

## Product Brief

Intel® 10 Gigabit CX4 Dual Port Server Adapter  
Network Connectivity



# Intel® 10 Gigabit CX4 Dual Port Server Adapter

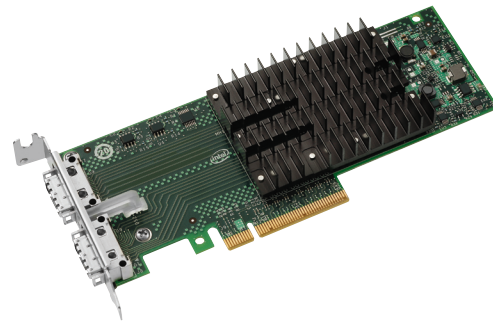
## 10 Gigabit Performance at the Lowest Cost Per Port

Adding to a robust family of 10 Gigabit Ethernet adapters, Intel is now offering the Intel® 10 Gigabit CX4 Dual Port Server Adapter. Following the 802.ak specification, the Intel 10 Gigabit CX4 Dual Port Server Adapter offers the lowest cost per port of all the current 10GbE interconnects. The low-profile PCI Express\* form factor combined with two CX4 ports and a low-power envelope for energy efficiency, makes the board ideal for slot-constrained environments. 10GBASE-CX4 adapters are well-suited for customers with shorter distance and low latency requirements.

## Next-Generation 10 Gigabit Performance

10 Gigabit Ethernet has moved past the early adoption stage and is rapidly becoming mainstay for backbones within enterprise and service provider networks. The escalating deployments of servers with multi-core processors and demanding applications such as High Performance Computing (HPC), database clusters, and video on demand are driving the need for 10 Gigabit connections.

Designed to meet the need of high-speed, low-latency interconnects of HPC clusters, the Intel® 10 Gigabit CX4 Dual Port Server Adapter provides bandwidth-intensive applications with highly affordable 10GbE network performance for distances up to 15 meters with standard twinaxial or up to 100 meters with Intel® Connects cable. Based on the Intel® 82598EB 10 Gigabit Ethernet controller, Intel's next-generation 10 Gigabit CX4 Dual Port Server Adapter is designed to meet the throughput requirements of bandwidth-hungry applications. Intel's new 10GBASE-CX4 adapter can also be used in wiring closets and server racks, as well as data centers to aggregate servers.



## Performance-Enhancing Features Designed for Multi-Core Environments

When implemented within multi-core processor environments, the Intel 10 Gigabit CX4 Dual Port Server Adapter offers advanced networking features for efficient distribution of Ethernet workloads across CPU cores. Load balancing of interrupts using MSI-X enables more efficient response times and improved application performance. CPU utilization can be lowered further through stateless offloads such as TCP segmentation offload, header replications/splitting, and Direct Cache Access (DCA).

## Multiple Queues Optimized for Virtual Environments

The Intel 10 Gigabit CX4 Dual Port Server Adapter is optimized for virtualized environments, supporting multiple queues, alleviating I/O bottlenecks between virtual machines. Virtual Machine Device queue<sup>1</sup> (VMDq) technology offloads data sorting and data copying from the virtual machine monitor (VMM) software layer to the hardware, improving overall throughput and CPU utilization on virtualized servers. Additionally, the Intel 10 Gigabit CX4 Dual Port Server Adapter enables Intel® I/O Acceleration Technology<sup>2</sup> (Intel® I/OAT) with support for Intel® QuickData for faster I/O processing on the new Quad-Core and Dual-Core Intel® Xeon® processor-based servers.

Conserve valuable PCI Express (PCIe\*) server slots while adding 10 Gigabit Ethernet capability with the Intel 10 Gigabit CX4 Dual Port Server Adapter. The dedicated input/output (I/O) bandwidth of PCIe ensures priority performance on each port – without bus sharing – for 10 Gigabit Ethernet connectivity, as well as a low-profile design, which improves server throughput and rack density at the same time. In addition, eight-lane PCIe enables maximum bandwidth for fast and efficient data transfer.

## Advances for Unified Storage

The fast growth in storage capacity coupled with server virtualization has brought the need for Storage Area Network (SAN) to the forefront. To satisfy this growing demand, Intel's 10 Gigabit CX4 Dual Port Server adapters support iSCSI acceleration through

Intel I/OAT and provide advanced features for unified storage connectivity. Fast and reliable networked storage can be achieved via native iSCSI support with Microsoft, Linux\*, and VMware operating systems as well as support for iSCSI remote boot.

### Features

### Benefits

|   |   |
|---|---|
| Intel® 82598EB 10 Gigabit Ethernet Controller                           | <ul style="list-style-type: none"> <li>Industry-leading, energy-efficient design for next-generation 10 Gigabit performance and multi-core processors</li> </ul>  |
| Low profile   | <ul style="list-style-type: none"> <li>Enables higher bandwidth and throughput from standard and low-profile PCIe slots and servers</li> </ul>  |
| Load balancing on multiple CPUs   | <ul style="list-style-type: none"> <li>Increases performance on multi-processor systems by efficiently balancing network loads across CPU cores when used with Receive-Side Scaling from Microsoft or Scalable I/O on Linux*</li> </ul>                   |
| Intel® I/OAT <sup>2</sup>   | <ul style="list-style-type: none"> <li>Accelerates I/O with higher throughput and lower CPU utilization by offloading processing overhead</li> </ul>  |
| iSCSI remote boot support   | <ul style="list-style-type: none"> <li>Provides centralized storage area network (SAN) management at a lower cost than competing iSCSI solutions</li> </ul>   |
| MSI-X support   | <ul style="list-style-type: none"> <li>Minimizes the overhead of interrupts</li> <li>Allows load balancing of interrupt handling between multiple cores/CPU's</li> </ul>  |
| Virtual Machine Device queues (VMDq)                                    | <ul style="list-style-type: none"> <li>Allows the efficient routing of packets to the correct target machine in a virtualized environment using multiple hardware queues</li> <li>Ensures transmit fairness and prevents head-of-line blocking</li> </ul> |
| Low latency   | <ul style="list-style-type: none"> <li>Ability to toggle between the interrupt aggregation and non-aggregation mode based on the type of data being transferred</li> </ul>  |
| Optimized queues: 32 Transmit (Tx) and 64 Receive (Rx) per port         | <ul style="list-style-type: none"> <li>Network packet handling without waiting or buffer overflow</li> <li>Efficient packet prioritization</li> </ul>   |
| Compatible with x8, and x16 standard and low-profile PCI Express* slots | <ul style="list-style-type: none"> <li>Allows each PCI Express* slot port to operate without interfering with the other</li> </ul>  |
| Support for most Network Operating Systems (NOS)                        | <ul style="list-style-type: none"> <li>Enables widespread deployment</li> <li>Supports up to 100m with Intel® Connects Cable</li> </ul>   |
| CX4 connections over 8 pair, 100 Ohm, Twinaxial cabling                 | <ul style="list-style-type: none"> <li>Ensures compatibility with cable lengths up to 15m</li> <li>Supports up to 100m with Intel® Connects Cable</li> </ul>  |
| RoHS-compliant <sup>3</sup>   | <ul style="list-style-type: none"> <li>Compliant with the European Union directive 2002/95/EC to reduce the use of hazardous materials</li> </ul>   |
| Intel® PROSet Utility for Microsoft Windows* Device Manager             | <ul style="list-style-type: none"> <li>Provides point-and-click power over individual adapters, advanced adapter features, connection teaming, and virtual local area network (VLAN) configuration</li> </ul>   |
| Intel backing   | <ul style="list-style-type: none"> <li>Backed by an Intel® limited lifetime warranty, 90-day money-back guarantee (U.S. and Canada), and worldwide support</li> </ul>   |

## Specifications

### General

|              |                                  |
|--------------|----------------------------------|
| Product code | EXPX9502CX4                      |
| Connectors   | CX4                              |
| Cabling      | 8 pair, 100 Ohm, twinaxial cable |

### Adapter Product Features

|  |  |
|--|--|
| Intel® PROSet Utility for easy configuration and management                    | ▪  |
| Plug and play specification support  | Standard   |
| Intel® I/OAT <sup>2</sup> including QuickData                                  | ▪  |
| Ships with full-height bracket installed, low-profile bracket added in package | ▪  |
| Cable Distance   |  |
| 8 pair, 100 Ohm, twinaxial cable   | 15m  |
| Intel® Connects Cable  | 100m   |
| Receive-side scaling   | ▪  |
| VMDq <sup>1</sup>  | In a virtualized environment, packets dedicated to different virtual machines can be routed to different queues, thus easing the routing of these packets to the target machine  |
| Advanced packet filtering (per port)   | <ul style="list-style-type: none"><li>▪ 16 exact-matched packets (unicast or multicast)</li><li>▪ 4096-bit hash filter for multicast frames</li><li>▪ Promiscuous (unicast and multicast) transfer mode support</li><li>▪ Optional filtering of invalid frames</li></ul> |
| Direct Cache Access (DCA)  | The I/O device activates a pre-fetch engine in the CPU that loads the data into the CPU cache ahead of time, before use, eliminating cache misses and reducing CPU load  |

### Network Management

|  |   |
|--|---|
| DMI 2.0 support, Windows Management Instrumentation (WMI) and SNMP | ▪ |
| Remote Installation Services (RIS)                                 | ▪ |
| PXE 2.0 enabled through boot Read-Only Memory (ROM)                | ▪ |

### Network Operating Systems (NOS) Software Support

|  |                |
|--|----------------|
| Windows Vista SP1*                     | IA32, X64      |
| Windows Server* 2003 SP2               | IA32, X64, IPF |
| Windows Unified Storage Solution* 2003 | IA32, X64, IPF |
| Windows Server* 2008                   | IA32, X64, IPF |
| Linux* Stable Kernel version 2.6       | IA32, X64, IPF |
| Linux* RHEL 4 and RHEL 5               | IA32, X64, IPF |
| Linux* SLES 9 and SLES 10              | IA32, X64, IPF |
| FreeBSD* 7.0                           | IA32, X64, IPF |
| EFI* 1.1                               | IA32, X64, IPF |

### Intel Backing

|  |   |
|--|---|
| Limited lifetime warranty                      | ▪ |
| 90-day, money-back guarantee (U.S. and Canada) | ▪ |

### Advanced Software Features

|  |   |
|--|---|
| Adapter Fault Tolerance (AFT)  | ▪   |
| Switch Fault Tolerance (SFT)   | ▪   |
| Adaptive Load Balancing (ALB)  | ▪   |
| Teaming support  | ▪   |
| IEEE 802.3ad <sup>4</sup> (link aggregation control protocol)  | ▪   |
| Test switch configuration  | Tested with major switch original equipment manufacturers (OEMs)          |
| PCIe Hot Plug*/Active Peripheral Component Interconnect (PCI)  | ▪   |
| IEEE 802.1Q* VLANs   | ▪   |
| IEEE 802.3 2005* flow control support  | ▪   |
| Tx/Rx IP, TCP, & UDP checksum offloading (IPv4, IPv6) capabilities (Transmission control protocol (TCP), User Datagram Protocol (UDP), Internet Protocol (IP)) | ▪   |
| IEEE 802.1p*   | ▪   |
| TCP segmentation/large send offload  | ▪   |
| MSI-X supports Multiple Independent Queues   | ▪   |
| Interrupt moderation   | ▪   |
| IPv6 offloading  | Checksum and segmentation capability extended to new standard packet type |

### Technical Features

|                              |   |
|------------------------------|---|
| Data rate supported per port | 10 Gigabit  |
| Bus type                     | PCI Express 2.0 (2.5 GT/s)                        |
| Bus width                    | x8 lane PCI Express, operable in x8 and x16 slots |
| Bus speed (x8, encoded rate) | 20 Gbps uni-directional; 40 Gbps bi-directional   |
| Interrupt levels             | INTA, MSI, MSI-X                                  |
| Hardware certifications      | FCC B, UL, CE, VCCI, BSMI, CTICK, MIC             |
| Controller-processor         | Intel® 82598EB                                    |
| Typical power consumption    | 4.5 W (passive cables), 6.9 W (active cables)     |
| Operating temperature        | 0° C to 55° C (32° F to 131° F)                   |
| Storage temperature          | -40° C to 70° C (-40° F to 158° F)                |
| Storage humidity             | 90% non-condensing relative humidity at 35° C     |
| LED Indicators               | LINK (solid) and ACTIVITY (blinking)              |

### Physical Dimensions

|                       |  |
|-----------------------|--|
| Length                | 16.74 cm (6.59 in)   |
| Width                 | 6.89 cm (2.71 in)  |
| Height of end bracket | PCI Express standard, 12 cm (4.725 in); PCI Express low-profile, 7.92 cm (3.12 in) |

## Order Codes

Single Unit: EXPX9502CX4

## Companion Products

Consider these Intel products in your server and network planning:

- Intel® 10 Gigabit Server Adapters
  - Copper or fiber-optic network connectivity, up to two ports per card
- Intel® PRO/1000 Server Adapters
  - Copper or fiber-optic network connectivity, up to four ports per card
  - Solutions for PCI Express, PCI-X\*, and PCI interfaces
- Intel® PRO/1000 Desktop Adapters for PCI Express and PCI interfaces
- Other Intel® PRO Desktop and Server Adapters
- Intel® Xeon® processors
- Intel® Server Boards

## 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.

## For 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/network/connectivity](http://www.intel.com/network/connectivity).

To see the full line of Intel Network Adapters for PCI Express, visit [www.intel.com/network/connectivity](http://www.intel.com/network/connectivity)

<sup>1</sup> Intel® VMDq requires an operating system that supports VMDq.

<sup>2</sup> Intel® I/O Acceleration Technology (Intel® I/OAT) requires an operating system that supports Intel I/OAT.

<sup>3</sup> Lead and other materials banned in RoHS Directive are either (1) below all applicable substance thresholds the EU or (2) an approved exemption applies.

<sup>4</sup> Available only when used with a capable switch.

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