IBM Flex System EN4132 2-port 10Gb Ethernet Adapter

IBM Redbooks Product Guide

The IBM Flex System™ EN4132 2-port 10Gb Ethernet Adapter delivers high-bandwidth and industry-leading Ethernet connectivity for performance-driven server and storage applications in enterprise data centers, high-performance computing (HPC), and embedded environments. Clustered databases, web infrastructure, and high frequency trading are just a few applications that achieve significant throughput and latency improvements, resulting in faster access, real-time response, and more users per server. Based on Mellanox ConnectX-3 EN technology, this adapter improves network performance by increasing available bandwidth while decreasing the associated transport load on the processor.

The following figure shows the IBM Flex System EN4132 2-port 10Gb Ethernet Adapter.

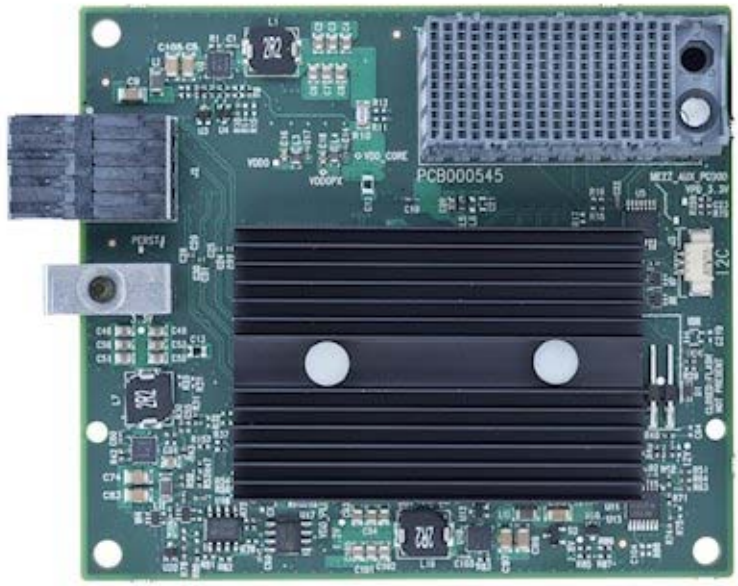

Figure 1. IBM Flex System EN4132 2-port 10Gb Ethernet Adapter

Did you know?

Mellanox networking adapters deliver industry-leading bandwidth with ultra low, sub-microsecond latency for performance-driven server clustering applications. Combined with the IBM Flex System Fabric EN4093 10Gb Scalable Switch, your organization can achieve efficient computing by off-loading the processor protocol processing and data movement overhead, such as RDMA and Send/Receive semantics, allowing more processor power for the application.

Part number information

The following table shows the part number to order this card.

Table 1. Part number and feature code for ordering

Description	Part number	Feature code (x-config)	Feature code (e-config)
IBM Flex System EN4132 2-port 10Gb Ethernet Adapter	90Y3466	A1QY	EC2D

The part number includes the following items:

- One IBM Flex System EN4132 2-port 10Gb Ethernet Adapter
- A documentation CD containing the adapter user's guide
- The *IBM Important Notices* document

Target uses

- Financial institutions using high frequency trading or data exchange applications that require low latency fabrics. This adapter delivers low latency Sockets and RDMA solutions for the ultimate in application performance.
- Web 2.0 and cloud service providers that need high bandwidth and processor off-loads to get the highest productivity from their data centers.
- Data centers deploying virtualized servers with high demands on the I/O infrastructure. With support for 10 and up to 127 virtual machines, this adapter can satisfy the bandwidth demands of a virtualized environment.

Features

The IBM Flex System EN4132 2-port 10Gb Ethernet Adapter has the following features:

- RDMA over Converged Ethernet

  ConnectX-3 uses IBTA RoCE technology to provide efficient RDMA services, delivering low-latency and high-performance to bandwidth and latency sensitive applications. With link-level interoperability in existing Ethernet infrastructure, network administrators can use existing data center fabric management solutions.
- Sockets acceleration

  Applications using TCP/UDP/IP transport can achieve industry-leading throughput over 10 GbE. The hardware-based stateless off-load and flow steering engines in ConnectX-3 reduce the processor overhead of IP packet transport, freeing more processor cycles to work on the application. Sockets acceleration software further increases performance for latency sensitive applications.
- I/O virtualization

  ConnectX-3 EN provides dedicated adapter resources and guaranteed isolation and protection for virtual machines within the server. ConnectX-3 EN gives data center managers better server utilization and LAN and SAN unification while reducing costs, power, and complexity.

- Precision data centers

  ConnectX-3 EN IEEE 1588 precision time protocol circuitry synchronizes the host clock to the data center master clock for accurate data delivery time stamping and data center SLA measurements. The hardware-based mechanisms ensure high accuracy and low jitter.

- Storage acceleration

  A consolidated compute and storage network achieves significant cost-performance advantages over multifabric networks. Standard block and file access protocols can use RDMA for high-performance storage access.

- Quality of Service

  Resource allocation per application or per VM is provided and protected by the advanced QoS supported by ConnectX-3 EN. Service levels for multiple traffic types can be based on IETF DiffServ or IEEE 802.1p/Q, allowing system administrators to prioritize traffic by application, virtual machine, or protocol. This powerful combination of QoS and prioritization provides fine-grained control of traffic, ensuring that applications run smoothly.

Specifications

The IBM Flex System EN4132 2-port 10Gb Ethernet Adapter has the following specifications:

- Based on Mellanox Connect-X3 technology
- Virtual Protocol Interconnect (VPI)
- PCI Express 3.0 (1.1 and 2.0 compatible) through an x8 edge connector up to 8 GT/s
- CORE-Direct application off-load
- GPUDirect application off-load
- RDMA over Converged Ethernet (RoCE)
- End-to-end QoS and congestion control
- Ethernet encapsulation (EoIB)
- Wake on LAN (WoL) support
- RoHS-6 compliant
- Power consumption: Typical: 9 W, maximum 11 W

Ethernet specifications

- IEEE 802.3ae 10 Gigabit Ethernet
- IEEE 802.3ba 40 Gigabit Ethernet
- IEEE 802.3ad Link Aggregation and Failover
- IEEE 802.3az Energy Efficient Ethernet
- IEEE 802.1Q, .1p VLAN tags and priority
- IEEE 802.1Qau Congestion Notification
- IEEE P802.1Qbb D1.0 Priority-based Flow Control
- IEEE 1588 Precision Clock Synchronization
- Jumbo frame support (10 KB)
- 128 MAC/VLAN addresses per port

Hardware-based I/O virtualization

- Single Root IOV –Address translation and protection
- Dedicated adapter resources
- Multiple queues per virtual machine
- Enhanced QoS for vNICs
- VMware NetQueue support

Additional processor off-loads

- RDMA over Converged Ethernet
- TCP/UDP/IP stateless off-load
- Intelligent interrupt coalescence

FlexBoot Technology

- Flexible multiprotocol remote boot technology
- Remote boot over Ethernet
- Remote boot over iSCSI

Supported servers

The following table lists the IBM Flex System compute nodes that support the EN4132 2-port 10Gb Ethernet Adapter.

Table 2. Supported servers

Description	Part number	x220	x240	x440	p24L	p260	p460
IBM Flex System EN4132 2-port 10Gb Ethernet Adapter	90Y3466	Yes	Yes	Yes	No	No	No

See IBM ServerProven® at the following web address for the latest information about the expansion cards that are supported by each blade server type:
http://ibm.com/servers/eserver/serverproven/compat/us/

I/O adapter cards are installed in the slot in supported servers, such as the x240, as highlighted in the following figure.

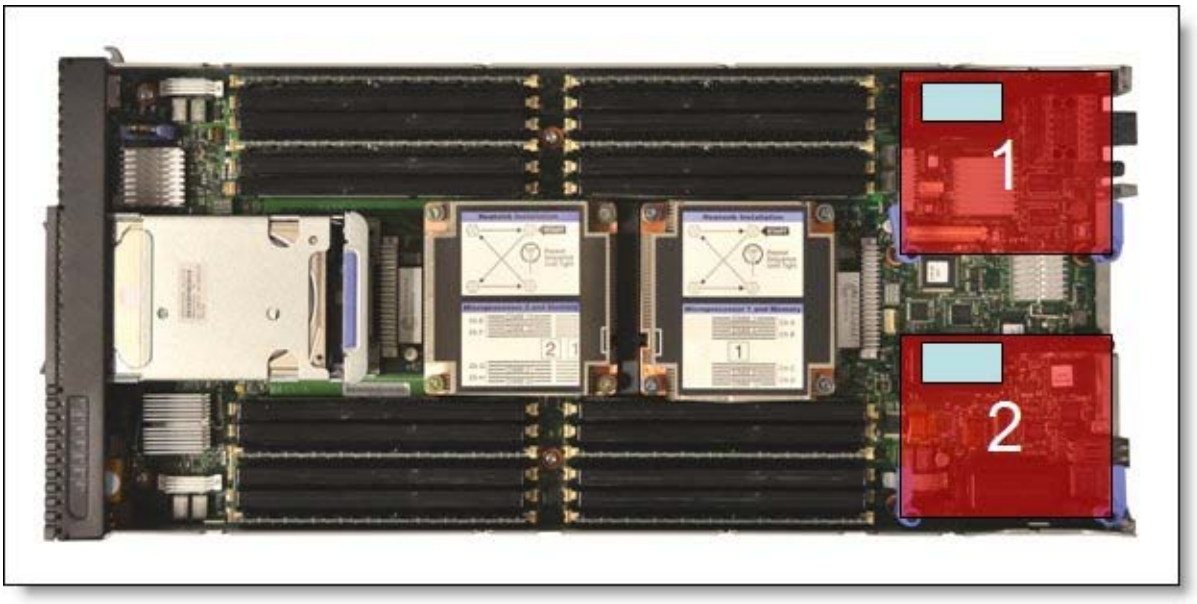

Figure 2. Location of the I/O adapter slots in the IBM Flex System x240 Compute Node

Supported I/O modules

The EN4132 2-port 10Gb Ethernet Adapter supports the I/O modules listed in the following table. One or two compatible switches must be installed in the corresponding I/O bays in the chassis. Installing two switches means that both ports of the adapter are enabled.

Table 3. I/O modules supported with the EN4132 2-port 10Gb Ethernet Adapter

Description	Part number	Supports the EN4132 adapter
IBM Flex System Fabric CN4093 10Gb Converged Scalable Switch	00D5823	No
IBM Flex System Fabric EN4093R 10Gb Scalable Switch	95Y3309	Yes
IBM Flex System Fabric EN4093 10Gb Scalable Switch	49Y4270	Yes
IBM Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043	Yes
IBM Flex System EN2092 1Gb Ethernet Scalable Switch	49Y4294	No

The following table shows the connections between adapters installed in the compute nodes to the switch bays in the chassis.

Table 4. Adapter to I/O bay correspondence

I/O adapter slot in the server	Port on the adapter	Corresponding I/O module bay in the chassis
Slot 1	Port 1	Module bay 1
	Port 2	Module bay 2
Slot 2	Port 1	Module bay 3
	Port 2	Module bay 4

The connections between the adapters installed in the compute nodes to the switch bays in the chassis are shown in the following figure.

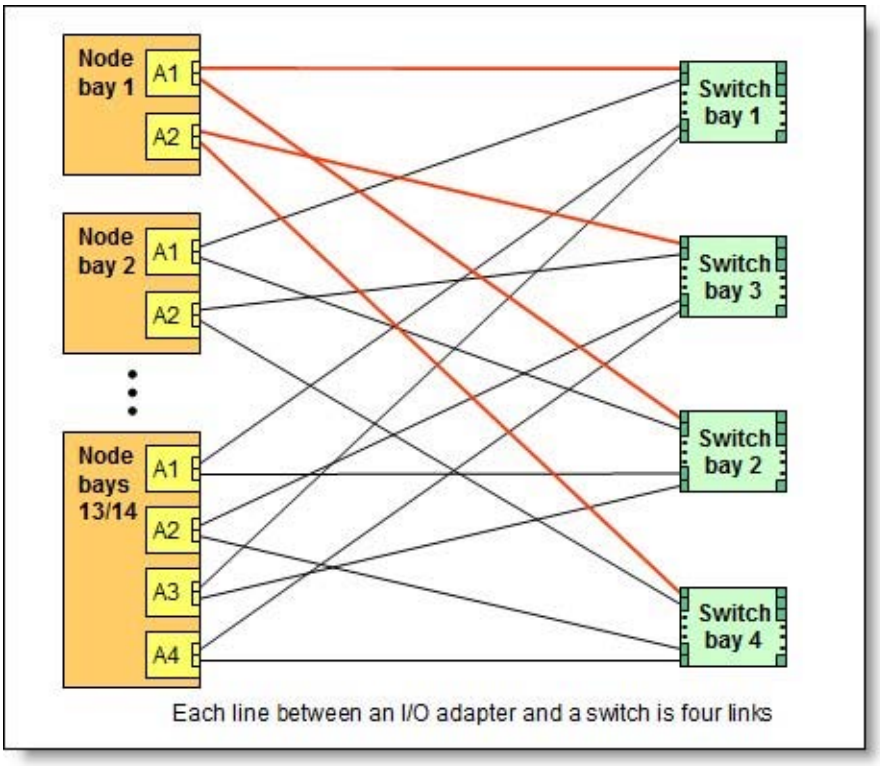

Figure 3. Logical layout of the interconnects between I/O adapters and I/O modules

Supported operating systems

The EN4132 2-port 10Gb Ethernet Adapter supports the following 64-bit operating systems:

- Microsoft Windows Server 2008 HPC Edition
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 4.1
- VMware ESXi 4.1
- VMware vSphere 5
- VMware vSphere 5.1

Regulatory compliance

The adapter conforms to the following standards:

- United States FCC 47 CFR Part 15, Subpart B, ANSI C63.4 (2003), Class A
- United States UL 60950-1, Second Edition
- IEC/EN 60950-1, Second Edition
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1-03
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- IEC 60950-1(CB Certificate and CB Test Report)
- Taiwan BSMI CNS13438, Class A
- Korea KN22, Class A; KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22-99, GOST R 51318.24-99, GOST R 51317.3.2-2006, GOST R 51317.3.3-99
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A

Physical specifications

The dimensions and weight of the adapter are as follows:

- Width: 100 mm (3.9 in.)
- Depth: 80 mm (3.1 in.)
- Weight: 13 g (0.3 lb)

Shipping dimensions and weight (approximate):

- Height: 58 mm (2.3 in.)
- Width: 229 mm (9.0 in.)
- Depth: 208 mm (8.2 in.)
- Weight: 0.4 kg (0.89 lb)

Popular configurations

The EN4132 2-port 10Gb Ethernet Adapter is designed to be used with the IBM Flex System Fabric EN4093 10Gb Scalable Switch. The following figure shows one EN4132 adapter installed in slot 2 an x240 Compute Node, which in turn is installed in the chassis. Two IBM Flex System Fabric EN4093 10Gb Scalable Switches are installed in I/O bays 3 and 4.

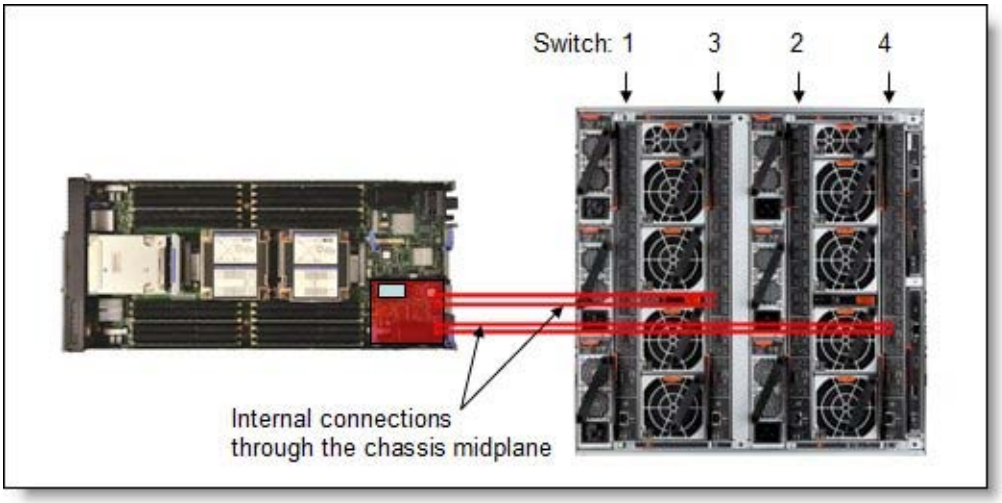

Figure 4. Example configuration

The following table lists the parts that are used in the configuration.

Table 5. Components used when connecting the EN4132 2-port 10Gb Ethernet Adapter to EN4093 10Gb Scalable Switches

Part number/machine type	Description	Quantity
8737	IBM Flex System x240 Compute Node	1 to 14
90Y3454	EN4132 2-port 10Gb Ethernet Adapter	1 per server
8721-A1x	IBM Flex System Enterprise Chassis	1
49Y4270	IBM Flex System Fabric EN4093 10Gb Scalable Switch	1 or 2

Related publications

For more information, see the following resources:

- *IBM Flex System Fabric EN4093 10Gb Scalable Switch Product Guide*
  http://www.redbooks.ibm.com/abstracts/tips0864.html
- IBM Flex System EN4091 10Gb Ethernet Pass-thru Product Guide
  http://www.redbooks.ibm.com/abstracts/tips0865.html
- *IBM Flex System x240 Compute Node Product Guide*
  http://www.redbooks.ibm.com/abstracts/tips0860.html
- *EN4132 2-port 10Gb Ethernet Adapter Installation and User Guide*
  http://www.ibm.com/support
- *IBM Flex System Interoperability Guide*
  http://www.ibm.com/support
- *IBM Flex System Products and Technology*, SG24-7984
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