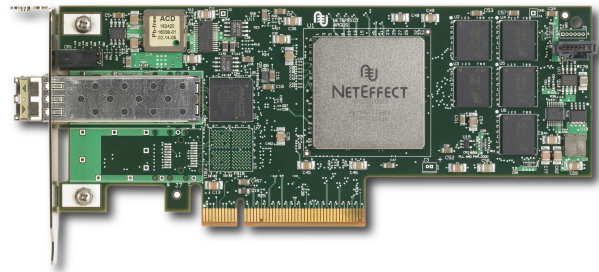
Powered by the second-generation of accelerated 10 Gigabit Ethernet technology, the NetEffect NEO20 network controller provides the protocol processing required to deliver the low-latency, scalable performance that is required.

### iWARP and Kernel-Bypass

The NetEffect Server Cluster Adapters support iWARP, or internet Wide Area RDMA Protocol. iWARP provides a low-latency, kernel-bypass solution on Ethernet by using RDMA (Remote Direct Memory Access) semantics. RDMA enables a remote memory capability that can be abstracted to various application APIs. iWARP is built on top of the TCP/IP protocol and therefore provides datacenter-compatible connectivity using standard network infrastructures. And it works on the standard IP-based management software and standard Ethernet-based switches used in datacenters today.

Kernel-bypass (or OS-bypass) is a key element of iWARP because of the RDMA semantics. But kernel-bypass can be utilized without iWARP. The NetEffect Server Cluster Adapters support a mode that implements the bypass operation without the RDMA protocol. This enables standard APIs, like UDP sockets, to be used with existing applications while also benefiting from latency improvements of kernel-bypass.

Both of these modes of operation provide lower latency and more deterministic latency jitter. The end result is a more efficient network implementation that delivers more performance to the application.



Multiple media types are supported:

Connector Type	Interconnect Cabling	Maximum Distance	Notes
CX4	Twinax CX4 Cables	12 meters	Copper
SFP+	850 nm Multi-mode Fiber	300 meters	Requires Fiber Optic transceiver
	Twinax Direct Attach Cables	7 meters	Copper

### HPC Clustering

High-Performance Computing (HPC) describes a class of computing that extracts the most performance from the cluster's compute and fabric resources.

The majority of HPC implementations are now commodity x86 server clusters. In turn, Ethernet and InfiniBand are the prevalent commodity fabrics of choice.

Workload examples include: Computational Fluid Dynamics, Computational Chemistry & Material Sciences, Finite Element Analysis, Bio-Informatics, Climate & Weather Simulation, and Reservoir Simulation & Visualization.

iWARP provides a low-latency option for Ethernet. NetEffect Server Cluster adapters deliver an RDMA interface for various Upper Layer Protocols (ULPs) including Intel-MPI, Microsoft-MPI, Open-MPI, MVAPICH2, and uDAPL. For Linux, this is provided through the OpenFabrics Enterprise Distribution (OFED) open-source releases that are adopted from commercial distributors, like Red Hat\*. For Windows\*, Microsoft\* supports the Network Direct interface in Windows HPC Server 2008.

## Financial Market Data Systems

The main performance I/O bottleneck in the financial computing sector is latency. High-Frequency Trading (HFT) is the best example of this – the faster the trade in response to a market trend, the more the financial opportunity. Market data systems that can benefit from low-latency acceleration include: Feed Assemblers & Handlers, Matching Engines, Algo Engines, Smart Order Routers, Trading Gateways, and Risk Engines.

Ethernet is the typical interconnect in the financial industry because the exchange interface is Ethernet. This drives Ethernet as the first choice, but it must have the right low-latency characteristics. iWARP has value in the servers within the Exchange or within the Trading House/Security over a messaging layer, like NYSE's Data Fabric or Red Hat's AMQP. In the datapath between the Exchange and Trading House/Security, TCP and UDP sockets interfaces are used and a kernel-bypass solution, like Voltaire's VMA can be employed to accelerate the UDP multi-cast data.

## Network-Ready Servers

Top PC and server manufacturers offer Intel® adapters in their new products. Specify or ask for Intel® Network Connections with your next PC, server, or mobile PC purchase. For a list of preferred suppliers, visit us at [www.intel.com/buy/networking/adapters.htm](http://www.intel.com/buy/networking/adapters.htm).

## Customer Support

Intel® Customer Support Services offers a broad selection of programs including phone support and warranty service. For more information, contact us at [support.intel.com/support/go/network/adapter/home.htm](http://support.intel.com/support/go/network/adapter/home.htm). Service and availability may vary by country.

### Features

### Benefits

<b>NetEffect NEO20 10GbE Ethernet Controller</b>	▪ Provides a power and performance efficient implementation of iWARP for low-latency Ethernet applications.
<b>Multi-core scalability</b>	▪ Pipelining enables low-latency performance for applications that use all the cores/compute of the server.
<b>Intel Cluster Ready (ICR)</b>	▪ Compliant with the Intel Cluster Ready program to deliver proven and stable iWARP implementations.
<b>Low profile</b>	▪ Small form-factor enables high-performance compute in dense applications.
<b>RoHS Compliant</b>	▪ Complies with the European Union directive 2002/95/EC to reduce the use of hazardous material.
<b>PXE Boot</b>	▪ Network boot support for bare-metal installations, such as HPC cluster provisioning with Intel Cluster Ready.
<b>Intel backing</b>	▪ Backed by Intel's Ltd. lifetime warranty, 90-day money-back guarantee (U.S. & Canada), and worldwide support

## Specifications

### Product Offerings

Product Name & Description	Product Code
NetEffect® Ethernet Server Cluster Adptr SFP+ SR 850 nm Multi-mode Fiber with optical transceiver	E10G81GF2SR
NetEffect® Ethernet Server Cluster Adapter DA Twin-ax copper cables with SFP+ connectors	E10G81G2P
NetEffect® Ethernet Server Cluster Adapter CX4 Twin-ax copper cables with CX4 connectors	E10G81GT2CX4

### Performance

Latency	less than 6 µsec
Bandwidth	over 18 Gbps (bi-directional)

### Layer 2

Checksum offload (TCP, UDP, IP)
Jumbo frame (9 kB)

### iWARP (RDMA over Ethernet)

RDMA v1.0 and IETF specification support
User-level and kernel-level direct access support
Direct payload placement into application memory
Up to 8000 simultaneous accelerated TCP/IP connections

### Memory

ECC protected industry-standard DDR2
256 MB standard on-board

---

## Standards

---

IEEE 802.3-2005: 10GbE, link aggregation, link pause, management

IEEE 802.3ae 10Gb Ethernet over fibre

IEEE 802.3ak CX4

IEEE 802.1p Priority Encoding

IEEE 802.1Q VLAN tagging, support for 4096 VLANs

IPv4 (all connections), IPv6 (unaccelerated connections)

IETF RFCs: 793, 1323, 2581, 3782

---

## Host Interface

---

PCI Express v1.1 (x8)

---

## Management

---

ACPI 2.0c and PCI Power Management 1.2 compliant

PXE boot support

---

## APIs & Middleware

---

Sockets and standard NIC

OpenFabrics\* iWARP Verbs

uDAPL

Intel MPI, Platform Computing-MPI, Open-MPI, MVAPICH2, Microsoft MPI

Voltaire Messaging Accelerator (VMA)

NYSE\*, Datafabric\*

Red Hat\* AMQP

---

---

## Operating Systems

---

Microsoft\* Windows\* HPC Server 2008 (via Network Direct)

Linux\* Novell\* and Red Hat\* (via OFED\*)

---

## Physical & Environmental

---

Operating temperature: 0 to 60 °C

Dimensions	
Length	6.6 in.
Width	2.5 in.
Full-height end bracket:	4.725 in.
Low-profile end bracket:	3.12 in.

---

No fan or heat sink required

---

## Power (typical)

---

NEO20 SFP+ (SR optical module) 11.0 W

NEO20 SFP+ (pluggable/no module) 10.0 W

NEO20 CX4 (and Powered CX4) 8.0 W

---

## Certifications

---

RoHS compliant

PCI Express 1.1 compliant

FCC Class A

---

## Intel Backing

---

Limited lifetime warranty

90-day, money-back guarantee (U.S. and Canada)

---

## For More Product Information

To speak to a customer service representative regarding Intel products, please call 1-800-538-3373 (U.S. and Canada) or visit [support.intel.com/support/go/network/contact.htm](http://support.intel.com/support/go/network/contact.htm) for the telephone number in your area. For additional product information on Intel Networking Connectivity products, visit: [www.intel.com/go/ethernet](http://www.intel.com/go/ethernet).

Note: Lead and other materials banned in RoHS Directive are either (1) below all applicable substance thresholds the EU or (2) an approved/pending exemption applies.

Note: Lead has not been intentionally added, but lead may still exist as an impurity below 1000 ppm, or an approved RoHS exemption applies.

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL® PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER, AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request. Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order. Copies of documents which have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or by visiting Intel's Web Site at <http://www.intel.com/>.


Copyright © 2010 Intel Corporation. All rights reserved.

Intel, the Intel logo, and Xeon are trademarks of Intel Corporation in the U.S. and other countries.

\*Other names and brands may be claimed as the property of others.

Printed in USA

0810/SWU

 Please Recycle

318349-004US

