

## Flex System EN2024 4-port 1Gb Ethernet Adapter Product Guide (withdrawn product)

The Flex System™ EN2024 4-port 1Gb Ethernet Adapter is a quad-port Gigabit Ethernet network adapter. When it is combined with the Flex System EN2092 1Gb Ethernet Scalable Switch, clients can leverage an end-to-end 1 Gb solution on the Flex System Enterprise Chassis. The EN2024 adapter is based on the Broadcom 5718 controller and offers a PCIe 2.0 x1 host interface with MSI/MSI-X. It also supports I/O virtualization features like VMware NetQueue and Microsoft VMQ technologies.

Figure 1 shows the adapter.



Figure 1. Flex System EN2024 4-port 1Gb Ethernet Adapter

### Did you know?

This EN2024 is based on the industry-standard PCIe architecture and is ideal for customers using Gigabit Ethernet in their network infrastructure. The Flex System compute nodes support up to two of these adapters for a total of eight NICs per system.

## Part number information

The following table lists the ordering information.

**Withdrawn:** This adapter is now withdrawn from marketing.

Table 1. Ordering part number and feature code

Description	Part number	Feature code
Flex System EN2024 4-port 1Gb Ethernet Adapter	49Y7900	A10Y

The EN2024 4-port 1Gb Ethernet Adapter part number includes the following items:

- One adapter
- Documentation package

## Features

The Flex System EN2024 4-port 1Gb Ethernet Adapter has these features:

- Dual Broadcom BCM5718 ASICs
- Quad-port Gigabit 1000BASE-X interface
- Two PCI Express 2.0 x1 host interfaces, one per ASIC
- Full-duplex (FDX) capability, enabling simultaneous transmission and reception of data on the Ethernet network
- MSI and MSI-X capabilities, up to 17 MSI-X vectors
- I/O virtualization support for VMware NetQueue, and Microsoft VMQ
- Seventeen receive queues and 16 transmit queues
- Seventeen MSI-X vectors supporting per-queue interrupt to host
- Function Level Reset (FLR)
- ECC error detection and correction on internal SRAM
- TCP, IP, and UDP checksum offload
- Large Send offload, TCP segmentation offload
- Receive-side scaling
- Virtual LANs (VLANs): IEEE 802.1q VLAN tagging
- Jumbo frames (9 KB)
- IEEE 802.3x flow control
- Statistic gathering (SNMP MIB II, Ethernet-like MIB [IEEE 802.3x, Clause 30])
- Comprehensive diagnostic and configuration software suite
- ACPI 1.1a-compliant: multiple power modes
- Wake-on-LAN (WOL) support
- Preboot Execution Environment (PXE) support
- RoHS-compliant

## Supported servers

The following table lists the Flex System compute nodes that support the adapters.

Table 2. Supported servers

Description	Part number	x220 (7906)	x222 (7916)	x240 (8737, E5-2600)	x240 (8737, E5-2600 v2)	x240 (7162)	x240 M5 (9532)	x440 (7917)	x440 (7167)	x280 / x480 / x880 X6 (7903)	x280 / x480 / x880 X6 (7196)
Flex System EN2024 4-port 1Gb Ethernet Adapter	49Y7900	Y	N	Y	Y	Y	Y	Y	Y	Y*	Y*

\* Only supported in slots 1 and 2 of the x280 X6, x480 X6, and x880 X6

See 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.

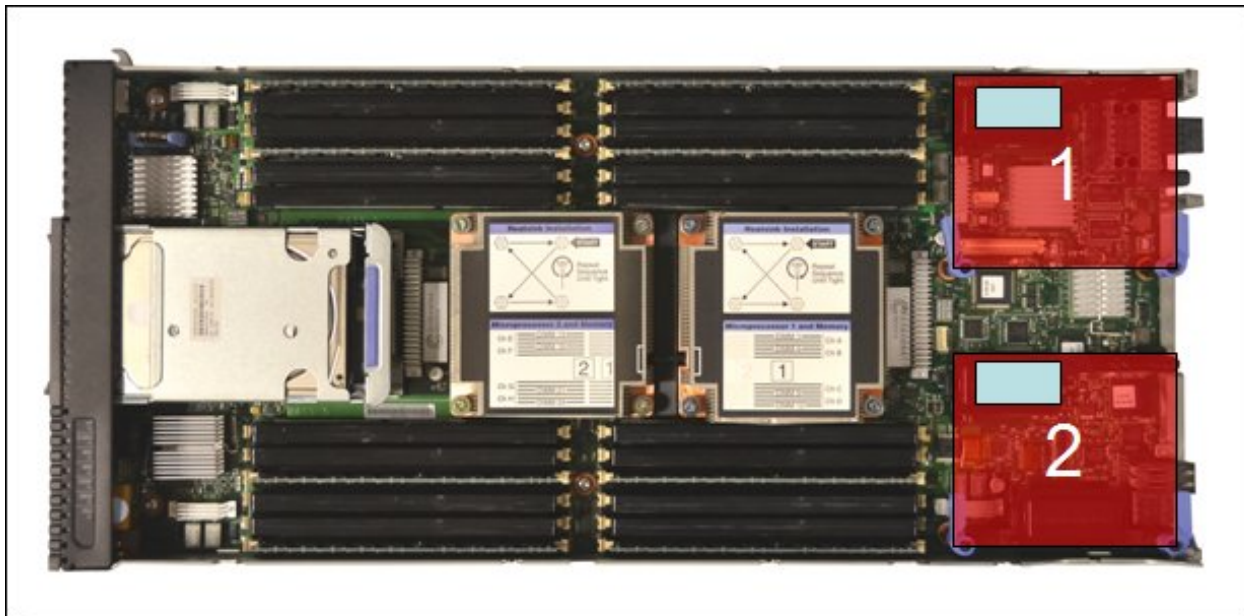


Figure 2. Location of the I/O adapter slots in the Flex System x240 Compute Node

## Supported I/O modules

These adapter can be installed in any I/O adapter slot of a supported Flex System compute node. One or two compatible 1 Gb or 10 Gb I/O modules must be installed in the corresponding I/O bays in the chassis. The following table lists the switches that are supported. When connected to the 10Gb switch or pass-thru module, the internal switch ports will operate at 1Gb speeds.

To maximize the number of adapter ports usable, you may also need to order switch upgrades to enable additional ports as listed in the table. Alternatively, for CN4093, EN4093R, and SI4093 switches, you can use Flexible Port Mapping, a new feature of Networking OS 7.8, that allows you to minimize the number of upgrades needed. See the Product Guides for the switches for more details:  
<http://lenovopress.com/flexsystem/iomodules>

The table also specifies how many ports of the adapter are supported once the indicated upgrades are applied. Switches should be installed in pairs to maximize the number of ports enabled and to provide redundant network connections.

Table 3. I/O modules and upgrades for use with the EN2024 4-port 1Gb Ethernet Adapter

Description	Part number	Port count (per pair of switches)*
<b>1 Gb switches</b>		
Flex System EN2092 1Gb Ethernet Scalable Switch + EN2092 1Gb Ethernet Scalable Switch (Upgrade 1)	49Y4294 90Y3562	4
<b>10 Gb switches</b>		
Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch + EN4093 10Gb Scalable Switch (Upgrade 1)	00FM514 49Y4798	4
Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch + CN4093 10Gb Converged Scalable Switch (Upgrade 1)	00FM510 49Y4798	4
Lenovo Flex System SI4091 10Gb System Interconnect Module	00FE327	2
Lenovo Flex System Fabric SI4093 System Interconnect Module + SI4093 System Interconnect Module (Upgrade 1)	00FM518 95Y3318	4
Flex System Fabric CN4093 10Gb Converged Scalable Switch + CN4093 10Gb Converged Scalable Switch (Upgrade 1)	00D5823 49Y4798	4
Flex System Fabric EN4093R 10Gb Scalable Switch + EN4093 10Gb Scalable Switch (Upgrade 1)	95Y3309 49Y4798	4
Flex System Fabric EN4093 10Gb Scalable Switch + EN4093 10Gb Scalable Switch (Upgrade 1)	49Y4270 49Y4798	4
Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043	2
Flex System Fabric SI4093 System Interconnect Module + SI4093 System Interconnect Module (Upgrade 1)	95Y3313 95Y3318	4
Flex System EN4023 10Gb Scalable Switch + Flex System EN4023 10Gb Scalable Switch (Upgrade 1) or Flex System EN4023 10Gb Scalable Switch (Upgrade 2)	94Y5212 94Y5158 94Y5159	4
Cisco Nexus B22 Fabric Extender for Flex System	94Y5350	2

\* This column indicates the number of adapter ports that will be active if indicated upgrades are installed.

The adapter does not support the following I/O modules:

- Flex System EN6131 40Gb Ethernet Switch

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
	Port 3*	Module bay 1
	Port 4*	Module bay 2
Slot 2	Port 1	Module bay 3
	Port 2	Module bay 4
	Port 3*	Module bay 3
	Port 4*	Module bay 4
Slot 3 (full-wide compute nodes only)	Port 1	Module bay 1
	Port 2	Module bay 2
	Port 3*	Module bay 1
	Port 4*	Module bay 2
Slot 4 (full-wide compute nodes only)	Port 1	Module bay 3
	Port 2	Module bay 4
	Port 3*	Module bay 3
	Port 4*	Module bay 4

\* Ports 3 and 4 require Upgrade 1 of either the EN2092 1Gb or EN4093 10Gb switch. The EN4091 Pass-thru only supports ports 1 and 2 (and only when two I/O modules are installed).

The connections between the adapters installed in the compute nodes to the switch bays in the chassis are shown diagrammatically in the following figure. The figure shows both half-wide servers, such as the x240 with two adapters, and full-wide servers, such as the x440 with four adapters.

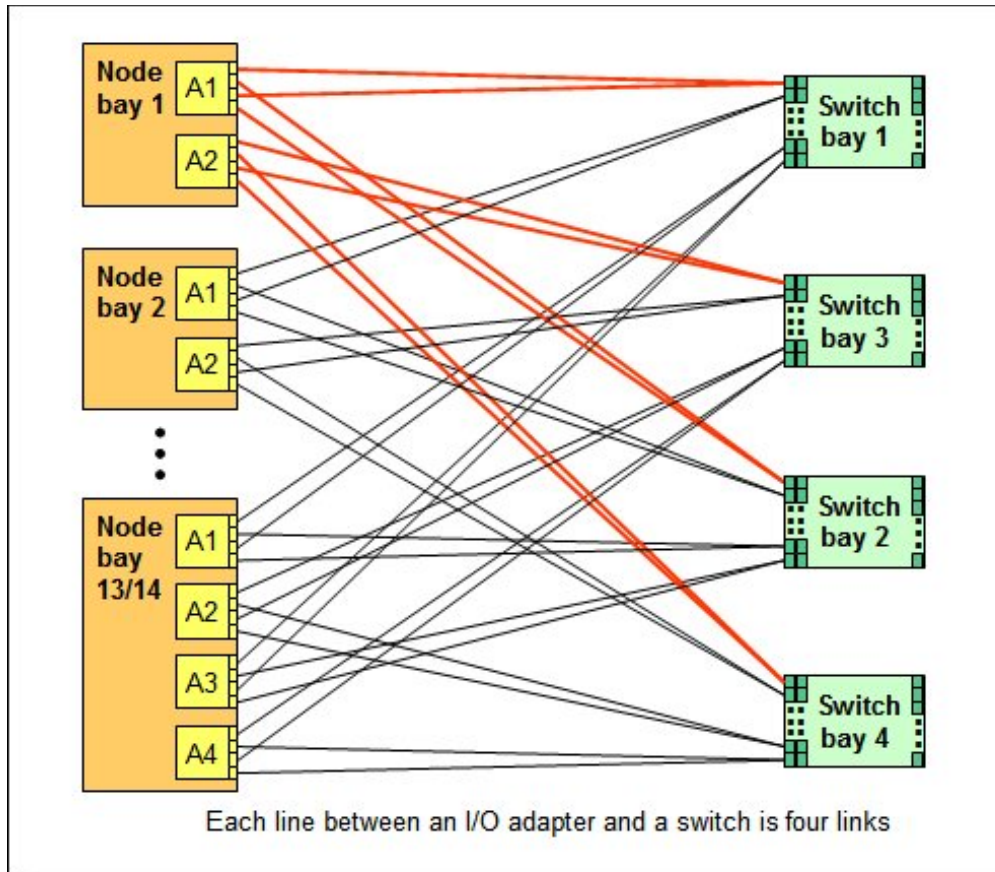


Figure 3. Logical layout of the interconnects between I/O adapters and I/O modules

## Operating system support

The Flex System EN2024 4-port 1Gb Ethernet Adapter supports the following operating systems.

- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server 2019
- Microsoft Windows Server version 1709
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 12
- SUSE Linux Enterprise Server 15
- SUSE Linux Enterprise Server 15 with Xen
- VMware vSphere 5.1 (ESXi)
- VMware vSphere Hypervisor (ESXi) 5.5
- VMware vSphere Hypervisor (ESXi) 6.0
- VMware vSphere Hypervisor (ESXi) 6.5
- VMware vSphere Hypervisor (ESXi) 6.7

Support for operating systems is based on the combination of the expansion card and the blade server on which it is installed. See the ServerProven website for the latest information about the specific versions and service packs supported. Select the blade server, and then select the expansion card to see the supported operating systems: <http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/>

## Warranty

There is a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a server, these adapters assume your system's base warranty and any IBM ServicePac® upgrade.

## Physical specifications

The dimensions and weight of the adapter are as follows:

- Width: 100 mm (3.9 inches)
- Depth: 80 mm (3.1 inches)
- 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)

## 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



## Popular configurations

The adapters can be used in various configurations. The following figure shows EN2024 4-port 1Gb Ethernet Adapters installed in both slots of the x240 (a model without the Embedded 10Gb Virtual Fabric Adapter), which in turn is installed in the chassis. The chassis also has four Flex System EN2092 1Gb Ethernet Scalable Switches, each with Upgrade 1 installed to enable 28 internal ports.

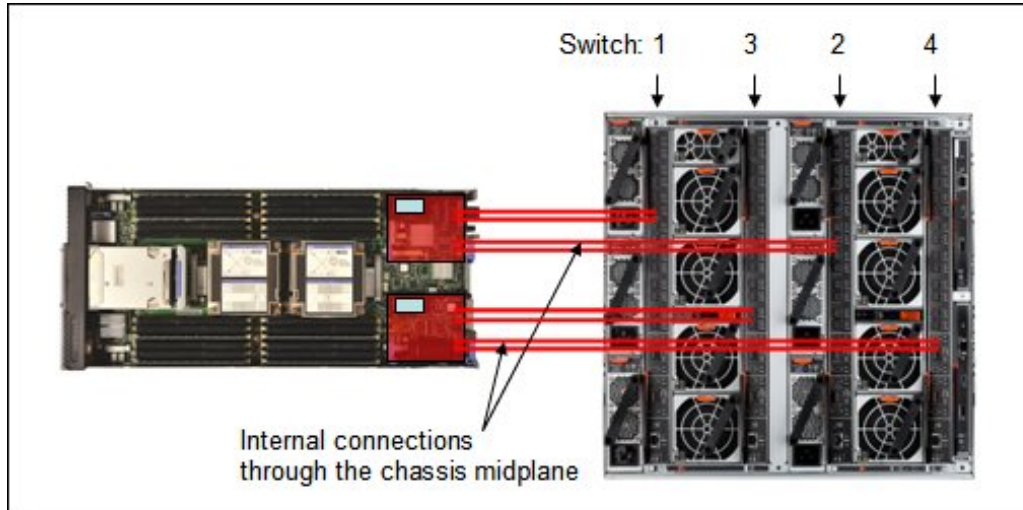


Figure 4. Example configuration

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

Table 5. Components used when connecting the adapter to the 10 GbE switches

Part number	Description	Quantity
8737-x1x	Flex System x240 Compute Node (without Embedded 10Gb Virtual Fabric Adapter) or other supported server	1 to 14
90Y3554	Flex System EN2024 4-port 1Gb Ethernet Adapter	2 per server
8721-A1x	Flex System Enterprise Chassis	1
49Y4294	Flex System EN2092 1Gb Ethernet Scalable Switch	4
90Y3562	Flex System EN2092 1Gb Ethernet Scalable Switch (Upgrade 1)	4



## Related publications

For more information refer to the following resources:

- Product Guides for all Flex System switches:  
<http://lenovopress.com/flexsystem/iomodules>
- Product Guides for Flex System compute nodes:  
<http://lenovopress.com/flexsystem/nodes>
- Flex System Information Center (User's Guides for servers and options)  
<http://publib.boulder.ibm.com/infocenter/flexsys/information>
- *Flex System Interoperability Guide*  
<http://lenovopress.com/fsig>
- *Flex System Products and Technology for x86 Systems* , SG24-8255  
<http://lenovopress.com/sg248255>
- Product Guides for Flex System servers and options  
<http://lenovopress.com/flexsystem>
- System x and Cluster Solutions configurator (x-config)  
<http://ibm.com/products/hardware/configurator/americas/bhui/asit/>
- System x Configuration and Options Guide:  
<http://ibm.com/systems/xbc/cog/>
- ServerProven for Flex System  
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/flexsystems.html>

## Related product families

Product families related to this document are the following:

- [1 Gb Embedded Connectivity](#)
- [Blade Network Adapters](#)

## Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.  
8001 Development Drive  
Morrisville, NC 27560  
U.S.A.  
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2022. All rights reserved.

This document, TIPS0845, was created or updated on November 26, 2018.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:  
<https://lenovopress.com/TIPS0845>
- Send your comments in an e-mail to:  
[comments@lenovopress.com](mailto:comments@lenovopress.com)

This document is available online at <https://lenovopress.com/TIPS0845>.

## Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

Flex System

ServerProven®

System x®

The following terms are trademarks of other companies:

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

Microsoft®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.